

1 All of the text-related items on the “list of known errors” in the 2003 edition were incorporated. They are
2 considered editorial unless otherwise noted.

3
4 Cross references to chapters, sections, figures, and tables have been updated as necessary to maintain
5 accuracy. Paragraph numbering has been added and paragraph cross references have been added.

6
7 The number or letter designations for items in listings within paragraphs have been updated as necessary to
8 maintain an accurate sequence.

9
10 The word “centerline” in the 2003 MUTCD was replaced by the phrase “center line” in order to be consistent
11 with “edge line.”

12
13 The words “left” and “right” in the 2003 MUTCD text were replaced by “left-hand” and “right-hand” to add
14 clarity because of the double meaning of these words (i.e., is the “right lane” the “correct lane” or the “lane
15 closest to the right-hand side of the roadway”?).

16
17 The title of the “Standard Highway Signs and Markings” book was revised to reflect the updated name of the
18 book.

19
20 Metric dimensions have been deleted from the text. Metric conversion tables are provided in Appendix A2.

21
22 Guidance paragraphs have been italicized.

23
24 The Manual on Uniform Traffic Control Devices (MUTCD) is approved by the Federal Highway
25 Administrator as the National Standard in accordance with Title 23 U.S. Code, Sections 109(d), 114(a), 217,
26 315, and 402(a), 23 CFR 655, and 49 CFR 1.48(b)(8), 1.48(b)(33), and 1.48(c)(2).

27
28 Addresses for Publications Referenced in the MUTCD

29
30 [American Automobile Association \(AAA\)](#)
31 [1000 AAA Drive](#)
32 [Heathrow, FL 32746](#)
33 [www.aaa.com](#)
34 [800-222-4357](#)
35

36 American Association of State Highway and Transportation Officials (AASHTO)
37 444 North Capitol Street, NW, Suite 249
38 Washington, DC 20001
39 [www.transportation.org](#)
40 [202-624-5800](#)
41

42 [American National Standards Institute \(ANSI\)](#)
43 [1819 L Street, NW, 6th Floor](#)
44 [Washington, DC 20036](#)
45 [www.ansi.org](#)
46 [202-293-8020](#)
47

48 American Railway Engineering and Maintenance-of-Way Association (AREMA)
49 ~~8201 Corporate Drive~~ [10003 Derekwod Lane](#), Suite ~~1125~~ [210](#)
50 ~~Landover~~ [Lanham](#), MD ~~20785-2230~~ [20706](#)
51 [www.arema.org](#)
52 [301-459-3200](#)
53

54 Federal Highway Administration Report Center
55 Facsimile number: ~~301-577-1421~~ [814-239-2156](#)
56 [report.center@fhwa.dot.gov](#)
57

1 Illuminating Engineering Society (IES)
2 120 Wall Street, Floor 17
3 New York, NY 10005
4 www.iesna.org
5 [212-248-5000](tel:212-248-5000)
6
7 Institute of Makers of Explosives
8 1120 19th Street, NW, Suite 310
9 Washington, DC 20036-3605
10 www.ime.org
11 [202-429-9280](tel:202-429-9280)
12
13 Institute of Transportation Engineers (ITE)
14 1099 14th Street, NW, Suite 300 West
15 Washington, DC 20005-3438
16 www.ite.org
17 [202-289-0222](tel:202-289-0222)
18
19 International Organization for ~~Standards~~ [Standardization](#)
20 ~~e/o Mr. Gerard Kuse 1, ch. de la Voie-Creuse~~
21 ~~Austrian Standards Institute~~ [Case Postale 56](#)
22 ~~Heinestrabe 38~~ [CH-1211](#)
23 ~~Postfach 130~~ [Geneva 20, Switzerland](#)
24 ~~A-1021~~
25 ~~Wien, Austria~~
26 www.iso.ch
27 [011-41-22-749-0111](tel:011-41-22-749-0111)
28
29 ~~ISEA—The~~ [International](#) Safety Equipment Association ([ISEA](#))
30 1901 North Moore Street, Suite 808
31 Arlington, VA 22209
32 www.safetysafetyequipment.org
33 [703-525-1695](tel:703-525-1695)
34
35 National Committee on Uniform Traffic Laws and Ordinances (NCUTLO)
36 107 South West Street, Suite 110
37 Alexandria, VA 22314
38 www.ncutlo.org
39 [800-807-5290](tel:800-807-5290)
40
41 [National Electrical Manufacturers Association \(NEMA\)](#)
42 [1300 North 17th Street, Suite 1752](#)
43 [Rosslyn, VA 22209](#)
44 www.nema.org
45 [703-841-3200](tel:703-841-3200)
46
47 Occupational Safety and Health Administration (OSHA)
48 U.S. Department of Labor
49 200 Constitution Avenue, NW
50 Washington, DC 20210
51 www.osha.gov
52 [800-321-6742](tel:800-321-6742)
53
54 Transportation Research Board (TRB)
55 The National Academies
56 ~~2101 Constitution Avenue~~ [500 Fifth Street](#), NW
57 Washington, DC ~~20418~~ [20001](#)

1 www.nas.edu/trb

2 [202-334-3072](tel:202-334-3072)

3

4 U.S. Architectural and Transportation Barriers Compliance Board (The U.S. Access Board)

5 1331 F Street, NW, Suite 1000

6 Washington, DC 20004-1111

7 www.access-board.gov

8 [202-272-0080](tel:202-272-0080)

9

10 Acknowledgments

11

12 The Federal Highway Administration gratefully acknowledges the valuable assistance that it received from the
13 National Committee on Uniform Traffic Control Devices and its ~~over 200~~ [more than 250](#) voluntary members
14 in the development of this Manual.

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES

INTRODUCTION

Standard:

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

The Manual on Uniform Traffic Control Devices (MUTCD) is incorporated by reference in 23 Code of Federal Regulations (CFR), Part 655, Subpart F and shall be recognized as the national standard for all traffic control devices installed on any street, highway, ~~or bicycle trail~~ bikeway, or private road open to public travel (see definition in Section 1A.13) in accordance with 23 U.S.C. 109(d) and 402(a). The policies and procedures of the Federal Highway Administration (FHWA) to obtain basic uniformity of traffic control devices shall be as described in 23 CFR 655, Subpart F.

In accordance with 23 CFR 655.603(a), for the purposes of applicability of the MUTCD:

A. Toll roads under the jurisdiction of public agencies or authorities or public-private partnerships shall be considered to be public highways;

B. Private roads open to public travel shall be as defined in Section 1A.13; and

C. Parking areas, including the driving aisles within those parking areas, that are either publicly or privately owned shall not be considered to be “open to public travel” for purposes of MUTCD applicability.

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

Support:

Pictographs, as defined in Section 1A.13, are embedded in traffic control devices but the pictographs themselves are not considered traffic control devices for the purposes of Paragraph 4.

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

Standard:

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

Support:

~~23 CFR 655.603 adopts the MUTCD as the national standard for any street, highway, or bicycle trail open to public travel in accordance with 23 U.S.C. 109(d) and 402(a).~~ The “Uniform Vehicle Code (UVC)” is one of the publications referenced in the MUTCD. The UVC contains a model set of motor vehicle codes and traffic laws for use throughout the United States.

Guidance:

1 The States ~~are encouraged to~~ should adopt Section 15-116 of the UVC, which states that, “No person shall
2 install or maintain in any area of private property used by the public any sign, signal, marking, or other device
3 intended to regulate, warn, or guide traffic unless it conforms with the State manual and specifications
4 adopted under Section 15-104.”

5 Support:

6 The Standard, Guidance, Option, and Support material described in this edition of the MUTCD provide
7 the transportation professional with the information needed to make appropriate decisions regarding the use of
8 traffic control devices on streets, ~~and~~ highways, bikeways, and private roads open to public travel (see
9 definition in Section 1A.13). ~~The material in this edition is organized to better differentiate between~~
10 ~~Standards that must be satisfied for the particular circumstances of a situation, Guidances that should be~~
11 ~~followed for the particular circumstances of a situation, and Options that may be applicable for the particular~~
12 ~~circumstances of a situation.~~

13 Throughout this Manual the headings Standard, Guidance, Option, and Support are used to classify the
14 nature of the text that follows. Figures, and tables, ~~and illustrations~~ including the notes contained therein,
15 supplement the text and might constitute a Standard, Guidance, Option, or Support. The user needs to refer to
16 the appropriate text to classify the nature of the figure, table, or ~~illustration~~ note contained therein.

17 **Standard:**

18 When used in this Manual, the text headings of Standard, Guidance, Option, and Support shall be
19 as defined as follows: in Paragraph 1 of Section 1A.13.

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

35 **Support:**

36 Throughout this Manual all dimensions and distances are provided in ~~the International System of Units, a~~
37 ~~modernized version of the Metric system, and their English equivalent units are shown in parentheses~~ English
38 units. Appendix A2 contains tables for converting each of the English unit numerical values that are used in
39 this Manual to the equivalent Metric (International System of Units) values.

40 **Guidance:**

41 ~~Before~~ If Metric units are to be used in laying out distances or determining ~~sign~~ sign sizes of devices, ~~the~~
42 ~~public agency should decide whether to use the International System of Units (Metric) or the English~~
43 ~~equivalent units. The chosen~~ such units should be specified on plan drawings: and ~~The chosen unit of~~
44 ~~measurement should be~~ made known to those responsible for designing, installing, or maintaining traffic
45 control devices.

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

50 **Support:**

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

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

6 Each Section is comprised of one or more paragraphs. The paragraphs are indented ~~but~~ and are ~~not~~
7 identified by a number ~~or letter~~. Paragraphs are counted from the beginning of each Section without regard to
8 the intervening text headings (Standard, Guidance, Option, or Support). Some paragraphs have lettered or
9 numbered items. As an example of how to cite this Manual, the phrase “Not less than 40 feet beyond the stop
10 line” that appears in Section 4D.14 of this Manual would be referenced in writing as “Section 4D.14, P1,
11 A.1,” and would be verbally referenced as “Item A.1 of Paragraph 1 of Section 4D.14.”

12 Standard:

13 In accordance with 23 CFR 655.603(b)(~~4~~)(3), States or other Federal agencies that have their own
14 MUTCDs or Supplements shall revise these MUTCDs or Supplements to be in substantial conformance
15 with changes to the National MUTCD within 2 years of ~~issuance of the effective date of the Final Rule~~
16 for the changes. Substantial conformance of such State or other Federal agency MUTCDs or
17 Supplements shall be as defined in 23 CFR 655.603(b)(1).

18 After the effective date of a new edition of the MUTCD or a revision thereto, or after the adoption
19 thereof by the State, whichever occurs later, new or reconstructed devices installed shall be in
20 compliance with the new edition or revision.

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

25 Unless a particular device is no longer serviceable, non-compliant devices on existing highways and
26 bikeways shall be brought into compliance with the current edition of the National MUTCD as part of
27 the systematic upgrading of substandard traffic control devices (and installation of new required traffic
28 control devices) required pursuant to the Highway Safety Program, 23 U.S.C. §402(a). The FHWA has
29 the authority to establish other target compliance dates for implementation of particular changes to the
30 MUTCD [23 CFR 655.603(d)(~~4~~)(1)]. These target compliance dates established by the FHWA shall be
31 as ~~follows:~~ shown in Table I-2. The target compliance dates that were listed in the 2003 MUTCD have been
32 incorporated into a new Table I-2 to make the information easier to access.

33 Except as provided in Paragraph 24, when a non-compliant traffic control device is being replaced
34 or refurbished because it is damaged, missing, or no longer serviceable for any reason, it shall be
35 replaced with a compliant device.

36 Option:

37 ~~In order for maintenance personnel to understand what to do when replacing~~ A damaged, missing, or
38 otherwise non-serviceable device that is non-compliant ~~traffic control device, agencies may be establish a~~
39 ~~policy regarding whether to replaced~~ the device in kind ~~or to replace it with a compliant device.~~

40 Support:

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

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

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CHAPTER 1A. GENERAL

Section 1A.01 Purpose of Traffic Control Devices

Support:

The purpose of traffic control devices, as well as the principles for their use, is to promote highway safety and efficiency by providing for the orderly movement of all road users on streets, ~~and~~ highways, [bikeways](#), and [private roads open to public travel](#) throughout the Nation.

Traffic control devices notify road users of regulations and provide warning and guidance needed for the ~~reasonably safe~~, uniform, and efficient operation of all elements of the traffic stream [in a manner intended to minimize the occurrences of crashes](#).

Standard:

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

Support:

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

Section 1A.02 Principles of Traffic Control Devices

Support:

This Manual contains the basic principles that govern the design and use of traffic control devices for all streets, ~~and~~ highways, [bikeways](#), and [private roads](#) open to public travel ([see definition in Section 1A.13](#)) regardless of type or class or the public agency, [official](#), or [owner](#) having jurisdiction. This Manual's text specifies the restriction on the use of a device if it is intended for limited application or for a specific system. It is important that these principles be given primary consideration in the selection and application of each device.

Guidance:

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

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

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

Support:

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

Guidance:

The actions required of road users to obey regulatory devices should be specified by State statute, or in cases not covered by State statute, by local ordinance or resolution. [Such statutes, ordinances, and resolutions should be](#) consistent with the "Uniform Vehicle Code" ([see Section 1A.11](#)).

The proper use of traffic control devices should provide the reasonable and prudent road user with the information necessary to ~~reasonably safely~~ [efficiently](#) and lawfully use the streets, highways, pedestrian facilities, and bikeways.

Support:

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

Section 1A.03 Design of Traffic Control Devices

Guidance:

1 Devices should be designed so that features such as size, shape, color, composition, lighting or
2 retroreflection, and contrast are combined to draw attention to the devices; that size, shape, color, and
3 simplicity of message combine to produce a clear meaning; that legibility and size combine with placement to
4 permit adequate time for response; and that uniformity, size, legibility, and reasonableness of the message
5 combine to command respect.

6 **Standard:**

7 ~~All symbols shall be unmistakably similar to or mirror images of the adopted symbol signs, all of~~
8 ~~which are shown in the “Standard Highway Signs” book (see Section 1A.11). Symbols and colors shall~~
9 ~~not be modified unless otherwise stated herein. All symbols and colors for signs not shown in the~~
10 ~~“Standard Highway Signs” book shall follow the procedures for experimentation and change described~~
11 ~~in Section 1A.10.~~ this paragraph was relocated to Section 2A.06

12 **Guidance:**

13 Aspects of a device’s [standard](#) design should be modified only if there is a demonstrated need.

14 **Support:**

15 An example of modifying a device’s design would be to modify the [Side Road \(W2-2\) Combination](#)
16 [Horizontal Alignment/Intersection \(W1-10\)](#) sign to show ~~a second offset~~ intersecting [side roads on both sides](#)
17 [rather than on just one side of the major road within the curve.](#)

18 **Option:**

19 ~~Highway agencies may develop word message signs to notify road users of special regulations or to warn~~
20 ~~road users of a situation that might not be readily apparent. Unlike symbol signs and colors, new word~~
21 ~~message signs may be used without the need for experimentation.~~ this text was relocated to Section 2A.06

22 With the exception of symbols and colors, minor modifications in the specific design elements of a device
23 may be made provided the essential appearance characteristics are preserved. ~~Although the standard design of~~
24 ~~symbol signs cannot be modified, it may be appropriate to change the orientation of the symbol to better~~
25 ~~reflect the direction of travel.~~ this text was relocated to Section 2A.06

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

27 **Guidance:**

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

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

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

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

37 **Guidance:**

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

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

42 **Support:**

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

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

45 **Support:**

46 Uniformity of devices simplifies the task of the road user because it aids in recognition and understanding,
47 thereby reducing perception/reaction time. Uniformity assists road users, law enforcement officers, and traffic
48 courts by giving everyone the same interpretation. Uniformity assists public highway officials through
49 efficiency in manufacture, installation, maintenance, and administration. Uniformity means treating similar
50 situations in a similar way. The use of uniform traffic control devices does not, in itself, constitute uniformity.

1 A standard device used where it is not appropriate is as objectionable as a non-standard device; in fact, this
2 might be worse, because such misuse might result in disrespect at those locations where the device is needed
3 and appropriate.

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

5 **Standard:**

6 The responsibility for the design, placement, operation, maintenance, and uniformity of traffic
7 control devices shall rest with the public agency or the official having jurisdiction, or, in the case of
8 private roads open to public travel, with the private owner or private official having jurisdiction. 23
9 CFR 655.603 adopts the ~~Manual on Uniform Traffic Control Devices~~ MUTCD as the national standard
10 for all traffic control devices installed on any street, highway, ~~or bicycle trail~~ bikeway, or private road
11 open to public travel (see definition in Section 1A.13). When a State or other Federal agency manual or
12 supplement is required, that manual or supplement shall be in substantial conformance with the
13 ~~n~~National ~~Manual on Uniform Traffic Control Devices~~ MUTCD.

14 23 CFR 655.603 also states that traffic control devices on all streets, ~~and~~ highways, bikeways, and
15 private roads open to public travel in each State shall be in substantial conformance with standards
16 issued or endorsed by the Federal Highway Administrator.

17 **Support:**

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

20 The “Uniform Vehicle Code” (see Section 1A.11) has the following provision in Section 15-104 for the
21 adoption of a uniform ~~M~~manual:

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

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

28 All States have officially adopted the National MUTCD either in its entirety, with supplemental
29 provisions, or as a separate published document.

30 **Guidance:**

31 These individual State manuals or supplements should be reviewed for specific provisions relating to that
32 State.

33 **Support:**

34 The National MUTCD has also been adopted by the National Park Service, the U.S. Forest Service, the
35 U.S. Military Command, the Bureau of Indian Affairs, the Bureau of Land Management, and the U.S. Fish
36 and Wildlife Service.

37 **Guidance:**

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

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

43 **Standard:**

44 Traffic control devices, advertisements, announcements, and other signs or messages within the
45 highway right-of-way shall be placed only as authorized by a public authority or the official having
46 jurisdiction, or, in the case of private roads open to public travel, by the private owner or private
47 official having jurisdiction, for the purpose of regulating, warning, or guiding traffic.

48 When the public agency or the official having jurisdiction over a street or highway or, in the case of
49 private roads open to public travel, the private owner or private official having jurisdiction, has
50 granted proper authority, others such as contractors and public utility companies shall be permitted to

1 **install temporary traffic control devices in temporary traffic control zones. Such traffic control devices**
2 **shall conform with the Standards of this Manual.**

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

4 Support:

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

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

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

18 A. Devices whose purpose is to assist highway maintenance personnel. Examples include markers to
19 guide snowplow operators, devices that identify culvert and drop inlet locations, and devices that
20 precisely identify highway locations for maintenance or mowing purposes.

21 B. Devices whose purpose is to assist fire or law enforcement personnel. Examples include markers that
22 identify fire hydrant locations, signs that identify fire or water district boundaries, speed measurement
23 pavement markings, small indicator lights to assist in enforcement of red light violations, and photo
24 enforcement systems.

25 C. Devices whose purpose is to assist utility company personnel and highway contractors, such as
26 markers that identify underground utility locations.

27 D. Signs posting local non-traffic ordinances.

28 E. Signs giving civic organization meeting information.

29 **Standard:**

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

33 Guidance:

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

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

38 **Support:**

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

40 **Standard:**

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

43 Guidance:

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

48 ~~Engineering judgment should be exercised in the selection and application of traffic control devices, as~~
49 ~~well as~~ Early in the processes of ~~in the~~ location and design of ~~the~~ roads and streets, engineers should
50 coordinate such location and design with the design and placement of ~~that~~ the traffic control devices
51 ~~complement~~ to be used with such roads and streets.

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

5 Support:

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

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

11 **Standard:**

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

14 Support:

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

20 **Standard:**

21 Except as provided in Paragraph 4, requests for any interpretation, permission to experiment,
22 interim approval, or change shall be ~~sent~~ submitted electronically to the Federal Highway
23 Administration (FHWA), Office of Transportation Operations, ~~400 Seventh Street, SW, HOTO,~~
24 ~~Washington, DC 20590~~ MUTCD team, at the following e-mail address:
25 MUTCDofficialrequest@dot.gov.

26 Option:

27 If electronic submittal is not possible, requests for interpretations, permission to experiment, interim
28 approvals, or changes may instead be mailed to the Office of Transportation Operations, HOTO-1, Federal
29 Highway Administration, 1200 New Jersey Avenue, SE, Washington, DC 20590.

30 Support:

31 Communications regarding other MUTCD matters that are not related to official requests will receive
32 quicker attention if they are submitted electronically to the MUTCD Team Leader or to the appropriate
33 individual MUTCD team member. Their e-mail addresses are available through the links contained on the
34 "Who's Who" page on the MUTCD website at <http://mutcd.fhwa.dot.gov/team.htm>.

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

37 Guidance:

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

- 39 A. A concise statement of the interpretation being sought;
- 40 B. A description of the condition that provoked the need for an interpretation;
- 41 C. Any illustration that would be helpful to understand the request; and
- 42 D. Any supporting research data that is pertinent to the item to be interpreted.

43 Support:

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

47 A request for permission to experiment will be considered only when submitted by the public agency or
48 ~~private~~ toll facility operator responsible for the operation of the road or street on which the experiment is to
49 take place. For a private road open to public travel, the request will be considered only if it is submitted by
50 the private owner or private official having jurisdiction.

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

1 Guidance:

2 The request for permission to experiment should contain the following:

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

40 Support:

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

44 Guidance:

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

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

49 Support:

50 ~~Requests for~~ Interim approval ~~include consideration of allowing~~ allows interim use, pending official
51 rulemaking, of a new traffic control device, a revision to the application or manner of use of an existing traffic
52 control device, or a provision not specifically described in this Manual. The FHWA issues an Interim
53 Approval by official memorandum signed by the Associate Administrator for Operations and posts this
54 memorandum on the MUTCD website. ~~If granted,~~ The issuance by FHWA of an interim approval will
55 typically result in the traffic control device or application being placed into the next scheduled rulemaking

1 process for revisions to this Manual. ~~The device or application will be permitted to remain in place, under any~~
2 ~~conditions established in the interim approval, until an official rulemaking action has occurred.~~

3 Interim approval is considered based on the results of successful experimentation, results of analytical or
4 laboratory studies, and/or review of non-U.S. experience with a traffic control device or application. Interim
5 approval considerations include an assessment of relative risks, benefits, ~~and~~ costs, impacts, and other factors.

6 Interim approval allows for optional use of a traffic control device or application and does not create a
7 new mandate or recommendation for use. Interim approval includes conditions that jurisdictions agree to
8 comply with in order to use the traffic control device or application until an official rulemaking action has
9 occurred.

10 Standard:

11 A jurisdiction, toll facility operator, or owner of a private road open to public travel that desires to
12 use a traffic control device for which FHWA has issued an interim approval shall request permission
13 from FHWA.

14 Guidance:

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

17 ~~A. A statement indicating the nature of the problem.~~

18 ~~B. A description of the proposed change to the traffic control device or application of the traffic control~~
19 ~~device, how it was developed, the manner in which it deviates from the standard, and how it is~~
20 ~~expected to be an improvement over existing standards.~~

21 A. The location(s) A description of where it the device will be used, ~~and any illustration that would be~~
22 ~~helpful to understand the traffic control device or use of the traffic control device.~~ such as a list of
23 specific locations or highway segments or types of situations, or a statement of the intent to use the
24 device jurisdiction-wide;

25 ~~D. A legally binding statement certifying that the concept of the traffic control device is not protected by~~
26 ~~a patent or copyright. (An example of a traffic control device concept would be countdown pedestrian~~
27 ~~signals in general. Ordinarily an entire general concept would not be patented or copyrighted, but if it~~
28 ~~were it would not be acceptable for interim approval unless the patent or copyright owner signs a~~
29 ~~waiver of rights acceptable to the FHWA. An example of a patented or copyrighted specific device~~
30 ~~within the general concept of countdown pedestrian signals would be a manufacturer's design for its~~
31 ~~specific brand of countdown signal, including the design details of the housing or electronics that are~~
32 ~~unique to that manufacturer's product. Interim approval of a specific patented or copyrighted product~~
33 ~~is not acceptable.)~~

34 ~~E. A detailed completed research or evaluation on this traffic control device.~~

35 B. An agreement to abide by the specific conditions for use of the device as contained in the FHWA's
36 interim approval document;

37 C. An agreement to maintain and continually update a list of locations where the device has been
38 installed; and

39 D. An agreement to:

- 40 1. Restore the site(s) of the interim approval to a condition that complies with the provisions in this
41 Manual within 3 months following the issuance of a Final Rule on this traffic control device; and
- 42 2. This agreement must also provide that the agency sponsoring the interim approval will Terminate
43 use of the device or application installed under the interim approval at any time that it determines
44 significant safety concerns are directly or indirectly attributable to the device or application. The
45 FHWA's Office of Transportation Operations has the right to terminate the interim approval at
46 any time if there is an indication of safety concerns.

47 Option:

48 A State may submit a request for the use of a device under interim approval for all jurisdictions in that
49 State, as long as the request contains the information listed in ~~the Guidance above~~ Paragraph 18.

50 ~~Standard~~ Guidance:

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

1 A local jurisdiction, [toll facility operator, or owner of a private road open to public travel](#) using a traffic
2 control device or application under an interim approval that was granted [by FHWA](#) either directly ~~to that~~
3 ~~jurisdiction~~ or on a statewide basis based on the State's request ~~shall~~ [should](#) inform the State of the locations
4 of such use.

5 [A local jurisdiction, toll facility operator, or owner of a private road open to public travel that is](#)
6 [requesting permission to experiment or permission to use a device or application under an interim approval](#)
7 [should first check for any State laws and/or directives covering the application of the MUTCD provisions that](#)
8 [might exist in their State.](#)

9 [Option:](#)

10 [A device or application installed under an interim approval may remain in place, under the conditions](#)
11 [established in the interim approval, until an official rulemaking action has occurred.](#)

12 Support:

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

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

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

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

20 **Standard:**

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

25 Support:

26 The “Standard Highway Signs [and Markings](#)” book includes standard alphabets and symbols [and arrows](#)
27 for ~~highway~~ signs and pavement markings.

28 For information about the ~~above~~ publications [mentioned in Paragraph 1](#), visit the Federal Highway
29 Administration's MUTCD website at <http://mutcd.fhwa.dot.gov>, or write to the FHWA, ~~400 Seventh Street,~~
30 ~~SW, 1200 New Jersey Avenue, SE,~~ HOTO, Washington, DC 20590.

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

34 ~~The publication entitled “Maintaining Traffic Sign Retroreflectivity” (2007 Edition) is available at~~
35 ~~www.fhwa.dot.gov/retro, or write to the FHWA, 1200 New Jersey Avenue, SE, HSA-1, Washington, DC~~
36 ~~20590.~~

37 Other publications that are useful sources of information with respect to the use of this Manual are listed
38 ~~below in this paragraph~~. See Page i of this Manual for ordering information for the following publications
39 ([later editions might also be available as useful sources of information](#)):

- 40 [1. “AAA School Safety Patrol Operations Manual,” 2006 Edition \(American Automobile Association—](#)
41 [AAA\)](#)
- 42 [2. “A Policy on Geometric Design of Highways and Streets,” 2001 2004 Edition \(American Association](#)
43 [of State Highway and Transportation Officials—AASHTO\)](#)
- 44 [3. “Guide for the Development of Bicycle Facilities,” 1999 Edition \(AASHTO\)](#)
- 45 [4. “Guide for the Planning, Design, and Operation of Pedestrian Facilities,” 2004 Edition \(AASHTO\)](#)
- 46 [5. “Guide to Metric Conversion,” 1993 Edition \(AASHTO\)](#)
- 47 [6. “Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to](#)
48 [Freeways,” 4th Edition/Guide Signs, Part II: Guidelines for Airport Guide Signing/Guide Signs, Part](#)
49 [III: List of Control Cities for Use in Guide Signs on Interstate Highways,” \[Item Code: GSGLC-4,\]\(#\)](#)
50 [2001 Edition \(AASHTO\) \[combination of Items 4 and 5 in the 2003 MUTCD\]\(#\)](#)
- 51 [7. “Roadside Design Guide,” 2004 6 Edition \(AASHTO\)](#)
- 52 [8. “Standard Specifications for Movable Highway Bridges,” 1988 Edition \(AASHTO\)](#)

- 1 9. "Traffic Engineering Metric Conversion Folders—Addendum to the Guide to Metric Conversion,"
- 2 1993 Edition (AASHTO)
- 3 10. "2009 AREMA Communications & Signals Manual," (American Railway Engineering &
- 4 Maintenance-of-Way Association—(AREMA)
- 5 11. ["Changeable Message Sign Operation and Messaging Handbook \(FHWA-OP-03-070\)," 2004 Edition](#)
- 6 [\(Federal Highway Administration—FHWA\)](#)
- 7 12. "Designing Sidewalks and Trails for Access—Part 2—Best Practices Design Guide ([FHWA-EP-01-](#)
- 8 [027](#))," 2001 Edition (FHWA) ~~(Publication No. FHWA-EP-01-027)~~
- 9 13. ["Federal-Aid Highway Program Guidance on High Occupancy Vehicle \(HOV\) Lanes," 2001](#)
- 10 [\(FHWA\)](#)
- 11 14. ["Maintaining Traffic Sign Retroreflectivity," 2007 Edition \(FHWA\)](#)
- 12 15. ["Railroad-Highway Grade Crossing Handbook—Revised Second Edition \(FHWA-SA-07-010\),"](#)
- 13 [2007 Edition \(FHWA\)](#)
- 14 16. ["Ramp Management and Control Handbook \(FHWA-HOP-06-001\)," 2006 Edition \(FHWA\)](#)
- 15 17. ["Roundabouts-An Informational Guide \(FHWA-RD-00-067\)," 2000 Edition \(FHWA\)](#)
- 16 18. ["Signal Timing Manual \(FHWA-HOP-08-024\)," 2008 Edition \(FHWA\)](#)
- 17 19. ["Signalized Intersections: an Informational Guide \(FHWA-HRT-04-091\)," 2004 Edition \(FHWA\)](#)
- 18 20. ["Travel Better, Travel Longer: A Pocket Guide to Improving Traffic Control and Mobility for Our](#)
- 19 [Older Population \(FHWA-OP-03-098\)," 2003 Edition \(FHWA\)](#)
- 20 21. "Practice for Roadway Lighting," RP-8, 2001, (Illuminating Engineering Society—(IES)
- 21 22. "Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Commercial
- 22 Electric Detonators (Blasting Caps)," Safety Library Publication No. 20, [July 2001 Edition](#) (Institute
- 23 of Makers of Explosives)
- 24 23. ["American National Standard for High-Visibility Public Safety Vests," \(ANSI/ISEA 207-2006\), 2006](#)
- 25 [Edition \(International Safety Equipment Association—ISEA\)](#)
- 26 24. "American National Standard for High-Visibility Safety Apparel [and Headwear](#)," (ANSI/ISEA ~~107-~~
- 27 ~~1999~~ [107-2004](#)), ~~1999~~ [2004](#) Edition, (ISEA) ~~The Safety Equipment Association~~
- 28 25. "Manual of Traffic Signal Design," 1998 Edition (Institute of Transportation Engineers—ITE)
- 29 26. "Manual of Transportation Engineering Studies," 1994 Edition (ITE)
- 30 27. "Pedestrian Traffic Control Signal Indications," [Part 1—1985 Edition; Part 2 \(LED Pedestrian Traffic](#)
- 31 [Signal Modules\)—2004 Edition](#) (ITE)
- 32 28. "Preemption of Traffic Signals ~~at or~~ Near Railroad ~~Grade~~ Crossings ~~with Active Warning Devices~~,"
- 33 [2006 Edition](#) (ITE)
- 34 29. "Purchase Specification for Flashing and Steady Burn Warning Lights," 1981 Edition (ITE)
- 35 ~~19. "School Trip Safety Program Guidelines," 1984 Edition (ITE)~~
- 36 30. "Traffic Control Devices Handbook," 2001 Edition (ITE)
- 37 31. "Traffic Detector Handbook," 1991 Edition (ITE)
- 38 32. "Traffic Engineering Handbook," ~~1999~~ [2009](#) Edition (ITE)
- 39 33. "Traffic Signal Lamps," 1980 Edition (ITE)
- 40 34. "Vehicle Traffic Control Signal Heads," Part 1—1985 Edition; Part 2 ([LED Circular Signal](#)
- 41 [Supplement\)—1998](#) [2005](#) Edition; Part 3 ([LED Vehicular Arrow Traffic Signal Supplement\)—2004](#)
- 42 [Edition](#) (ITE)
- 43 35. "Uniform Vehicle Code (UVC) and Model Traffic Ordinance," 2000 Edition (National Committee on
- 44 Uniform Traffic Laws and Ordinances—[NCUTLO](#))
- 45 36. ["NEMA Standards Publication TS 4-2005 Hardware Standards for Dynamic Message Signs \(DMS\)](#)
- 46 [With NTCIP Requirements," 2005 Edition \(National Electrical Manufacturers Association—NEMA\)](#)
- 47 37. "Occupational Safety and Health Administration Regulations (Standards - 29 CFR), General Safety
- 48 and Health Provisions - 1926.20," amended June 30, 1993, (Occupational Safety and Health
- 49 Administration—(OSHA)
- 50 38. ["Accessible Pedestrian Signals—A Guide to Best Practices \(NCHRP Web-Only Document 117A\),"](#)
- 51 [2008 Edition \(Transportation Research Board—TRB\)](#)
- 52 39. ["Guidelines for Accessible Pedestrian Signals \(NCHRP Web-Only Document 117B\)," 2008 Edition](#)
- 53 [\(TRB\)](#)
- 54 40. "Highway Capacity Manual," 2000 Edition (~~Transportation Research Board—~~TRB)
- 55 41. "Recommended Procedures for the Safety Performance Evaluation of Highway Features," (NCHRP
- 56 Report 350), 1993 Edition (~~Transportation Research Board—~~TRB)

- 1 ~~29. “Accessible Pedestrian Signals,” A-37, 1998 Edition, U.S. Architectural and Transportation Barriers~~
2 ~~Compliance Board (The U.S. Access Board)~~
3 ~~30. “Building a True Community—Final Report—Public Rights of Way Access Advisory Committee~~
4 ~~(PRWAAC),” 2001 Edition (The U.S. Access Board)~~
5 42. “The Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities
6 (ADAAG),” July 1998 Edition (The U.S. Access Board)
7 ~~32. “Highway-Rail Intersection Architecture,” U.S. Department of Transportation, Federal Railroad~~
8 ~~Administration (USDOT/FRA)~~

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

10 Support:

11 The following color code establishes general meanings for ~~10~~ 11 colors of a total of 13 colors that have
12 been identified as being appropriate for use in conveying traffic control information. ~~Central values and~~
13 Tolerance limits for each color are contained in 23 CFR Part 655, Appendix to Subpart F and are available
14 from at the Federal Highway Administration’s 400 Seventh Street, SW, HOTO, Washington, DC 20590, and
15 at FHWA’s MUTCD website at <http://mutcd.fhwa.dot.gov> or by writing to the FHWA, Office of Safety
16 Research and Development (HRD-T-301), 6300 Georgetown Pike, McLean, VA 22101.

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

21 **Standard:**

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

- 23 A. Black—regulation
24 B. Blue—road user services guidance, tourist information, and evacuation route
25 C. Brown—recreational and cultural interest area guidance
26 D. Coral—unassigned
27 E. Fluorescent Pink—incident management
28 F. Fluorescent Yellow-Green—pedestrian warning, bicycle warning, playground warning, school
29 bus and school warning
30 G. Green—indicated movements permitted, direction guidance
31 H. Light Blue—unassigned
32 I. Orange—temporary traffic control
33 J. Purple—~~unassigned~~ lanes restricted to use only by vehicles with registered electronic toll
34 collection (ETC) accounts
35 K. Red—stop or prohibition
36 L. White—regulation
37 M. Yellow—warning

38 **Section 1A.13 Definitions of Headings, Words, and Phrases in this Manual**

39 **Standard:**

40 When used in this Manual, the text headings of Standard, Guidance, Option, and Support shall be
41 defined as follows: these definitions were relocated from the Introduction

- 42 A. **Standard**—a statement of required, mandatory, or specifically prohibitive practice regarding a
43 traffic control device. All Standard statements are labeled, and the text appears in bold type.
44 The verb “shall” is typically used. The verbs “should” and “may” are not used in Standard
45 statements. Standard statements are sometimes modified by Options. Standard statements
46 shall not be modified or compromised based on engineering judgment or engineering study.
47 B. **Guidance**—a statement of recommended, but not mandatory, practice in typical situations, with
48 deviations allowed if engineering judgment or engineering study indicates the deviation to be
49 appropriate. All Guidance statements are labeled, and the text appears in unbold type. The
50 verb “should” is typically used. The verbs “shall” and “may” are not used in Guidance
51 statements. Guidance statements are sometimes modified by Options.
52 C. **Option**—a statement of practice that is a permissive condition and carries no requirement or
53 recommendation. Option statements ~~may~~ sometime contain allowable modifications to a

1 Standard or Guidance statement. All Option statements are labeled, and the text appears in
2 unbold type. The verb “may” is typically used. The verbs “shall” and “should” are not used in
3 Option statements.

- 4 D. Support—an informational statement that does not convey any degree of mandate,
5 recommendation, authorization, prohibition, or enforceable condition. Support statements are
6 labeled, and the text appears in unbold type. The verbs “shall,” “should,” and “may” are not
7 used in Support statements.

8 Unless otherwise defined herein in this Section, or in ~~the~~ other Parts of this Manual, ~~definitions-~~
9 ~~contained~~ words or phrases shall have the meaning(s) as defined in the most recent editions of the
10 “Uniform Vehicle Code,” “AASHTO Transportation Glossary (Highway Definitions),” and other
11 publications ~~specified mentioned~~ in Section 1A.11 ~~are also incorporated and adopted by reference.~~

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

- 13 1. Accessible Pedestrian Signal—a device that communicates information about pedestrian signal
14 timing in non-visual format such as audible tones, ~~verbal~~ speech messages, and/or vibrating
15 surfaces. relocated from Section 4A.02
- 16 2. Accessible Pedestrian Signal Detector—a device designated to assist the pedestrian who has
17 visual or physical disabilities in activating the pedestrian phase.
- 18 3. Active Grade Crossing Warning System—the flashing-light signals, with or without warning
19 gates, together with the necessary control equipment used to inform road users of the approach
20 or presence of ~~trains~~ rail traffic at ~~highway-rail or highway-light rail transit~~ grade crossings.
- 21 4. Actuated Operation—a type of traffic control signal operation in which some or all signal
22 phases are operated on the basis of actuation. relocated from Section 4A.02
- 23 5. Actuation—initiation of a change in or extension of a traffic signal phase through the operation
24 of any type of detector. relocated from Section 4A.02
- 25 6. Advance Preemption—the notification of ~~an~~ approaching ~~train~~ rail traffic that is forwarded to
26 the highway traffic signal controller unit or assembly by the railroad or light rail transit
27 equipment in advance of the activation of the railroad or light rail transit warning devices.
28 relocated from Section 8A.01
- 29 7. Advance Preemption Time—the period of time that is the difference between the required
30 maximum highway traffic signal preemption time and the activation of the railroad or light rail
31 transit warning devices. relocated from Section 8A.01
- 32 8. Advisory Speed—a recommended speed for all vehicles operating on a section of highway and
33 based on the highway design, operating characteristics, and conditions. relocated from definition
34 of “Speed”
- 35 9. Alley—a street or highway intended to provide access to the rear or side of lots or buildings in
36 urban areas and not intended for the purpose of through vehicular traffic.
- 37 10. Altered Speed Zone—a speed limit, other than a statutory speed limit, that is based upon an
38 engineering study.
- 39 11. Approach—all lanes of traffic moving toward an intersection or a midblock location from one
40 direction, including any adjacent parking lane(s).
- 41 12. Arterial Highway (Street)—a general term denoting a highway primarily used by through
42 traffic, usually on a continuous route or a highway designated as part of an arterial system.
- 43 13. Attended Lane (Manual Lane)—a toll lane adjacent to a toll booth occupied by a human toll
44 collector who makes change, issues receipts, and perform other toll-related functions. Attended
45 lanes at toll plazas typically require vehicles to stop to pay the toll.
- 46 14. Automatic Lane—see Exact Change Lane.
- 47 15. Average Annual Daily Traffic (AADT)—the total volume of traffic passing a point or segment
48 of a highway facility in both directions for one year divided by the number of days in the year.
49 Normally, periodic daily traffic volumes are adjusted for hours of the day counted, days of the
50 week, and seasons of the year to arrive at average annual daily traffic.
- 51 16. Average Daily Traffic (ADT)—the average 24 hour volume, being the total volume during a
52 stated period divided by the number of days in that period. Normally, this would be periodic
53 daily traffic volumes over several days, not adjusted for days of the week or seasons of the year.
- 54 17. Average Day—a day representing traffic volumes normally and repeatedly found at a location,
55 ~~Where~~ typically a weekday when volumes are ~~primarily~~ primarily influenced by employment, ~~the average~~

- 1 ~~day is typically a weekday, or a weekend day~~ when volumes are primarily influenced by
2 entertainment or recreation, ~~the average day is typically a weekend day.~~
- 3 18. Backplate—see Signal Backplate. [relocated from Section 4A.02](#)
- 4 19. Barrier-Separated Lane—a preferential lane or other special purpose lane that is separated
5 from the adjacent general-purpose lane(s) by a physical barrier.
- 6 20. Beacon—a highway traffic signal with one or more signal sections that operates in a flashing
7 mode.
- 8 21. Bicycle—a pedal-powered vehicle upon which the human operator sits.
- 9 22. Bicycle Facilities—a general term denoting improvements and provisions that accommodate or
10 encourage bicycling, including parking and storage facilities, and shared roadways not
11 specifically defined for bicycle use. [relocated from Section 9A.03](#)
- 12 23. Bicycle Lane—a portion of a roadway that has been designated for preferential or exclusive use
13 by bicyclists by ~~signs and~~ pavement markings and, if used, signs ~~for preferential or exclusive use~~
14 ~~by bicyclists.~~
- 15 24. Bikeway—a generic term for any road, street, path, or way that in some manner is specifically
16 designated for bicycle travel, regardless of whether such facilities are designated for the
17 exclusive use of bicycles or are to be shared with other transportation modes. [relocated from](#)
18 [Section 9A.03](#)
- 19 25. Buffer-Separated Lane—a preferential lane or other special purpose lane that is separated from
20 the adjacent general-purpose lane(s) by a pattern of standard longitudinal pavement markings
21 that is wider than a normal or wide lane line marking. The buffer area might include rumble
22 strips, textured pavement, or channelizing devices such as tubular markers or traversable
23 curbs, but does not include a physical barrier.
- 24 26. Cantilevered Signal Structure—a structure, also referred to as a mast arm, that is rigidly
25 attached to a vertical pole and is used to provide overhead support of highway traffic signal
26 faces or grade crossing signal units. [relocated from Section 8A.01](#)
- 27 27. ~~Centerline~~ Center Line Markings—the yellow pavement marking line(s) that delineates the
28 separation of traffic lanes that have opposite directions of travel on a roadway. These markings
29 need not be at the geometrical center of the pavement.
- 30 28. Changeable Message Sign—a sign that is capable of displaying more than one message (one of
31 which might be a “blank” display), changeable manually, by remote control, or by automatic
32 control. ~~These~~ Electronic-display changeable message signs are referred to as Dynamic
33 Message Signs in the National Intelligent Transportation Systems (ITS) Architecture and are
34 referred to as Variable Message Signs in the National Electrical Manufacturers Association
35 (NEMA) standards publication.
- 36 29. Channelizing Line Markings—a wide or double solid white line used to form islands where
37 traffic in the same direction of travel is permitted on both sides of the island.
- 38 30. Circular Intersection—an intersection that has an island, generally circular in design, located in
39 the center of the intersection where traffic passes to the right of the island. Circular
40 intersections include roundabouts, rotaries, and traffic circles.
- 41 31. Circulatory Roadway—the roadway within a circular intersection on which traffic travels in a
42 counterclockwise direction around an island in the center of the circular intersection.
- 43 32. Clear Storage Distance—when used in Part 8, the distance available for vehicle storage
44 measured between 6 feet from the rail nearest the intersection to the intersection stop line or the
45 normal stopping point on the highway. At skewed ~~highway-rail~~ grade crossings and
46 intersections, the 6-foot distance shall be measured perpendicular to the nearest rail either along
47 the ~~centerline~~ center line or edge line of the highway, as appropriate, to obtain the shorter
48 distance. Where exit gates are used, the distance available for vehicle storage is measured from
49 the point where the rear of the vehicle would be clear of the exit gate arm. In cases where the
50 exit gate arm is parallel to the track(s) and is not perpendicular to the highway, the distance is
51 measured either along the ~~centerline~~ center line or edge line of the highway, as appropriate, to
52 obtain the shorter distance. [relocated from Section 8A.01](#)
- 53 33. Clear Zone—the total roadside border area, starting at the edge of the traveled way, that is
54 available for an errant driver to stop or regain control of a vehicle. This area might consist of a
55 shoulder, a recoverable slope, and/or a non-recoverable, traversable slope with a clear run-out
56 area at its toe.

- 1 34. Collector Highway—a term denoting a highway that in rural areas connects small towns and
2 local highways to arterial highways, and in urban areas provides land access and traffic
3 circulation within residential, commercial, and business areas and connects local highways to
4 the arterial highways.
- 5 35. Concurrent Flow ~~HOV~~ Preferential Lane—~~an HOV~~ a preferential lane that is operated in the
6 same direction as the adjacent mixed flow lanes, separated from the adjacent general-purpose
7 freeway lanes by a standard lane stripe, painted buffer, or barrier.
- 8 36. Conflict Monitor—a device used to detect and respond to improper or conflicting signal
9 indications and improper operating voltages in a traffic controller assembly. relocated from
10 Section 4A.02
- 11 37. Constant Warning Time Detection—a means of detecting rail traffic that provides relatively
12 uniform warning time for the approach of trains or light rail transit traffic that are not
13 accelerating or decelerating after being detected.
- 14 38. Contiguous Lane—a lane, preferential or otherwise, that is separated from the adjacent lane(s)
15 only by a normal or wide lane line marking.
- 16 39. Controller Assembly—a complete electrical device mounted in a cabinet for controlling the
17 operation of a highway traffic signal. relocated from Section 4A.02
- 18 40. Controller Unit—that part of a controller assembly that is devoted to the selection and timing of
19 the display of signal indications. relocated from Section 4A.02
- 20 41. Conventional Road—a street or highway other than a low-volume road (as defined in Section
21 5A.01), expressway, or freeway.
- 22 42. ~~Contraflow~~ Counter-Flow Lane—a lane operating in a direction opposite to the normal flow of
23 traffic designated for peak direction of travel during at least a portion of the day. ~~Contraflow~~
24 Counter-flow lanes are usually separated from the off-peak direction lanes by ~~plastic pylons~~
25 tubular markers or other flexible channelizing devices, temporary lane separators, or ~~by~~
26 movable or permanent barrier.
- 27 43. Crashworthy—a characteristic of a roadside appurtenance that has been successfully crash
28 tested in accordance with a national standard such as the National Cooperative Highway
29 Research Program Report 350, “Recommended Procedures for the Safety Performance
30 Evaluation of Highway Features.”
- 31 44. Crosswalk—(a) that part of a roadway at an intersection included within the connections of the
32 lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or in the
33 absence of curbs, from the edges of the traversable roadway, and in the absence of a sidewalk on
34 one side of the roadway, the part of a roadway included within the extension of the lateral lines
35 of the sidewalk at right angles to the ~~centerline~~ center line; (b) any portion of a roadway at an
36 intersection or elsewhere distinctly indicated as a pedestrian crossing by pavement marking
37 lines on the surface, which ~~may~~ might be supplemented by contrasting pavement texture, style,
38 or color.
- 39 45. Crosswalk Lines—white pavement marking lines that identify a crosswalk.
- 40 46. Cycle Length—the time required for one complete sequence of signal indications. relocated from
41 Section 4A.02
- 42 47. Dark Mode—the lack of all signal indications at a signalized location. (The dark mode is most
43 commonly associated with power failures, ramp meters, hybrid beacons, beacons, and some
44 movable bridge signals.) relocated from Section 4A.02
- 45 48. Delineator—a retroreflective device mounted on the roadway surface or at the side of the
46 roadway in a series to indicate the alignment of the roadway, especially at night or in adverse
47 weather.
- 48 49. Design Vehicle—the longest vehicle permitted by statute of the road authority (State or other)
49 on that roadway. relocated from Section 8A.01
- 50 50. Designated Bicycle Route—a system of bikeways designated by the jurisdiction having authority
51 with appropriate directional and informational route signs, with or without specific bicycle
52 route numbers. ~~Bicycle routes, which might be a combination of various types of bikeways,~~
53 ~~should establish a continuous routing.~~ relocated from Section 9A.03 with 2nd sentence relocated to
54 Section 9B.21
- 55 51. Detectable—having a continuous edge within 6 inches of the surface so that pedestrians who
56 have visual disabilities can sense its presence and receive usable guidance information.

- 1 52. **Detector**—a device used for determining the presence or passage of vehicles or pedestrians.
2 relocated from Section 4A.02
- 3 53. **Downstream**—a term that refers to a location that is encountered by traffic subsequent to an
4 upstream location as it flows in an “upstream to downstream” direction. For example, “the
5 downstream end of a lane line separating the turn lane from a through lane on the approach to
6 an intersection” is the end of the lane line that is closest to the intersection.
- 7 54. **Dropped Lane**—a through lane that becomes a mandatory turn lane on a conventional
8 roadway, or a through lane that becomes a mandatory exit lane on a freeway or expressway.
9 The end of an acceleration lane and reductions in the number of through lanes that do not
10 involve a mandatory turn or exit are not considered dropped lanes.
- 11 55. **Dual-Arrow Signal Section**—a type of signal section designed to include both a yellow arrow
12 and a green arrow. relocated from Section 4A.02
- 13 56. **Dynamic Envelope**—the clearance required for light rail transit traffic or ~~the~~ a train and its
14 cargo overhang due to any combination of loading, lateral motion, or suspension failure (see
15 Figure 8B-8).
- 16 57. **Dynamic Exit Gate Operating Mode**—a mode of operation where the exit gate operation is
17 based on the presence of vehicles within the minimum track clearance distance. relocated from
18 Section 8A.01
- 19 58. **Edge Line Markings**—white or yellow pavement marking lines that delineate the right or left
20 edge(s) of a traveled way.
- 21 59. **Electronic Toll Collection (ETC)**—a system for automated collection of tolls from moving or
22 stopped vehicles through wireless technologies such as radio-frequency communication or
23 optical scanning. ETC systems are classified as one of the following: (1) systems that require
24 users to have registered toll accounts, with the use of equipment inside or on the exterior of
25 vehicles, such as a transponder or barcode decal, that communicates with or is detected by
26 roadside or overhead receiving equipment, or with the use of license plate optical scanning, to
27 automatically deduct the toll from the registered user account, or (2) systems that do not require
28 users to have registered toll accounts because vehicle license plates are optically scanned and
29 invoices for the toll amount are sent through postal mail to the address of the vehicle owner.
- 30 60. **Electronic Toll Collection (ETC) Account Only Lane**—a non-attended toll lane that is restricted
31 to use only by vehicles with a registered toll payment account.
- 32 61. **Emergency-Vehicle Hybrid Beacon**—a special type of hybrid beacon used to warn and control
33 traffic at an unsignalized location to assist authorized emergency vehicles in entering or crossing
34 a street or highway.
- 35 62. **Emergency-Vehicle Traffic Control Signal**—a special traffic control signal that assigns the
36 right-of-way to an authorized emergency vehicle. relocated from Section 4A.02
- 37 63. **End-of-Roadway Marker**—a device used to warn and alert road users of the end of a roadway
38 in other than temporary traffic control zones.
- 39 64. **Engineering Judgment**—the evaluation of available pertinent information, and the application
40 of appropriate principles, ~~Standards, Guidance~~ provisions, and practices as contained in this
41 Manual and other sources, for the purpose of deciding upon the applicability, design, operation,
42 or installation of a traffic control device. Engineering judgment shall be exercised by an
43 engineer, or by an individual working under the supervision of an engineer, through the
44 application of procedures and criteria established by the engineer. Documentation of
45 engineering judgment is not required.
- 46 65. **Engineering Study**—the comprehensive analysis and evaluation of available pertinent
47 information, and the application of appropriate principles, ~~Standards, Guidance~~ provisions, and
48 practices as contained in this Manual and other sources, for the purpose of deciding upon the
49 applicability, design, operation, or installation of a traffic control device. An engineering study
50 shall be performed by an engineer, or by an individual working under the supervision of an
51 engineer, through the application of procedures and criteria established by the engineer. An
52 engineering study shall be documented.
- 53 66. **Entrance Gate**—an automatic gate that can be lowered across the lanes approaching a grade
54 crossing to block road users from entering the grade crossing.
- 55 67. **Exact Change Lane (Automatic Lane)**—a non-attended toll lane that has a receptacle into which
56 road users deposit coins totaling the exact amount of the toll. Exact Change lanes at toll plazas
57 typically require vehicles to stop to pay the toll.

- 1 **68. Exit Gate**—an automatic gate that can be lowered across the lanes departing a grade crossing to
2 **block road users from entering the grade crossing by driving in the opposing traffic lanes.**
- 3 **69. Exit Gate Clearance Time**—for Four-Quadrant Gate systems **at grade crossings**, the ~~exit gate~~
4 ~~clearance time is the~~ amount of time provided to delay the descent of the exit gate arm(s) after
5 entrance gate arm(s) begin to descend. **relocated from Section 8A.01**
- 6 **70. Exit Gate Operating Mode**—for Four-Quadrant Gate systems **at grade crossings**, the mode of
7 control used to govern the operation of the exit gate arms. **relocated from Section 8A.01**
- 8 **71. Expressway**—a divided highway with partial control of access.
- 9 **72. Flagger**—a person who actively controls the flow of vehicular traffic into and/or through a
10 **temporary traffic control zone using hand-signaling devices or an Automated Flagger**
11 **Assistance Device (AFAD).**
- 12 **73. Flasher**—a device used to turn highway traffic signal indications on and off at a repetitive rate
13 of approximately once per second. **relocated from Section 4A.02**
- 14 **74. Flashing**—an operation in which a **light source, such as a traffic** signal indication, is turned on
15 and off repetitively.
- 16 **75. Flashing-Light Signals**—a warning device consisting of two red signal indications arranged
17 horizontally that are activated to flash alternately when ~~a train~~ **rail traffic** is approaching or
18 present at a ~~highway-rail~~ grade crossing. **relocated from Section 8A.01**
- 19 **76. Flashing Mode**—a mode of operation in which at least one traffic signal indication in each
20 vehicular signal face of a highway traffic signal is turned on and off repetitively. **relocated from**
21 **Section 4A.02**
- 22 **77. Freeway**—a divided highway with full control of access.
- 23 **78. Full-Actuated Operation**—a type of traffic control signal operation in which all signal phases
24 function on the basis of actuation. **relocated from Section 4A.02**
- 25 **79. Gate**—an automatically-operated or manually-operated traffic control device that is used to
26 **physically obstruct road users such that they are discouraged from proceeding past a particular**
27 **point on a roadway or pathway, or such that they are discouraged from entering a particular**
28 **grade crossing, ramp, lane, roadway, or facility.**
- 29 **80. Grade Crossing**—the general area where a highway and a railroad and/or light rail transit
30 **route cross at the same level, within which are included the tracks, highway, and traffic control**
31 **devices for traffic traversing that area.**
- 32 **81. Guide Sign**—a sign that shows route designations, destinations, directions, distances, services,
33 points of interest, or other geographical, recreational, or cultural information.
- 34 **82. High-Occupancy Vehicle (HOV)**—a motor vehicle carrying at least two or more persons,
35 including carpools, vanpools, and buses.
- 36 **83. Highway**—a general term for denoting a public way for purposes of ~~travel by~~ vehicular travel,
37 including the entire area within the right-of-way.
- 38 **84. Highway-Light Rail Transit Grade Crossing**—the general area where a highway and a light rail
39 **transit route cross at the same level, within which are included the light rail transit tracks,**
40 **highway, and traffic control devices for traffic traversing that area.**
- 41 **85. Highway-Rail Grade Crossing**—the general area where a highway and a **railroad** ~~right-of-way~~
42 cross at the same level, within which are included the railroad tracks, highway, and traffic
43 control devices for highway traffic traversing that area.
- 44 **86. Highway Traffic Signal**—a power-operated traffic control device by which traffic is warned or
45 directed to take some specific action. These devices do not include ~~signals at toll plazas~~, power-
46 operated signs, **steadily**-illuminated pavement markers, warning lights (see Section 6F.83), or
47 steady burning electric lamps.
- 48 **87. HOV Lane**—any preferential lane designated for exclusive use by high-occupancy vehicles for
49 all or part of a day—including a designated lane on a freeway, other highway, street, or
50 independent roadway on a separate right-of-way.
- 51 **88. Hybrid Beacon**—a special type of beacon that is intentionally placed in a dark mode (no
52 **indications displayed**) between periods of operation and, when operated, displays both steady
53 **and flashing traffic control signal indications.**
- 54 **89. Inherently Low Emission Vehicle (ILEV)**—any kind of vehicle that, because of inherent
55 properties of the fuel system design, will not have significant evaporative emissions, even if its
56 evaporative emission control system has failed.

- 1 90. **In-Roadway Lights**—a special type of highway traffic signal installed in the roadway surface to
 2 warn road users that they are approaching a condition on or adjacent to the roadway that
 3 might not be readily apparent and might require the road users to slow down and/or come to a
 4 stop. **relocated from Section 4A.02**
- 5 91. **Interchange**—a system of interconnecting roadways providing for traffic movement between
 6 two or more highways that do not intersect at grade.
- 7 92. **Interconnection**—when used in Part 8, the electrical connection between the railroad or light
 8 rail transit active warning system and the highway traffic signal controller assembly for the
 9 purpose of preemption. **relocated from Section 8A.01**
- 10 93. **Intermediate Interchange**—an interchange with an urban or rural route that is not a major or
 11 minor interchange as defined **herein in this Section.**
- 12 94. **Intersection**—intersection is defined as follows:
- 13 (a) The area embraced within the prolongation or connection of the lateral curb lines, or if
 14 none, the lateral boundary lines of the roadways of two highways that join one another at,
 15 or approximately at, right angles, or the area within which vehicles traveling on different
 16 highways that join at any other angle might come into conflict.
- 17 (b) The junction of an alley or driveway with a roadway or highway shall not constitute an
 18 intersection, unless the roadway or highway at said junction is controlled by a traffic control
 19 device.
- 20 (c) If a highway includes two roadways that are 30 feet or more apart (see definition of
 21 Median), then every crossing of each roadway of such divided highway by an intersecting
 22 highway shall be a separate intersection.
- 23 (d) If both intersecting highways include two roadways that are 30 feet or more apart, then
 24 every crossing of any two roadways of such highways shall be a separate intersection.
- 25 (e) At a location controlled by a traffic control signal, regardless of the distance between the
 26 separate intersections as defined in (c) and (d) above:
- 27 (1) If a stop line, yield line, or crosswalk has not been designated on the roadway (within the
 28 median) between the separate intersections, the two intersections and the roadway
 29 (median) between them shall be considered as one intersection;
- 30 (2) Where a stop line, yield line, or crosswalk is designated on the roadway on the
 31 intersection approach, the area within the crosswalk and/or beyond the designated stop
 32 line or yield line shall be part of the intersection; and
- 33 (3) Where a crosswalk is designated on a roadway on the departure from the intersection,
 34 the intersection shall include the area extending to the far side of such crosswalk.
- 35 95. **Intersection Control Beacon**—a beacon used only at an intersection to control two or more
 36 directions of travel. **relocated from Section 4A.02**
- 37 96. **Interval**—the part of a signal cycle during which signal indications do not change. **relocated from**
 38 **Section 4A.02**
- 39 97. **Interval Sequence**—the order of appearance of signal indications during successive intervals of
 40 a signal cycle. **relocated from Section 4A.02**
- 41 98. **Island**—a defined area between traffic lanes for control of vehicular movements, for toll
 42 collection, or for pedestrian refuge. It includes all end protection and approach treatments.
 43 Within an intersection area, a median or an outer separation is considered to be an island.
- 44 **99. Lane Drop**—see **Dropped Lane.**
- 45 100. **Lane Line Markings**—white pavement marking lines that delineate the separation of traffic
 46 lanes that have the same direction of travel on a roadway.
- 47 101. **Lane-Use Control Signal**—a signal face displaying indications to permit or prohibit the use of
 48 specific lanes of a roadway or to indicate the impending prohibition of such use.
- 49 102. **Legend**—see **Sign Legend.**
- 50 103. **Lens**—see **Signal Lens.** **relocated from Section 4A.02**
- 51 **104. Light Rail Transit Traffic (Light Rail Transit Equipment)**—every device in, upon, or by which
 52 any person or property can be transported on light rail transit tracks, including single-unit light
 53 rail transit cars (such as streetcars and trolleys) and assemblies of multiple light rail transit cars
 54 coupled together.
- 55 **105. Locomotive Horn**—an air horn, steam whistle, or similar audible warning device (see 49 CFR
 56 Part 229.129) mounted on a locomotive or control cab car. The terms “locomotive horn,” “train

1 [whistle,” “locomotive whistle,” and “train horn” are used interchangeably in the railroad](#)
2 [industry.](#)

- 3 106. Logo—a distinctive emblem, ~~symbol,~~ or trademark that identifies a [commercial business and/or](#)
4 [the product or service offered by the business.](#)
- 5 107. Longitudinal Markings—pavement markings that are generally placed parallel and adjacent to
6 the flow of traffic such as lane lines, ~~centerlines~~ [center lines](#), edge lines, channelizing lines, and
7 others.
- 8 108. Louver—see Signal Louver. [relocated from Section 4A.02](#)
- 9 109. Major Interchange—an interchange with another freeway or expressway, or an interchange
10 with a high-volume multi-lane highway, principal urban arterial, or major rural route where
11 the interchanging traffic is heavy or includes many road users unfamiliar with the area.
- 12 110. Major Street—the street normally carrying the higher volume of vehicular traffic.
- 13 111. Malfunction Management Unit—same as Conflict Monitor. [relocated from Section 4A.02](#)
- 14 [112. Managed Lane—a highway lane or set of lanes, or a highway facility, for which variable](#)
15 [operational strategies such as direction of travel, tolling, pricing, and/or vehicle type or](#)
16 [occupancy requirements are implemented and managed in real-time in response to changing](#)
17 [conditions. Managed lanes are typically buffer- or barrier-separated lanes parallel to the](#)
18 [general-purpose lanes of a highway in which access is restricted to designated locations. There](#)
19 [are also some highways on which all lanes are managed.](#)
- 20 [113. Manual Lane—see Attended Lane.](#)
- 21 114. Maximum Highway Traffic Signal Preemption Time—the maximum amount of time needed
22 following initiation of the preemption sequence for the highway traffic signals to complete the
23 timing of the right-of-way transfer time, queue clearance time, and separation time. [relocated](#)
24 [from Section 8A.01](#)
- 25 115. Median—the area between two roadways of a divided highway measured from edge of traveled
26 way to edge of traveled way. The median excludes turn lanes. The median width might be
27 different between intersections, interchanges, and at opposite approaches of the same
28 intersection.
- 29 116. Minimum Track Clearance Distance—for standard two-quadrant ~~railroad~~ warning devices, the
30 minimum track clearance distance is the length along a highway at one or more railroad [or light](#)
31 [rail transit](#) tracks, measured ~~either~~ from the highway stop line, warning device, or 12 feet
32 perpendicular to the track ~~centerline~~ [center line](#), to 6 feet beyond the track(s) measured
33 perpendicular to the far rail, along the ~~centerline~~ [center line](#) or edge line of the highway, as
34 appropriate, to obtain the longer distance. For Four-Quadrant Gate systems, the minimum
35 track clearance distance is the length along a highway at one or more railroad [or light rail](#)
36 [transit](#) tracks, measured either from the highway stop line or entrance warning device, to the
37 point where the rear of the vehicle would be clear of the exit gate arm. In cases where the exit
38 gate arm is parallel to the track(s) and is not perpendicular to the highway, the distance is
39 measured either along the ~~centerline~~ [center line](#) or edge [line](#) of the highway, as appropriate, to
40 obtain the longer distance. [relocated from Section 8A.01](#)
- 41 117. Minimum Warning Time—~~Through Train Movements~~—[when used in Part 8](#), the least amount
42 of time active warning devices shall operate prior to the arrival of ~~a train~~ [rail traffic](#) at a
43 ~~highway-rail~~ grade crossing. [relocated from Section 8A.01](#)
- 44 118. Minor Interchange—an interchange where traffic is local and very light, such as interchanges
45 with land service access roads. Where the sum of the exit volumes is estimated to be lower than
46 100 vehicles per day in the design year, the interchange is classified as local.
- 47 119. Minor Street—the street normally carrying the lower volume of vehicular traffic.
- 48 120. Movable Bridge Resistance Gate—a type of traffic gate, which is located downstream of the
49 movable bridge warning gate, that provides a physical deterrent to vehicle and/or pedestrian
50 traffic when placed in the appropriate position. [relocated from Section 4A.02](#)
- 51 121. Movable Bridge Signal—a highway traffic signal installed at a movable bridge to notify traffic
52 to stop during periods when the roadway is closed to allow the bridge to open. [relocated from](#)
53 [Section 4A.02](#)
- 54 122. Movable Bridge Warning Gate—a type of traffic gate designed to warn, but not primarily to
55 block, vehicle and/or pedestrian traffic when placed in the appropriate position. [relocated from](#)
56 [Section 4A.02](#)

- 1 123. Multi-Lane—more than one lane moving in the same direction. A multi-lane street, highway, or
2 roadway has a basic cross-section comprised of two or more through lanes in one or both
3 directions. A multi-lane approach has two or more lanes moving toward the intersection,
4 including turning lanes.
- 5 124. Neutral Area—the paved area between the channelizing lines separating an entrance or exit
6 ramp or a channelized turn lane or channelized entering lane from the adjacent through lane(s).
- 7 125. Object Marker—a device used to mark obstructions within or adjacent to the roadway.
- 8 126. Occupancy Requirement—any restriction that regulates the use of a facility or one or more
9 lanes of a facility for any period of the day based on a specified number of persons in a vehicle.
- 10 127. Occupant—a person driving or riding in a car, truck, bus, or other vehicle.
- 11 128. Open-Road ETC Lane—a non-attended lane that is designed to allow toll payments to be
12 electronically collected from vehicles traveling at normal highway speeds. Open-Road ETC
13 lanes are typically physically separated from the toll plaza, often following the alignment of the
14 mainline lanes, with toll plaza lanes for cash toll payments being on a different alignment after
15 diverging from the mainline lanes or a subset thereof.
- 16 129. Open-Road Tolling—a system designed to allow electronic toll collection (ETC) from vehicles
17 traveling at normal highway speeds. Open-Road Tolling might be used on toll roads or toll
18 facilities in conjunction with toll plazas. Open-Road Tolling is also typically used on managed
19 lanes and on toll facilities that only accept payment by ETC.
- 20 130. Open-Road Tolling Point—the location along an Open-Road ETC lane at which roadside or
21 overhead detection and receiving equipment are placed and vehicles are electronically assessed
22 a toll.
- 23 131. Opposing Traffic—vehicles that are traveling in the opposite direction. At an intersection,
24 vehicles entering from an approach that is approximately straight ahead would be considered to
25 be opposing traffic, but vehicles entering from approaches on the left or right would not be
26 considered to be opposing traffic.
- 27 132. Overhead Sign—a sign that is placed such that a portion or the entirety of the sign or its
28 support is directly above the roadway or shoulder such that vehicles travel below it. Typical
29 installations include signs placed on cantilever arms that extend over the roadway or shoulder,
30 on sign support structures that span the entire width of the pavement, on mast arms or span
31 wires that also support traffic control signals, and on highway bridges that cross over the
32 roadway.
- 33 133. Parking Area—a parking lot or parking garage that is separated from a roadway. Parallel or
34 angle parking spaces along a roadway are not considered a parking area.
- 35 134. Passive Grade Crossing—a grade crossing where none of the automatic traffic control devices
36 associated with an Active Grade Crossing Warning System are present and at which the traffic
37 control devices consist entirely of signs and/or markings.
- 38 135. Pathway—a general term denoting a public way for purposes of travel by authorized users
39 outside the traveled way and physically separated from the roadway by an open space or
40 barrier and either within the highway right-of-way or within an independent alignment.
41 Pathways include shared-use paths, but do not include sidewalks.
- 42 136. Pathway Grade Crossing—the general area where a pathway and railroad or light rail transit
43 tracks cross at the same level, within which are included the tracks, pathway, and traffic control
44 devices for pathway traffic traversing that area.
- 45 137. Paved—a bituminous surface treatment, mixed bituminous concrete, or Portland cement
46 concrete roadway surface that has both a structural (weight bearing) and a sealing purpose for
47 the roadway.
- 48 138. Pedestrian—a person ~~af~~^ofoot on foot, in a wheelchair, on skates, or on a skateboard.
- 49 139. Pedestrian Change Interval—an interval during which the flashing UPRAISED HAND
50 (symbolizing DONT WALK) signal indication is displayed. ~~When a verbal message is provided~~
51 ~~at an accessible pedestrian signal, the verbal message is “wait.”~~ ^{relocated from Section 4A.02}
- 52 140. Pedestrian Clearance Time—the time provided for a pedestrian crossing in a crosswalk, after
53 leaving the curb or shoulder, to travel to the far side of the traveled way or to a median.
54 ^{relocated from Section 4A.02}
- 55 141. Pedestrian Facilities—a general term denoting improvements and provisions made to
56 accommodate or encourage walking.

- 1 142. Pedestrian Hybrid Beacon—a special type of hybrid beacon used to warn and control traffic at
2 an unsignalized location to assist pedestrians in crossing a street or highway at a marked
3 crosswalk.
- 4 143. Pedestrian Signal Head—a signal head, which contains the symbols WALKING PERSON
5 (symbolizing WALK) and UPRAISED HAND (symbolizing DONT WALK), that is installed to
6 direct pedestrian traffic at a traffic control signal. **relocated from Section 4A.02**
- 7 144. Permissive Mode—a mode of traffic control signal operation in which, ~~when a CIRCULAR~~
8 ~~GREEN signal indication is displayed,~~ left or right turns are permitted to be made after yielding
9 to pedestrians, if any, and/or ~~oncoming~~ opposing traffic, if any. When a CIRCULAR GREEN
10 signal indication is displayed, both left and right turns are permitted unless otherwise
11 prohibited by another traffic control device. When a flashing YELLOW ARROW or flashing
12 RED ARROW signal indication is displayed, the turn indicated by the arrow is permitted.
13 **relocated from Section 4A.02**
- 14 145. Physical Gore—a longitudinal point where a physical barrier or the lack of a paved surface
15 inhibits road users from crossing from a ramp or channelized turn lane or channelized entering
16 lane to the adjacent through lane(s) or vice versa.
- 17 146. Pictograph—a pictorial representation used to identify a governmental jurisdiction, an area of
18 jurisdiction, a governmental agency, a military base or branch of service, a governmental-
19 approved university or college, a toll payment system, or a government-approved institution.
- 20 147. Plaque—a traffic control device intended to communicate specific information to road users
21 through a word, symbol, or arrow legend that is placed immediately adjacent to a sign to
22 supplement the message on the sign. The difference between a plaque and a sign is that a
23 plaque cannot be used alone. The designation for a plaque includes a “P” suffix.
- 24 148. Platoon—a group of vehicles or pedestrians traveling together as a group, either voluntarily or
25 involuntarily, because of traffic signal controls, geometrics, or other factors.
- 26 149. Portable Traffic Control Signal—a temporary traffic control signal that is designed so that it
27 can be easily transported and reused at different locations.
- 28 150. Post-Mounted Sign—a sign that is placed to the side of the roadway such that no portion of the
29 sign or its support is directly above the roadway or shoulder.
- 30 151. Posted Speed Limit—a speed limit determined by law or regulation and displayed on Speed
31 Limit signs. **relocated from definition of “Speed”**
- 32 152. Preemption ~~Control~~—the transfer of normal operation of a traffic control signal to a special
33 control mode of operation. **relocated from Section 4A.02**
- 34 153. Preferential Lane—a highway lane reserved for the exclusive use of one or more specific types
35 of vehicles or vehicles with at least a specific number of occupants.
- 36 154. Pre-Signal—~~supplemental highway traffic control signal faces operated as part of the that~~
37 ~~control traffic approaching a grade crossing in conjunction with the traffic control signal faces~~
38 ~~that control traffic approaching a highway-highway intersection traffic signals, located in a~~
39 ~~position that controls traffic approaching the highway-rail grade crossing in advance of the~~
40 ~~intersection beyond the tracks. Supplemental near-side traffic control signal faces for the~~
41 ~~highway-highway intersection are not considered pre-signals. Pre-signals are typically used~~
42 ~~where the clear storage distance is insufficient to store one or more design vehicles.~~ **relocated**
43 **from Section 8A.01**
- 44 155. Pretimed Operation—a type of traffic control signal operation in which none of the signal
45 phases function on the basis of actuation. **relocated from Section 4A.02**
- 46 156. Primary Signal Face—one of the required or recommended minimum number of signal faces
47 for a given approach or separate turning movement, but not including near-side signal faces
48 required as a result of the far-side signal faces exceeding the maximum distance from the stop
49 line.
- 50 157. Principal Legend—place names, street names, and route numbers placed on guide signs.
- 51 158. Priority Control—a means by which the assignment of right-of-way is obtained or modified.
52 **relocated from Section 4A.02**
- 53 159. Private Road Open to Public Travel—private toll roads and roads (including any adjacent
54 sidewalks that generally run parallel to the road) within shopping centers, airports, sports
55 arenas, and other similar business and/or recreation facilities that are privately owned, but
56 where the public is allowed to travel without access restrictions. Roads within private gated
57 properties (except for gated toll roads) where access is restricted at all times, parking areas,

- driving aisles within parking areas, and private grade crossings shall not be included in this definition.
160. Protected Mode—a mode of traffic control signal operation in which left or right turns are permitted to be made when a left or right GREEN ARROW signal indication is displayed.
161. Public Road—any road, ~~or~~ street, or similar facility under the jurisdiction of and maintained by a public agency and open to public travel.
162. Pushbutton—a button to activate ~~pedestrian~~ a device or signal timing for pedestrians, bicyclists, or other road users. relocated from Section 4A.02
163. Pushbutton Information Message—a recorded message that can be actuated by pressing a pushbutton when the walk interval is not timing and that provides the name of the street that the crosswalk associated with that particular pushbutton crosses and can also provide other information about the intersection signalization or geometry.
164. Pushbutton Locator Tone—a repeating sound that informs approaching pedestrians that ~~they are required to push a button~~ a pushbutton exists to actuate pedestrian timing or receive additional information and that enables pedestrians who have visual disabilities to locate the pushbutton. relocated from Section 4A.02
165. Queue Clearance Time—when used in Part 8, the time required for the design vehicle of maximum length stopped just inside the minimum track clearance distance to start up and move through and clear the entire minimum track clearance distance. If pre-signals are present, this time shall be long enough to allow the vehicle to move through the intersection, or to clear the tracks if there is sufficient clear storage distance. If a Four-Quadrant Gate system is present, this time shall be long enough to permit the exit gate arm to lower after the design vehicle is clear of the minimum track clearance distance. relocated from Section 8A.01
166. Quiet Zone—a segment of a rail line, with one or a number of consecutive public highway-rail grade crossings at which locomotive horns are not routinely sounded per 49 CFR Part 222.
167. Rail Traffic—every device in, upon, or by which any person or property can be transported on rails or tracks and to which all other traffic must yield the right-of-way by law at grade crossings, including trains, one or more locomotives coupled (with or without cars), other railroad equipment, and light rail transit operating in exclusive or semi-exclusive alignments. Light rail transit operating in a mixed-use alignment, to which other traffic is not required to yield the right-of-way by law, is a vehicle and is not considered to be rail traffic.
168. Raised Pavement Marker—a device ~~with a height of at least 0.4 inches~~ mounted on or in a road surface that has a height generally not exceeding approximately 1 inch above the road surface for a permanent marker, or not exceeding approximately 2 inches above the road surface for a temporary flexible marker, and that is intended to be used as a positioning guide and/or to supplement or substitute for pavement markings ~~or to mark the position of a fire hydrant.~~
169. Ramp Control Signal—a highway traffic signal installed to control the flow of traffic onto a freeway at an entrance ramp or at a freeway-to-freeway ramp connection. relocated from Section 4A.02
170. Ramp Meter—see Ramp Control Signal. relocated from Section 4A.02
171. Red Clearance Interval—an ~~optional~~ interval that follows a yellow change interval and precedes the next conflicting green interval. relocated from Section 4A.02
172. Regulatory Sign—a sign that gives notice to road users of traffic laws or regulations.
173. Retroreflectivity—a property of a surface that allows a large portion of the light coming from a point source to be returned directly back to a point near its origin.
174. Right-of-Way [Assignment]—the permitting of vehicles and/or pedestrians to proceed in a lawful manner in preference to other vehicles or pedestrians by the display of a sign or signal indications.
175. Right-of-Way Transfer Time—when used in Part 8, the maximum amount of time needed for the worst case condition, prior to display of the track clearance green interval. This includes any railroad or light rail transit or highway traffic signal control equipment time to react to a preemption call, and any traffic control signal green, pedestrian walk and clearance, yellow change, and red clearance intervals for conflicting traffic. relocated from Section 8A.01
176. Road—see Roadway.
177. Road User—a vehicle operator, bicyclist, or pedestrian, including persons with disabilities, within the highway, or on a private road open to public travel ~~including persons with disabilities.~~

- 1 178. Roadway—that portion of a highway improved, designed, or ordinarily used for vehicular
2 travel and parking lanes, but exclusive of the sidewalk, berm, or shoulder even though such
3 sidewalk, berm, or shoulder is used by persons riding bicycles or other human-powered
4 vehicles. In the event a highway includes two or more separate roadways, the term roadway as
5 used ~~herein in this Manual~~ shall refer to any such roadway separately, but not to all such
6 roadways collectively.
- 7 179. Roadway Network—a geographical arrangement of intersecting roadways.
- 8 180. Roundabout ~~Intersection~~—a circular intersection with yield control ~~of all entering traffic,~~
9 ~~channelized approaches, and appropriate geometric curvature, such that travel speeds on the~~
10 ~~circulatory roadway are typically less than 30 mph~~ at entry, which permits a vehicle on the
11 circulatory roadway to proceed, and with deflection of the approaching vehicle counter-
12 clockwise around a central island.
- 13 181. Rumble Strip—a series of intermittent, narrow, transverse areas of rough-textured, slightly
14 raised, or depressed road surface that ~~is installed~~ extend across the travel lane to alert road
15 users to unusual traffic conditions or are located along the shoulder, along the roadway center
16 line, or within islands formed by pavement markings to alert road users that they are leaving
17 the travel lanes.
- 18 182. Rural Highway—a type of roadway normally characterized by lower volumes, higher speeds,
19 fewer turning conflicts, and less conflict with pedestrians.
- 20 183. Safe-Positioned—the positioning of emergency vehicles at an incident in a manner that attempts
21 to protect both the responders performing their duties and road users traveling through the
22 incident scene, while minimizing, to the extent practical, disruption of the adjacent traffic flow.
- 23 184. School—a public or private educational institution recognized by the State education authority
24 for one or more grades K through 12 or as otherwise defined by the State.
- 25 185. School Zone—a designated roadway segment approaching, adjacent to, and beyond school
26 buildings or grounds, or along which school related activities occur.
- 27 186. Semi-Actuated Operation—a type of traffic control signal operation in which at least one, but
28 not all, signal phases function on the basis of actuation. relocated from Section 4A.02
- 29 187. Separate ~~Left~~-Turn Signal Face—a signal face ~~for controlling that exclusively controls a left~~
30 ~~turn movement~~ and that sometimes displays a different color of circular signal indications than
31 ~~the adjacent through signal faces display~~ that are applicable only to the turn movement.
32 relocated from Section 4A.02
- 33 188. Separation Time—the component of maximum highway traffic signal preemption time during
34 which the minimum track clearance distance is clear of vehicular traffic prior to the arrival of
35 ~~the train~~ rail traffic. relocated from Section 8A.01
- 36 189. Shared Roadway—a roadway that is officially designated and marked as a bicycle route, but
37 which is open to motor vehicle travel and upon which no bicycle lane is designated.
- 38 190. Shared ~~Left~~-Turn Signal Face—a signal face, for controlling both a ~~left~~ turn movement and the
39 adjacent through movement, that always displays the same color of circular signal indication
40 that the adjacent through signal face or faces display. relocated from Section 4A.02
- 41 191. Shared-Use Path—a bikeway outside the traveled way and physically separated from motorized
42 vehicular traffic by an open space or barrier and either within the highway right-of-way or
43 within an independent alignment. Shared-use paths are also used by pedestrians (including
44 skaters, users of manual and motorized wheelchairs, and joggers) and other authorized
45 motorized and non-motorized users.
- 46 192. Sidewalk—that portion of a street between the curb line, or the lateral line of a roadway, and
47 the adjacent property line or on easements of private property that is paved or improved and
48 intended for use by pedestrians.
- 49 193. Sign—any traffic control device that is intended to communicate specific information to road
50 users through a word, ~~or~~ symbol, and/or arrow legend. Signs do not include highway traffic
51 ~~control~~ signals, pavement markings, delineators, or channelization devices.
- 52 194. Sign Assembly—a group of signs, located on the same support(s), that supplement one another
53 in conveying information to road users.
- 54 195. Sign Illumination—either internal or external lighting that shows similar color by day or night.
55 Street or highway lighting shall not be considered as meeting this definition.

- 1 196. Sign Legend—all word messages, logos, pictographs, and symbol and arrow designs that are
2 intended to convey specific meanings. The border, if any, on a sign is not considered to be a
3 part of the legend.
- 4 197. Sign Panel—a separate panel or piece of material containing a word, ~~or~~ symbol, and/or arrow
5 legend that is affixed to the face of a sign.
- 6 198. Signal Backplate—a thin strip of material that extends outward from and parallel to a signal
7 face on all sides of a signal housing to provide a background for improved visibility of the signal
8 indications. relocated from Section 4A.02
- 9 199. Signal Coordination—the establishment of timed relationships between adjacent traffic control
10 signals. relocated from Section 4A.02
- 11 200. Signal Face—~~that part of a traffic control signal~~ an assembly of one or more signal sections that
12 is provided for controlling one or more traffic movements on a single approach. relocated from
13 Section 4A.02
- 14 201. Signal Head—an assembly of one or more signal ~~sections~~ faces that is provided for controlling
15 traffic movements on one or more approaches. relocated from Section 4A.02
- 16 202. Signal Housing—that part of a signal section that protects the light source and other required
17 components. relocated from Section 4A.02
- 18 203. Signal Indication—the illumination of a signal lens or equivalent device. relocated from Section
19 4A.02
- 20 204. Signal Lens—that part of the signal section that redirects the light coming directly from the
21 light source and its reflector, if any. relocated from Section 4A.02
- 22 205. Signal Louver—a device that can be mounted inside a signal visor to restrict visibility of a signal
23 indication from the side or to limit the visibility of the signal indication to a certain lane or
24 lanes, or to a certain distance from the stop line. relocated from Section 4A.02
- 25 206. Signal Phase—the right-of-way, yellow change, and red clearance intervals in a cycle that are
26 assigned to an independent traffic movement or combination of movements. relocated from
27 Section 4A.02
- 28 207. Signal Section—the assembly of a signal housing, signal lens, if any, and light source with
29 necessary components to be used for ~~providing~~ displaying one signal indication. relocated from
30 Section 4A.02
- 31 208. Signal System—two or more traffic control signals operating in signal coordination. relocated
32 from Section 4A.02
- 33 209. Signal Timing—the amount of time allocated for the display of a signal indication. relocated
34 from Section 4A.02
- 35 210. Signal Visor—that part of a signal section that directs the signal indication specifically to
36 approaching traffic and reduces the effect of direct external light entering the signal lens.
37 relocated from Section 4A.02
- 38 ~~69. Signal Warrant—a threshold condition that, if found to be satisfied as part of an engineering~~
39 ~~study, shall result in analysis of other traffic conditions or factors to determine whether a traffic~~
40 ~~control signal or other improvement is justified.~~ relocated from Section 4A.02
- 41 211. Signing—individual signs or a group of signs, not necessarily on the same support(s), that
42 supplement one another in conveying information to road users.
- 43 212. Simultaneous Preemption—notification of ~~an~~ approaching train rail traffic is forwarded to the
44 highway traffic signal controller unit or assembly and railroad or light rail transit active
45 warning devices at the same time. relocated from Section 8A.01
- 46 213. Special Purpose Road—a low-volume, low-speed road that serves recreational areas or resource
47 development activities, ~~or that provides local access.~~ relocated from Section 2A.01
- 48 214. Speed—speed is defined based on the following classifications:
- 49 ~~(a) Advisory Speed—a recommended speed for all vehicles operating on a section of highway~~
50 ~~and based on the highway design, operating characteristics, and conditions.~~ this has been
51 converted to an independent definition
- 52 (a) Average Speed—the summation of the instantaneous or spot-measured speeds at a specific
53 location of vehicles divided by the number of vehicles observed.
- 54 (b) Design Speed—a selected speed used to determine the various geometric design features of a
55 roadway.
- 56 (c) 85th-Percentile Speed—the speed at or below which 85 percent of the motor vehicles travel.

- 1 (d) Operating Speed—a speed at which a typical vehicle or the overall traffic operates.
 2 Operating speed might be defined with speed values such as the average, pace, or 85th-
 3 percentile speeds.
- 4 (e) Pace Speed—the ~~highest speed within a specific range of speeds that represents more~~
 5 ~~vehicles than in any other like range of speed. The range of speeds typically used is 10 mph~~
 6 speed range representing the speeds of the largest percentage of vehicles in the traffic
 7 stream.
- 8 ~~(h) Posted Speed—the speed limit determined by law and shown on Speed Limit signs. this has~~
 9 ~~been converted to an independent definition~~
- 10 ~~(i) Statutory Speed—a speed limit established by legislative action that typically is applicable~~
 11 ~~for highways with specified design, functional, jurisdictional and/or location characteristic~~
 12 ~~and is not necessarily shown on Speed Limit signs. this has been converted to an independent~~
 13 ~~definition~~

- 14 215. Speed Limit—the maximum (or minimum) speed applicable to a section of highway as
 15 established by law or regulation.
- 16 216. Speed Limit Sign Beacon—a beacon used to supplement a SPEED LIMIT sign. relocated from
 17 Section 4A.02
- 18 217. Speed Measurement Markings—a white transverse pavement marking placed on the roadway
 19 to assist the enforcement of speed regulations.
- 20 218. Speed Zone—a section of highway with a speed limit that is established by law or regulation,
 21 but which might be different from a legislatively specified statutory speed limit.
- 22 219. Splitter Island—a median island used to separate opposing directions of traffic entering and
 23 exiting a roundabout.
- 24 220. Station Crossing—a pathway grade crossing that is associated with a station platform.
- 25 221. Statutory Speed Limit—a speed limit established by legislative action that typically is applicable
 26 for a particular class of highways with specified design, functional, jurisdictional and/or
 27 location characteristics and that is not necessarily displayed on Speed Limit signs. relocated from
 28 definition of “Speed”
- 29 222. Steady (Steady Mode)—the continuous ~~illumination~~ display of a signal indication for the
 30 duration of an interval, signal phase, or consecutive signal phases. relocated from Section 4A.02
- 31 223. Stop Beacon—a beacon used to supplement a STOP sign, a DO NOT ENTER sign, or a
 32 WRONG WAY sign. relocated from Section 4A.02
- 33 224. Stop Line—a solid white pavement marking line extending across approach lanes to indicate the
 34 point at which a stop is intended or required to be made.
- 35 225. Street—see Highway.
- 36 226. Supplemental Signal Face—a signal face that is not a primary signal face but which is provided
 37 for a given approach or separate turning movement to enhance visibility or conspicuity.
- 38 227. Symbol—the approved design of a pictorial representation of a specific traffic control message
 39 for signs, pavement markings, traffic control signals, or other traffic control devices, as shown
 40 in the MUTCD.
- 41 228. Temporary Traffic Control Signal—a traffic control signal that is installed for a limited time
 42 period.
- 43 229. Temporary Traffic Control Zone—an area of a highway where road user conditions are
 44 changed because of a work zone or incident by the use of temporary traffic control devices,
 45 flaggers, uniformed law enforcement officers, or other authorized personnel.
- 46 230. Theoretical Gore—a longitudinal point at the upstream end of a neutral area at an exit ramp or
 47 channelized turn lane where the channelizing lines that separate the ramp or channelized turn
 48 lane from the adjacent through lane(s) begin to diverge, or a longitudinal point at the
 49 downstream end of a neutral area at an entrance ramp or channelized entering lane where the
 50 channelizing lines that separate the ramp or channelized entering lane from the adjacent
 51 through lane(s) intersect each other.
- 52 231. Timed Exit Gate Operating Mode—a mode of operation where the exit gate descent at a grade
 53 crossing is based on a predetermined time interval. relocated from Section 8A.01
- 54 232. Toll Booth—a shelter where a toll attendant is stationed to collect tolls or issue toll tickets. A
 55 toll booth is located adjacent to a toll lane and is typically set on a toll island.

- 1 233. Toll Island—a raised island on which a toll booth or other toll collection and related equipment
2 are located.
- 3 234. Toll Lane—an individual lane located within a toll plaza in which a toll payment is collected or,
4 for toll-ticket systems, a toll ticket is issued.
- 5 235. Toll Plaza—the location at which tolls are collected consisting of a grouping of toll booths, toll
6 islands, toll lanes, and, typically, a canopy. Toll plazas might be located on highway mainlines
7 or on interchange ramps. A mainline toll plaza is sometimes referred to as a barrier toll plaza
8 because it interrupts the traffic flow.
- 9 236. Toll-Ticket System—a system in which the user of a toll road receives a ticket from a machine
10 or toll booth attendant upon entering a toll system. The ticket denotes the user’s point of entry
11 and, upon exiting the toll system, the user surrenders the ticket and is charged a toll based on
12 the distance traveled between the points of entry and exit.
- 13 237. Traffic—pedestrians, bicyclists, ridden or herded animals, vehicles, streetcars, and other
14 conveyances either singularly or together while using for purposes of travel any highway or
15 private road open to public travel ~~for purposes of travel.~~
- 16 238. Traffic Control Device—a sign, signal, marking, or other device used to regulate, warn, or guide
17 traffic, placed on, over, or adjacent to a street, highway, private road open to public travel,
18 pedestrian facility, or shared-use path by authority of a public agency or official having
19 jurisdiction, or, in the case of a private road open to public travel, by authority of the private
20 owner or private official having jurisdiction.
- 21 239. Traffic Control Signal (Traffic Signal)—any highway traffic signal by which traffic is
22 alternately directed to stop and permitted to proceed.
- 23 240. Train—one or more locomotives coupled, with or without cars, that operates on rails or tracks
24 and to which all other traffic must yield the right-of-way by law at highway-rail grade crossings.
- 25 241. Transverse Markings—pavement markings that are generally placed perpendicular and across
26 the flow of traffic such as shoulder markings; word, ~~and~~ symbol, and arrow markings; stop
27 lines; crosswalk lines; speed measurement markings; parking space markings; and others.
- 28 242. Traveled Way—the portion of the roadway for the movement of vehicles, exclusive of the
29 shoulders, berms, sidewalks, and parking lanes.
- 30 243. Turn Bay—a lane for the exclusive use of turning vehicles that is formed on the approach to the
31 location where the turn is to be made. In most cases where turn bays are provided, drivers who
32 desire to turn must move out of a through lane into the newly formed turn bay in order to turn.
33 A through lane that becomes a turn lane is considered to be a dropped lane rather than a turn
34 bay.
- 35 244. Upstream—a term that refers to a location that is encountered by traffic prior to a downstream
36 location as it flows in an “upstream to downstream” direction. For example, “the upstream end
37 of a lane line separating the turn lane from a through lane on the approach to an intersection” is
38 the end of the line that is furthest from the intersection.
- 39 245. Urban Street—a type of street normally characterized by relatively low speeds, wide ranges of
40 traffic volumes, narrower lanes, frequent intersections and driveways, significant pedestrian
41 traffic, and more businesses and houses.
- 42 246. Vehicle—every device in, upon, or by which any person or property can be transported or
43 drawn upon a highway, except trains and light rail transit operating in exclusive or semi-
44 exclusive alignments. Light rail transit equipment operating in a mixed-use alignment, to which
45 other traffic is not required to yield the right-of-way by law, is a vehicle.
- 46 ~~22. Vehicle Intrusion Detection Devices—a detector or detectors used as a part of a system~~
47 ~~incorporating processing logic to detect the presence of vehicles within the minimum track~~
48 ~~clearance distance and to control the operation of the exit gates.~~ relocated from Section 8A.01
- 49 247. Vibrotactile Pedestrian Device—a device an accessible pedestrian signal feature that
50 communicates, by touch, information about pedestrian timing using a vibrating surface.
51 relocated from Section 4A.02
- 52 248. Visibility-Limited Signal Face or Visibility-Limited Signal Section—a type of signal face or
53 signal section designed (or shielded, hooded, or louvered) to restrict the visibility of a signal
54 indication from the side, to a certain lane or lanes, or to a certain distance from the stop line.
55 relocated from Section 4A.02

- 1 249. Walk Interval—an interval during which the WALKING PERSON (symbolizing WALK) signal
2 indication is displayed. ~~When a verbal message is provided at an accessible pedestrian signal,~~
3 ~~the verbal message is “walk sign.”~~ relocated from Section 4A.02
- 4 250. Warning Beacon—a beacon used only to supplement an appropriate warning or regulatory sign
5 or marker. relocated from Section 4A.02
- 6 251. Warning Light—a portable, powered, yellow, lens-directed, enclosed light that is used in a
7 temporary traffic control zone in either a steady burn or a flashing mode.
- 8 252. Warning Sign—a sign that gives notice to road users of a situation that might not be readily
9 apparent.
- 10 253. Warrant—a warrant describes a threshold conditions ~~to the engineer in evaluating the potential~~
11 ~~safety and operational benefits of traffic control devices and is~~ based upon average or normal
12 conditions that, if found to be satisfied as part of an engineering study, shall result in analysis of
13 other traffic conditions or factors to determine whether a traffic control device or other
14 improvement is justified. Warrants are not a substitute for engineering judgment. The fact
15 that a warrant for a particular traffic control device is met is not conclusive justification for the
16 installation of the device.
- 17 254. Wayside Equipment—the signals, switches, and/or control devices for railroad or light rail
18 transit operations housed within one or more enclosures located along the railroad or light rail
19 transit right-of-way and/or on railroad or light rail transit property. relocated from Section
20 8A.01
- 21 255. Wayside Horn System—a stationary horn (or series of horns) located at a grade crossing that is
22 used in conjunction with train-activated or light rail transit-activated warning systems to
23 provide audible warning of approaching rail traffic to road users on the highway or pathway
24 approaches to a grade crossing, either as a supplement or alternative to the sounding of a
25 locomotive horn.
- 26 256. Worker—a person on foot whose duties place him or her within the right-of-way of a street,
27 highway, or pathway, such as street, highway, or pathway construction and maintenance forces,
28 survey crews, utility crews, responders to incidents within the street, highway, or pathway right-
29 of-way, and law enforcement personnel when directing traffic, investigating crashes, and
30 handling lane closures, obstructed roadways, and disasters within the right-of-way of a street,
31 highway, or pathway.
- 32 257. Wrong-Way Arrow—a slender, elongated, white pavement marking arrow placed upstream
33 from the ramp terminus to indicate the correct direction of traffic flow. Wrong-way arrows are
34 intended primarily to warn wrong-way road users that they are going in the wrong direction.
- 35 258. Yellow Change Interval—the first interval following the green or flashing arrow interval during
36 which the steady yellow signal indication is displayed. relocated from Section 4A.02
- 37 259. Yield Line—a row of solid white isosceles triangles pointing toward approaching vehicles
38 extending across approach lanes to indicate the point at which the yield is intended or required
39 to be made.

40 Section 1A.14 Meanings of Acronyms and Abbreviations in this Manual

41 Standard:

42 The following acronyms and abbreviations, when used in this Manual, shall have the following
43 meanings:

- 44 1. AADT—annual average daily traffic
- 45 2. AASHTO—American Association of State Highway and Transportation Officials
- 46 3. ADA—Americans with Disabilities Act
- 47 4. ADAAG—Americans with Disabilities Accessibility Guidelines
- 48 5. ADT—average daily traffic
- 49 6. AFAD—Automated Flagger Assistance Device
- 50 7. ANSI—American National Standards Institute
- 51 8. CFR—Code of Federal Regulations
- 52 9. CMS—changeable message sign
- 53 10. dBA—A-weighted decibels
- 54 11. EPA—Environmental Protection Agency
- 55 12. ETC—electronic toll collection

- 1 [13. EV—electric vehicle](#)
- 2 [14. FHWA—Federal Highway Administration](#)
- 3 [15. FRA—Federal Railroad Administration](#)
- 4 [16. FTA—Federal Transit Administration](#)
- 5 [17. HOT—high occupancy tolls](#)
- 6 [18. HOTM—FHWA’s Office of Transportation Management](#)
- 7 [19. HOTO—FHWA’s Office of Transportation Operations](#)
- 8 [20. HOV—high-occupancy vehicle](#)
- 9 [21. ILEV—inherently low emission vehicle](#)
- 10 [22. ISEA—International Safety Equipment Association](#)
- 11 [23. ITE—Institute of Transportation Engineers](#)
- 12 [24. ITS—intelligent transportation systems](#)
- 13 [25. LED—light emitting diode](#)
- 14 [26. LP—liquid petroleum](#)
- 15 [27. MPH or mph—miles per hour](#)
- 16 [28. MUTCD—Manual on Uniform Traffic Control Devices](#)
- 17 [29. NCHRP—National Cooperative Highway Research Program](#)
- 18 [30. ORT—open-road tolling](#)
- 19 [31. PCMS—portable changeable message sign](#)
- 20 [32. PRT—perception-response time](#)
- 21 [33. RPM—raised pavement marker](#)
- 22 [34. RRPM—raised retroreflective pavement marker](#)
- 23 [35. RV—recreational vehicle](#)
- 24 [36. TDD—telecommunication devices for the deaf](#)
- 25 [37. TRB—Transportation Research Board](#)
- 26 [38. TTC—temporary traffic control](#)
- 27 [39. U.S.—United States](#)
- 28 [40. U.S.C.—United States Code](#)
- 29 [41. USDOT—United States Department of Transportation](#)
- 30 [42. UVC—Uniform Vehicle Code](#)
- 31 [43. VPH or vph—vehicles per hour](#)

32 **Section ~~1A.14~~ 1A.15 Abbreviations Used on Traffic Control Devices**

33 **Standard:**

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

36 When the word messages shown in Table 1A-2 need to be abbreviated on a portable changeable
37 message sign, the abbreviations shown in Table 1A-2 shall be used. Unless indicated by an asterisk,
38 these abbreviations shall only be used on portable changeable message signs.

39 **Guidance:**

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

43 **Standard:**

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

46 **Guidance:**

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

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

CHAPTER 2A. GENERAL

Section 2A.01 Function and Purpose of Signs

Support:

This Manual contains Standards, Guidance, and Options for the signing ~~within the right of way~~ of all types of highways, and private roads open to public travel. The functions of signs are to provide regulations, warnings, and guidance information for road users. ~~Both~~ Words, ~~and~~ symbols, and arrows are used to convey the messages. Signs are not typically used to confirm rules of the road.

Detailed sign requirements are located in the following Chapters of Part 2:

Chapter 2B—Regulatory Signs, Barricades, and Gates

Chapter 2C—Warning Signs and Object Markers

Chapter 2D—Guide Signs ~~(for Conventional Roads)~~

Chapter 2E—Guide Signs ~~(for Freeways and Expressways)~~

Chapter 2F—Toll Road Signs

Chapter 2G—Preferential and Managed Lane Signs

Chapter 2H—General Information Signs

Chapter 2I—General Service Signs

Chapter ~~2J~~ 2J—Specific Service (Logo) Signs

Chapter ~~2K~~ 2K—Tourist-Oriented Directional Signs

Chapter 2L—Changeable Message Signs

Chapter ~~2M~~ 2M—Recreational and Cultural Interest Area Signs

Chapter ~~2N~~ 2N—Emergency Management Signs

Standard:

Because the requirements and standards for signs depend on the particular type of highway upon which they are to be used, the ~~following~~ definitions for freeway, expressway, conventional road, and special purpose road given in Section 1A.13 shall apply in Part 2.

~~A. Freeway—a divided highway with full control of access;~~

~~B. Expressway—a divided highway with partial control of access;~~

~~C. Conventional Road—a street or highway other than a low volume road (as defined in Section 5A.01), a freeway, or an expressway; and~~

~~D. Special Purpose Road—a low volume, low speed road that serves recreational areas or resource development activities, or that provides local access.~~

Section 2A.02 Definitions

Support:

Definitions and acronyms that are applicable to signs are given in Sections 1A.13 and ~~2A.01~~ 1A.14.

Section 2A.03 Standardization of Application

Support:

It is recognized that urban traffic conditions differ from those in rural environments, and in many instances signs are applied and located differently. Where pertinent and practical, this Manual sets forth separate recommendations for urban and rural conditions.

Guidance:

Signs should be used only where justified by engineering judgment or studies, as ~~noted~~ provided in Section 1A.09.

Results from traffic engineering studies of physical and traffic factors should indicate the locations where signs are deemed necessary or desirable.

Roadway geometric design and sign application should be coordinated so that signing can be effectively placed to give the road user any necessary regulatory, warning, guidance, and other information.

Standard:

Each standard sign shall be displayed only for the specific purpose as prescribed in this Manual. Determination of the particular signs to be applied to a specific condition shall be made in accordance with the ~~criteria~~ provisions set forth in Part 2. Before any new highway, private road open to public

1 [travel \(see definition in Section 1A.13\)](#), detour, or temporary route is opened to ~~traffic~~ [public travel](#), all
2 necessary signs shall be in place. Signs required by road conditions or restrictions shall be removed
3 when those conditions cease to exist or the restrictions are withdrawn.

4 **Section 2A.04 Excessive Use of Signs**

5 Guidance:

6 Regulatory and warning signs should be used conservatively because these signs, if used to excess, tend to
7 lose their effectiveness. If used, route signs and directional [guide](#) signs should be used frequently because
8 ~~they~~ [their use](#) promotes ~~reasonably safe and~~ efficient operations by keeping road users informed of their
9 location.

10 **Section 2A.05 Classification of Signs**

11 **Standard:**

12 **Signs shall be defined by their function as follows:**

- 13 **A. Regulatory signs give notice of traffic laws or regulations.**
- 14 **B. Warning signs give notice of a situation that might not be readily apparent.**
- 15 **C. Guide signs show route designations, destinations, directions, distances, services, points of**
16 **interest, and other geographical, recreational, or cultural information.**

17 [Support:](#)

18 [Object markers are defined in Section 2C.63.](#)

19 **Section 2A.06 Design of Signs**

20 Support:

21 This Manual shows many typical standard signs [and object markers](#) approved for use on streets,
22 highways, bikeways, and pedestrian crossings.

23 In the specifications for individual signs [and object markers](#), the general appearance of the legend, color,
24 and size are shown in the accompanying tables and illustrations, and are not always detailed in the text.

25 Detailed drawings of standard signs, [object markers](#), ~~and~~ alphabets, [symbols, and arrows \(see Figure 2D-](#)
26 [2\)](#) are shown in the “Standard Highway Signs [and Markings](#)” book. Section 1A.11 contains information
27 regarding how to obtain this publication.

28 The basic requirements of a ~~highway~~ sign are that it be legible to those for whom it is intended and that it
29 be understandable in time to permit a proper response. Desirable attributes include:

- 30 A. High visibility by day and night; and
- 31 B. High legibility (adequately sized letters, ~~or~~ [symbols, or arrows](#), and a short legend for quick
32 comprehension by a road user approaching a sign).

33 Standardized colors and shapes are specified so that the several classes of traffic signs can be promptly
34 recognized. Simplicity and uniformity in design, position, and application are important.

35 **Standard:**

36 **The term legend shall include all word messages and symbol [and arrow](#) designs that are intended to**
37 **convey specific meanings.**

38 **Uniformity in design shall include shape, color, dimensions, legends, borders, and illumination or**
39 **retroreflectivity.**

40 [Standardization of these designs does not preclude further improvement by minor changes in the](#)
41 [proportion or orientation of symbols, width of borders, or layout of word messages, but all shapes and](#)
42 [colors shall be as indicated.](#) this text was relocated from below

43 [All symbols shall be unmistakably similar to, or mirror images of, the adopted symbol signs, all of](#)
44 [which are shown in the “Standard Highway Signs and Markings” book \(see Section 1A.11\). Symbols](#)
45 [and colors shall not be modified unless otherwise provided in this Manual. All symbols and colors for](#)
46 [signs not shown in the “Standard Highway Signs and Markings” book shall follow the procedures for](#)
47 [experimentation and change described in Section 1A.10.](#) this paragraph was relocated from Section 1A.03

48 [Option:](#)

1 Although the standard design of symbol signs cannot be modified, the orientation of the symbol may be
2 changed to better reflect the direction of travel, if appropriate. this paragraph was relocated from Section
3 1A.03

4 **Standard:**

5 Where a standard word message is applicable, the wording shall be as ~~herein~~ provided in this
6 Manual. ~~Standardization of these designs does not preclude further improvement by minor changes in~~
7 ~~the proportion or orientation of symbols, width of borders, or layout of word messages, but all shapes~~
8 ~~and colors shall be as indicated.~~ this text was relocated to above

9 In situations where word messages are required other than those ~~herein~~ provided in this Manual,
10 the signs shall be of the same shape and color as standard signs of the same functional type.

11 **Option:**

12 State and local highway agencies may develop special word message signs in situations where roadway
13 conditions make it necessary to provide road users with additional regulatory, warning, or guidance
14 information, such as when road users need to be notified of special regulations or warned about a situation that
15 might not be readily apparent. Unlike colors that have not been assigned or symbols that have not been
16 approved for signs, new word message signs may be used without the need for experimentation. this
17 paragraph was relocated within this Section – the added text was relocated and edited from Section 1A.03

18 **Standard:**

19 Except as ~~stated~~ provided in the Option below Paragraph 16 and except for the Carpool
20 Information (D12-2) sign (see Section 2I.11), Internet addresses and e-mail addresses, including domain
21 names and uniform resource locators (URL), shall not be shown displayed on any sign, supplemental
22 plaque, sign panel (including logo sign panels on Specific Service signs), or changeable message sign.

23 **Guidance:**

24 Unless otherwise ~~stated~~ provided in this Manual for a specific sign, and except as ~~stated~~ provided in ~~the~~
25 ~~Option below Paragraph 16,~~ telephone numbers of more than four characters should not be ~~shown~~ displayed
26 on any sign, supplemental plaque, sign panel (including logo sign panels on Specific Service signs), or
27 changeable message sign.

28 **Option:**

29 Internet addresses, e-mail addresses, or telephone numbers with more than four characters may be ~~shown~~
30 displayed on signs, supplemental plaques, sign panels, and changeable message signs that are intended for
31 viewing only by pedestrians, bicyclists, occupants of parked vehicles, or drivers of vehicles on low-speed
32 roadways where engineering judgment indicates that an area is available for drivers ~~can reasonably safely to~~
33 stop out of the traffic flow to read the message.

34 **Standard:**

35 Pictographs (see definition in Section 1A.13) shall not be displayed on signs except as specifically
36 provided in this Manual. Pictographs shall be simple, dignified, and devoid of any advertising. When
37 used to represent a political jurisdiction (such as a State, county, or municipal corporation) the
38 pictograph shall be the official designation adopted by the jurisdiction. When used to represent a
39 college or university, the pictograph shall be the official seal adopted by the institution. Pictorial
40 representations of university or college programs shall not be permitted to be displayed on a sign.

41 ~~Section 2A.07 Changeable Message Signs~~ the text from this Section has been relocated to new Chapter
42 2L

43 **Section ~~2A.08~~ 2A.07 Retroreflectivity and Illumination**

44 **Support:**

45 There are many materials currently available for retroreflection and various methods currently available
46 for the illumination of signs and object markers. New materials and methods continue to emerge. New
47 materials and methods can be used as long as the signs and object markers meet the standard requirements for
48 color, both by day and by night.

49 **Standard:**

1 Regulatory, warning, and guide signs **and object markers** shall be retroreflective ([see Section 2A.08](#))
2 or illuminated to show the same shape and similar color by both day and night, unless ~~specifically~~
3 ~~stated~~ otherwise [provided](#) in the text discussion in this Manual ~~of~~ [for](#) a particular sign or group of signs.

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

6 ~~Guidance:~~

7 ~~All overhead sign installations should be illuminated unless an engineering study shows that~~
8 ~~retroreflection will perform effectively without illumination.~~

9 Option:

10 Sign elements may be illuminated by the means shown in Table 2A-1.

11 Retroreflection of sign elements may be accomplished by the means shown in Table 2A-2.

12 Light Emitting Diode (LED) units may be used individually within the ~~face~~ [legend or symbol](#) of a sign
13 and in the border of a sign, except for changeable message signs, to improve the conspicuity, increase the
14 legibility of sign legends and borders, or provide a changeable message. ~~Individual LED pixels may be used~~
15 ~~in the border of a sign.~~

16 **Standard:**

17 ~~A module of multiple LED units used as a closely spaced, single light source shall only be used~~
18 ~~within the sign face for legends or symbols.~~

19 [Except as provided in Paragraphs 11 and 12, neither individual LEDs nor groups of LEDs shall be](#)
20 [placed within the background area of a sign.](#)

21 [If used, the LEDs shall have a maximum diameter of 1/4 inch and shall be the same color as the sign](#)
22 [legend, border, or background, following colors based on the type of sign:](#)

23 [A. White or red, if used with STOP or YIELD signs.](#)

24 [B. White, if used with regulatory signs other than STOP or YIELD signs.](#)

25 [C. White or yellow, if used with warning signs.](#)

26 [D. White, if used with guide signs.](#)

27 [E. White, yellow, or orange, if used with temporary traffic control signs.](#)

28 [F. White or yellow, if used with school area signs.](#)

29 **If flashed, all LED units shall flash simultaneously at a rate of more than 50 and less than 60 times**
30 **per minute.**

31 **The uniformity of the sign design shall be maintained without any decrease in visibility, legibility, or**
32 **driver comprehension during either daytime or nighttime conditions.**

33 [Option:](#)

34 [For STOP and YIELD signs, LEDs may be placed within the border or within one border width within the](#)
35 [background of the sign.](#)

36 [For STOP/SLOW paddles \(see Section 6E.03\) used by flaggers and the STOP paddles \(see Section](#)
37 [7D.05\) used by adult crossing guards, individual LEDs or groups of LEDs may be used.](#)

38 Support:

39 [Other methods of enhancing the conspicuity of standard signs are described in Section 2A.15.](#)

40 Information regarding the use of retroreflective material on the sign support is contained in Section 2A.21.

41 **Section ~~2A.09~~ [2A.08](#) Maintaining Minimum Retroreflectivity**

42 Support:

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

45 **Standard:**

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

48 Support:

49 Compliance with the ~~above~~ Standard [in Paragraph 2](#) is achieved by having a method in place and using
50 the method to maintain the minimum levels established in Table 2A-3. Provided that an assessment or

1 management method is being used, an agency or official having jurisdiction would be in compliance with the
2 ~~above~~ Standard [in Paragraph 2](#) even if there are some individual signs that do not meet the minimum
3 retroreflectivity levels at a particular point in time.

4 Guidance:

5 Except for those signs specifically identified in ~~the Option in this Section~~ [Paragraph 6](#), one or more of the
6 following assessment or management methods should be used to maintain sign retroreflectivity:

- 7 A. Visual Nighttime Inspection—The retroreflectivity of an existing sign is assessed by a trained sign
8 inspector conducting a visual inspection from a moving vehicle during nighttime conditions. Signs
9 that are visually identified by the inspector to have retroreflectivity below the minimum levels should
10 be replaced.
- 11 B. Measured Sign Retroreflectivity—Sign retroreflectivity is measured using a retroreflectometer. Signs
12 with retroreflectivity below the minimum levels should be replaced.
- 13 C. Expected Sign Life—When signs are installed, the installation date is labeled or recorded so that the
14 age of a sign is known. The age of the sign is compared to the expected sign life. The expected sign
15 life is based on the experience of sign retroreflectivity degradation in a geographic area compared to
16 the minimum levels. Signs older than the expected life should be replaced.
- 17 D. Blanket Replacement—All signs in an area/corridor, or of a given type, should be replaced at
18 specified intervals. This eliminates the need to assess retroreflectivity or track the life of individual
19 signs. The replacement interval is based on the expected sign life, compared to the minimum levels,
20 for the shortest-life material used on the affected signs.
- 21 E. Control Signs—Replacement of signs in the field is based on the performance of a sample of control
22 signs. The control signs might be a small sample located in a maintenance yard or a sample of signs
23 in the field. The control signs are monitored to determine the end of retroreflective life for the
24 associated signs. All field signs represented by the control sample should be replaced before the
25 retroreflectivity levels of the control sample reach the minimum levels.
- 26 F. Other Methods—Other methods developed based on engineering studies can be used.

27 Support:

28 Additional information about these methods is contained in the 2007 Edition of FHWA’s “Maintaining
29 Traffic Sign Retroreflectivity” (see Section 1A.11).

30 Option:

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

- 33 A. Parking, Standing, and Stopping signs (R7 and R8 series)
- 34 B. Walking/Hitchhiking/Crossing signs (R9 series, R10-1 through R10-4b)
- 35 C. ~~Adopt A Highway~~ [Acknowledgment](#) signs
- 36 D. All signs with blue or brown backgrounds
- 37 E. Bikeway signs that are intended for exclusive use by bicyclists or pedestrians

38 ~~Section 2A.10~~ [2A.09](#) Shapes

39 Standard:

40 Particular shapes, as shown in Table 2A-4, shall be used exclusively for specific signs or series of
41 signs, unless **specifically stated** otherwise [provided](#) in the text discussion in this Manual for a particular
42 sign or class of signs.

43 ~~Section 2A.11~~ [2A.10](#) Sign Colors

44 Standard:

45 The colors to be used on standard signs and their specific use on these signs shall be as **indicated**
46 [provided](#) in the applicable Sections of this Manual. The color coordinates and values shall be as
47 described in 23 CFR, Part 655, Subpart F, Appendix.

48 Support:

49 As a quick reference, common uses of sign colors are shown in Table 2A-5. Color schemes on specific
50 signs are shown in the illustrations located in each appropriate ~~Section~~ [Chapter](#).

1 Whenever white is specified ~~herein in this Manual or in the~~ [“Standard Highway Signs and Markings”](#)
2 [book \(see Section 1A.11\)](#) as a color, it is understood to include silver-colored retroreflective coatings or
3 elements that reflect white light.

4 The colors coral, ~~purple~~, and light blue are being reserved for uses that will be determined in the future by
5 the Federal Highway Administration.

6 Information regarding color coding of destinations on guide signs, including community wayfinding
7 signs, is contained in ~~Section 2D.03~~ [Chapter 2D](#).

8 **Option:**

9 [The approved fluorescent version of the standard red, yellow, green, or orange color may be used as an](#)
10 [alternative to the corresponding standard color.](#)

11 **Section ~~2A.12~~ [2A.11](#) Dimensions**

12 Support:

13 ~~Sign sizes for use on the different classes of highways are shown in Sections 2B.03, 2C.04, 2D.04, 5A.03,~~
14 ~~6F.02, 7B.01, 8B.02, and 9B.02, and in the “Standard Highway Signs” book (see Section 1A.11).~~

15 The “Standard Highway Signs [and Markings](#)” book (see Section 1A.11) prescribes design details for up to
16 five different sizes depending on the type of traffic facility, including bikeways. Smaller sizes are designed to
17 be used on bikeways and some other off-road applications. Larger sizes are designed for use on freeways and
18 expressways, and can also be used to enhance road user safety and convenience on other facilities, especially
19 on multi-lane divided highways and on undivided highways having five or more lanes of traffic and/or high
20 speeds. The intermediate sizes are designed to be used on other highway types.

21 **Standard:**

22 The sign dimensions prescribed in [the sign size tables in the various Parts and Chapters in this](#)
23 [Manual and in the “Standard Highway Signs and Markings” book \(see Section 1A.11\)](#) shall be used
24 unless engineering judgment determines that other sizes are appropriate. [Except as provided in](#)
25 [Paragraph 3](#), where engineering judgment determines that sizes smaller than the prescribed dimensions
26 are appropriate for use, the sign dimensions shall not be less than the minimum dimensions specified in
27 this Manual. [The sizes shown in the Minimum columns that are smaller than the sizes shown in the](#)
28 [Conventional Road columns in the various sign size tables in this Manual shall only be used on low-](#)
29 [speed roadways, alleys, and private roads open to public travel where the reduced legend size would be](#)
30 [adequate for the regulation or warning or where physical conditions preclude the use of larger sizes.](#)

31 **Option:**

32 [For alleys with restrictive physical conditions and vehicle usage that limits installation of the Minimum](#)
33 [size sign \(or the Conventional Road size sign if no Minimum size is shown\), both the sign height and the sign](#)
34 [width may be decreased by up to 6 inches.](#)

35 **Guidance:**

36 [The sizes shown in the Freeway and Expressway columns in the various sign size tables in this Manual](#)
37 [should be used on freeways and expressways, and for other higher-speed applications based upon engineering](#)
38 [judgment, to provide larger signs for increased visibility and recognition.](#)

39 [The sizes shown in the Oversized columns in the various sign size tables in this Manual size should be](#)
40 [used for those special applications where speed, volume, or other factors result in conditions where increased](#)
41 [emphasis, improved recognition, or increased legibility is needed, as determined by engineering judgment or](#)
42 [study.](#)

43 Increases above the prescribed sizes should be used where greater legibility or emphasis is needed.
44 ~~Wherever practical~~ [If signs larger than the prescribed sizes are used](#), the overall sign dimensions should be
45 increased in 6-inch increments.

46 **Standard:**

47 Where engineering judgment determines that sizes ~~larger~~ [that are different](#) than the prescribed
48 dimensions are appropriate for use, standard shapes and colors shall be used and standard proportions
49 shall be retained as much as practical.

50 **Guidance:**

1 [When supplemental plaques are installed with larger sized signs, a corresponding increase in the size of](#)
2 [the plaque and its legend should also be made. The resulting plaque size should be approximately in the same](#)
3 [relative proportion to the larger sized sign as the conventional sized plaque is to the conventional sized sign.](#)

4 **Section ~~2A.13~~ 2A.12 Symbols**

5 **Standard:**

6 **Symbol designs shall in all cases be unmistakably similar to those shown in this Manual and in the**
7 **“Standard Highway Signs [and Markings](#)” book (see Section 1A.11).**

8 [Support:](#)

9 New symbol designs ~~shall be~~ **are** adopted by the Federal Highway Administration based on research
10 evaluations to determine road user comprehension, sign conspicuity, and sign legibility.

11 ~~Support:~~

12 Sometimes a change from word messages to symbols requires significant time for public education and
13 transition. Therefore, this Manual [sometimes](#) includes the practice of using educational plaques to accompany
14 ~~some~~ new symbol signs.

15 **Guidance:**

16 New warning or regulatory symbol signs not readily recognizable by the public should be accompanied by
17 an educational plaque.

18 **Option:**

19 Educational plaques may be left in place as long as they are in serviceable condition.

20 State and/or local highway agencies may conduct research studies to determine road user comprehension,
21 sign conspicuity, and sign legibility.

22 [Guidance:](#)

23 Although most standard symbols are oriented facing left, mirror images of these symbols ~~may~~ **should** be
24 used where the reverse orientation might better convey to road users a direction of movement.

25 **Standard:**

26 [A symbol used for a given category of signs \(regulatory, warning, or guide\) shall not be used for a](#)
27 [different category of signs, except as specifically authorized in this Manual.](#)

28 [Except as provided in Paragraph 11, a recreational and cultural interest area symbol \(see Chapter](#)
29 [2M\) shall not be used on streets or highways outside of recreational and cultural interest areas.](#)

30 [A recreational and cultural interest area guide sign symbol \(see Chapter 2M\) shall not be used on](#)
31 [any regulatory or warning sign on any street, road, or highway.](#)

32 [Option:](#)

33 [A recreational and cultural interest area guide sign symbol \(see Section 2M.04\) may be used on a highway](#)
34 [guide sign outside of a recreational and cultural interest area to supplement a comparable word message for](#)
35 [which there is no approved symbol for that message in Chapters 2B through 2I or 2N.](#)

36 [Support:](#)

37 [Section 2M.07 contains provisions for the use of recreational and cultural interest area symbols to indicate](#)
38 [prohibited activities or items in non-road applications.](#)

39 **Section ~~2A.14~~ 2A.13 Word Messages**

40 **Standard:**

41 **Except as ~~noted~~ [provided](#) in Section 2A.06, all word messages shall use standard wording and**
42 **letters as shown in this Manual and in the “Standard Highway Signs [and Markings](#)” book (see Section**
43 **1A.11).**

44 **Guidance:**

45 Word messages should be as brief as possible and the lettering should be large enough to provide the
46 necessary legibility distance. A minimum specific ratio, ~~such as~~ **of** 1 inch of letter height per ~~40~~ **30** feet of
47 legibility distance, ~~;~~ should be used.

48 ~~Support:~~

1 ~~Some research indicates that a ratio of 1 inch of letter height per 33 feet of legibility distance could be~~
2 ~~beneficial.~~

3 ~~Guidance:~~

4 Abbreviations (see Section 1A.15) should be kept to a minimum, ~~and should include only those that are~~
5 ~~commonly recognized and understood, such as AVE (for Avenue), BLVD (for Boulevard), N (for North), or~~
6 ~~JCT (for Junction).~~

7 Word messages should not contain periods, apostrophes, question marks, ampersands, or other
8 punctuation or characters that are not letters, numerals, or hyphens unless necessary to avoid confusion.

9 The solidus (slanted line or forward slash) is intended to be used for fractions only and should not be used
10 to separate words on the same line of legend. Instead, a hyphen should be used for this purpose, such as
11 “TRUCKS - BUSES.”

12 Standard:

13 Fractions shall be displayed with the numerator and denominator diagonally arranged about the
14 solidus (slanted line or forward slash). The overall height of the fraction is measured from the top of
15 the numerator to the bottom of the denominator, each of which is vertically aligned with the upper and
16 lower ends of the solidus. The overall height of the fraction shall be determined by the height of the
17 numerals within the fraction, and shall be 1.5 times the height of an individual numeral within the
18 fraction.

19 Support:

20 The “Standard Highway Signs and Markings” book (see Section 1A.11) contains details regarding the
21 layouts of fractions on signs.

22 Guidance:

23 When initials are used to represent an abbreviation for separate words (such as “U S” for a United States
24 route), the initials should be separated by a space of between 1/2 and 3/4 of the letter height of the initials.

25 When an Interstate route is displayed in text form instead of using the route shield, a hyphen should be
26 used for clarity, such as “I-50.”

27 Standard:

28 All sign lettering shall be in ~~capital~~ upper-case letters as provided in the “Standard Highway Signs
29 and Markings” book (see Section 1A.11), ~~except as indicated in the Option below~~ unless otherwise
30 provided in this Manual for a particular sign or type of message.

31 ~~Option:~~

32 ~~Word messages on street name signs and destinations~~ The sign lettering for names of places, streets,
33 and highways on guide signs may ~~shall~~ be composed of a combination of lower-case letters with initial
34 upper-case letters.

35 Support:

36 Letter height is expressed in terms of the height of an upper-case letter. For mixed-case legends (those
37 composed of an initial upper-case letter followed by lower-case letters), the height of the lower-case letters is
38 derived from the specified height of the initial upper-case letter based on a prescribed ratio. Letter heights for
39 mixed-case legends might be expressed in terms of both the upper- and lower-case letters, or in terms of the
40 initial upper-case letter alone. When the height of a lower-case letter is specified or determined from the
41 prescribed ratio, the reference is to the nominal loop height of the letter. The term loop height refers to the
42 portion of a lower-case letter that excludes any ascending or descending stems or tails of the letter, such as
43 with the letters “d” or “q.” The nominal loop height is equal to the actual height of a non-rounded lower-case
44 letter whose form does not include ascending or descending stems or tails, such as the letter “x.” The rounded
45 portions of a lower-case letter extend slightly above and below the baselines projected from the top and
46 bottom of such a non-rounded letter so that the appearance of a uniform letter height within a word is
47 achieved. The actual loop height of a rounded lower-case letter is slightly greater than the nominal loop
48 height and this additional height is excluded from the expression of the lower-case letter height.

49 Standard:

50 When a mixed-case legend is used, the height of the lower-case letters shall be 3/4 of the height of
51 the initial upper-case letter.

1 The unique letter forms for each of the Standard Alphabet series shall not be stretched, compressed,
2 warped, or otherwise manipulated.

3 Support:

4 Section 2D.04 contains information regarding the acceptable methods of modifying the length of a word
5 for a given letter height and series.

6 **Section ~~2A.15~~ 2A.14 Sign Borders**

7 **Standard:**

8 **Unless ~~specifically stated~~ otherwise provided, each sign illustrated ~~herein~~ in this Manual shall have**
9 **a border of the same color as the legend, at or just inside the edge.**

10 **The corners of all sign borders shall be rounded, except for STOP signs.**

11 Guidance:

12 A dark border on a light background should be set in from the edge, while a light border on a dark
13 background should extend to the edge of the ~~panel~~ sign. A border for 30-inch signs with a light background
14 should be from 1/2 to 3/4 inch in width, 1/2 inch from the edge. For similar signs with a light border, a width
15 of 1 inch should be used. For other sizes, the border width should be of similar proportions, but should not
16 exceed the stroke-width of the major lettering of the sign. On signs exceeding 72 x 120 inches in size, the
17 border should be 2 inches wide, or on larger signs, 3 inches wide. Except for STOP signs and as otherwise
18 provided in Section 2E.16, the corners of the sign should be rounded to ~~fit~~ a radius that is concentric with that
19 of the border.

20 Section 2A.15 Enhanced Conspicuity for Standard Signs

21 Option:

22 Based upon engineering judgment, where the improvement of the conspicuity of a standard regulatory,
23 warning, or guide sign is desired, any of the following methods may be used, as appropriate, to enhance the
24 sign's conspicuity (see Figure 2A-1):

- 25 A. Increasing the size of a standard regulatory, warning, or guide sign.
- 26 B. Doubling-up of a standard regulatory, warning, or guide sign by adding a second identical sign on the
27 left-hand side of the roadway.
- 28 C. Adding a solid yellow or fluorescent yellow rectangular "header panel" above a standard regulatory
29 sign, with the width of the panel corresponding to the width of the standard regulatory sign. A legend
30 of "NOTICE," "STATE LAW," or other appropriate text may be added in black letters within the
31 header panel for a period of time determined by engineering judgment.
- 32 D. Adding a NEW plaque (see Section 2C.62) above a new standard regulatory or warning sign, for a
33 period of time determined by engineering judgment, to call attention to the new sign.
- 34 E. Adding one or more red or orange flags (cloth or retroreflective sheeting) above a standard regulatory
35 or warning sign, with the flags oriented so as to be at 45 degrees to the vertical.
- 36 F. Adding a solid yellow, a solid fluorescent yellow, or a diagonally striped black and yellow (or black
37 and fluorescent yellow) strip of retroreflective sheeting at least 3 inches wide around the perimeter of
38 a standard warning sign. This may be accomplished by affixing the standard warning sign on a
39 background that is 6 inches larger than the size of the standard warning sign.
- 40 G. Adding a warning beacon (see Section 4L.03) to a standard regulatory (other than a STOP or a Speed
41 Limit sign), warning, or guide sign.
- 42 H. Adding a speed limit sign beacon (see Section 4L.04) to a standard Speed Limit sign.
- 43 I. Adding a stop beacon (see Section 4L.05) to a STOP sign.
- 44 J. Adding light emitting diode (LED) units within the symbol or legend of a sign or border of a standard
45 regulatory, warning, or guide sign, as provided in Section 2A.07.
- 46 K. Adding a strip of retroreflective material to the sign support in compliance with the provisions of
47 Section 2A.21.
- 48 L. Using other methods that are specifically allowed for certain signs as described elsewhere in this
49 Manual.

50 Support:

51 Sign conspicuity improvements can also be achieved by removing non-essential and illegal signs from the
52 right-of-way (see Section 1A.08), and by relocating signs to provide better spacing.

1 **Standard:**

2 **The NEW plaque (see Section 2C.62) shall not be used alone.**

3 **Strobe lights shall not be used to enhance the conspicuity of highway signs.**

4 **Section 2A.16 Standardization of Location**

5 Support:

6 Standardization of position cannot always be attained in practice. Examples of heights and lateral
7 locations of signs for typical installations are illustrated in Figure 2A-2, and examples of locations for some
8 typical signs at intersections are illustrated in Figures 2A-3 and 2A-4.

9 Examples of advance signing on an intersection approach are illustrated in Figure 2A-4. Chapters 2B, 2C,
10 and 2D contain provisions regarding the application of regulatory, warning, and guide signs, respectively.

11 **Standard:**

12 **Signs requiring ~~different~~ separate decisions by the road user shall be spaced sufficiently far apart**
13 **for the ~~required~~ appropriate decisions to be made ~~reasonably safely~~. One of the factors considered**
14 **when determining the appropriate spacing shall be the posted or 85th-percentile speed.**

15 Guidance:

16 Signs should be located on the right-hand side of the roadway where they are easily recognized and
17 understood by road users. Signs in other locations should be considered only as supplementary to signs in the
18 normal locations, except as otherwise ~~indicated~~ provided in this Manual.

19 Signs should be individually installed on separate posts or mountings except where:

- 20 A. One sign supplements another;
21 B. Route or directional signs are grouped to clarify information to motorists;
22 C. Regulatory signs that do not conflict with each other are grouped, such as Turn Prohibition signs
23 posted with ONE WAY signs, ~~street name signs posted with a stop or yield sign,~~ or a parking
24 regulation sign posted with a Speed Limit sign; or
25 D. Street Name signs are posted with a STOP or YIELD sign.

26 Signs should be located so that they:

- 27 A. Are outside the clear zone unless placed on a breakaway or yielding support (see Section 2A.19),
28 B. Optimize nighttime visibility,
29 C. Minimize the effects of mud splatter and debris,
30 D. Do not obscure each other,
31 E. Do not obscure the sight distance to approaching vehicles on the major street for drivers who are
32 stopped on minor-street approaches, and
33 F. Are not hidden from view.

34 Support:

35 The clear zone is the total roadside border area, starting at the edge of the traveled way, available for use
36 by errant vehicles. The width of the clear zone is dependent upon traffic volumes, speeds, and roadside
37 geometry. Additional information can be found in AASHTO's "Roadside Design Guide" (see Section 1A.11).

38 Guidance:

39 With the increase in traffic volumes and the desire to provide road users regulatory, warning, and
40 guidance information, an order of priority for sign installation should be established.

41 Support:

42 An order of priority is especially critical where space is limited for sign installation and there is a demand
43 for several different types of signs. Overloading road users with too much information is not desirable.

44 Guidance:

45 Because regulatory and warning information is more critical to the road user than guidance information,
46 regulatory and warning signing whose location is critical should be displayed rather than guide signing in
47 cases where conflicts occur. Community wayfinding and acknowledgment guide signs should have a lower
48 priority as to placement than other guide signs. Information of a less critical nature should be moved to less
49 critical locations or omitted.

50 Option:

1 Under some circumstances, such as on curves to the right, signs may be placed on median islands or on
2 the left-hand side of the road. A supplementary sign located on the left-hand side of the roadway may be used
3 on a multi-lane road where traffic in a lane to the right lane might obstruct the view to the right.

4 Guidance:

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

7 **Section 2A.17 Overhead Sign Installations**

8 Guidance:

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

11 Support:

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

15 Option:

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

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

31 Over-crossing structures may ~~serve for the~~ be used to support ~~of~~ overhead signs.

32 Support:

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

36 **Section 2A.18 Mounting Height** paragraphs have been rearranged within this Section to improve clarity

37 ~~Support~~ **Standard:**

38 **The provisions of this Section shall apply unless specifically stated otherwise for a particular sign or**
39 **object marker elsewhere in this Manual.**

40 Support:

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

42 In addition to the provisions of this Section, information affecting the minimum mounting height of signs
43 as a function of crash performance can be found in AASHTO's "Roadside Design Guide" (see Section
44 1A.11).

45 **Standard:**

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

49 The minimum height, measured vertically from the bottom of the sign to the top of the curb, or in
50 the absence of curb, measured vertically from the bottom of the sign to the elevation of the near edge of
51 the traveled way, of signs installed at the side of the road in business, commercial, or residential areas

1 where parking or pedestrian movements are likely to occur, or where the view of the sign might be
2 obstructed, the clearance to the bottom of the sign shall be at least 7 feet (see Figure 2A-2).

3 Option:

4 The height to the bottom of a secondary sign mounted below another sign may be 1 foot less than the
5 height specified ~~above~~ in Paragraphs 4 and 5.

6 **Standard:**

7 The minimum height, measured vertically from the bottom of the sign to the sidewalk, of signs
8 installed above sidewalks shall be 7 feet.

9 If the bottom of a secondary sign that is mounted below another sign is mounted lower than 7 feet
10 above a pedestrian sidewalk or pathway (see Section 6D.02), the secondary sign shall not project more
11 than 4 inches into the pedestrian facility.

12 Option:

13 ~~Where~~ Signs that are placed 30 feet or more from the edge of the traveled way, ~~the~~ may be installed with a
14 minimum height to the bottom of such signs may be of 5 feet, above the level measured vertically from the
15 bottom of the sign to the elevation of the near edge of the pavement edge.

16 **Standard:**

17 Directional signs on freeways and expressways shall be installed with a minimum height of 7 feet,
18 measured vertically from the bottom of the sign to the elevation of the near edge of the pavement. All
19 route signs, warning signs, and regulatory signs on freeways and expressways shall be ~~at least~~ installed
20 with a minimum height of 7 feet, measured vertically from the bottom of the sign to above the level
21 elevation of the near edge of the pavement edge. If a secondary sign is mounted below another sign on a
22 freeway or expressway, the major sign shall be installed at least with a minimum height of 8 feet and
23 the secondary sign at least shall be installed with a minimum height of 5 feet, measured vertically from
24 the bottom of the sign to above the level elevation of the near edge of the pavement edge. sentences were
25 rearranged

26 Where large signs having an area exceeding 50 square feet are installed on multiple breakaway
27 posts, the clearance from the ground to the bottom of the sign shall be at least 7 feet. repeated from
28 Section 6F.03

29 Option:

30 A route sign assembly consisting of a route sign and auxiliary signs (see Section 2D.31) may be treated as
31 a single sign for the purposes of this Section.

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

35 ~~Support:~~

36 ~~Without this flexibility regarding steep backslopes, some agencies might decide to relocate the sign closer~~
37 ~~to the road, which might be less desirable.~~

38 **Standard:**

39 Overhead ~~mounted~~ signs shall provide a vertical clearance of not less than 17 feet to the sign, light
40 fixture, or sign bridge, over the entire width of the pavement and shoulders except where the structure
41 on which the overhead signs are to be mounted or other structures along the roadway near the sign
42 structure have a lesser vertical clearance is used for the design of other structures.

43 Option:

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

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

49 Support:

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

51 **Section 2A.19 Lateral Offset**

1 **Standard:**

2 For overhead sign supports, the minimum lateral offset from the edge of the shoulder (or if no
3 shoulder exists, from the edge of the pavement) to the near edge of overhead sign supports (cantilever
4 or sign bridges) shall be 6 feet. Overhead sign supports shall have a barrier or crash cushion to shield
5 them if they are within the clear zone.

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

8 Guidance:

9 For ~~ground-~~ post-mounted signs, the minimum lateral offset should be 12 feet from the edge of the
10 traveled way. If a shoulder wider than 6 feet exists, the minimum lateral offset for ~~ground-~~ post-mounted
11 signs should be 6 feet from the edge of the shoulder.

12 Support:

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

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

16 Guidance:

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

20 Option:

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

23 **Standard:**

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

26 Option:

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

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

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

33 Guidance:

34 Overhead sign supports and post-mounted sign and object marker supports should not intrude into the
35 usable width of a sidewalk or other pedestrian facility.

36 Support:

37 Figures 2A-2 and 2A-3 illustrate some examples of the lateral offset requirements contained in this
38 Section.

39 **Section 2A.20 Orientation**

40 Guidance:

41 Unless otherwise ~~stated~~ provided in this Manual, signs should be vertically mounted at right angles to the
42 direction of, and facing, the traffic that they are intended to serve.

43 Where mirror reflection from the sign face is encountered to such a degree as to reduce legibility, the sign
44 should be turned slightly away from the road. Signs that are placed 30 feet or more from the pavement edge
45 should be turned toward the road. On curved alignments, the angle of placement should be determined by the
46 direction of approaching traffic rather than by the roadway edge at the point where the sign is located.

47 Option:

48 On grades, sign faces may be tilted forward or back from the vertical position to improve the viewing
49 angle.

1 **Section 2A.21 Posts and Mountings**

2 **Standard:**

3 **Sign posts, foundations, and mountings shall be so constructed as to hold signs in a proper and**
4 **permanent position, and to resist swaying in the wind or displacement by vandalism.**

5 **Support:**

6 The latest edition of AASHTO's "Specifications for Structural Supports for Highway Signs, Luminaires,
7 and Traffic Signals" contains additional information regarding posts and mounting (see Page i for AASHTO's
8 address).

9 **Option:**

10 Where engineering judgment indicates a need to draw attention to the sign during nighttime conditions, a
11 strip of retroreflective material may be used on regulatory and warning sign supports.

12 **Standard:**

13 **If a strip of retroreflective material is used on the sign support, it shall be at least 2 inches in width,**
14 **it shall be placed for the full length of the support from the sign to within 2 feet above the edge of the**
15 **roadway, and its color shall match the background color of the sign, except that the color of the strip**
16 **for the YIELD and DO NOT ENTER signs shall be red.**

17 **Section 2A.22 Maintenance**

18 **Guidance:**

19 Maintenance activities should consider proper position, cleanliness, legibility, and daytime and nighttime
20 visibility (see Section 2A.09). Damaged or deteriorated signs, [gates, or object markers](#) should be replaced.

21 To assure adequate maintenance, a schedule for inspecting (both day and night), cleaning, and replacing
22 signs, [gates, and object markers](#) should be established. Employees of highway, law enforcement, and other
23 public agencies whose duties require that they travel on the roadways should be encouraged to report any
24 damaged, deteriorated, or obscured signs, [gates, or object markers](#) at the first opportunity.

25 Steps should be taken to see that weeds, trees, shrubbery, and construction, maintenance, and utility
26 materials and equipment do not obscure the face of any sign [or object marker](#).

27 A regular schedule of replacement of lighting elements for illuminated signs should be maintained.

28 **Section 2A.23 Median Opening Treatments for Divided Highways with Wide Medians**

29 **Guidance:**

30 Where divided highways are separated by median widths at the median opening itself of 30 feet or more,
31 median openings should be signed as two separate intersections.

1 **CHAPTER 2B. REGULATORY SIGNS, BARRICADES, AND GATES**

2 **Section 2B.01 Application of Regulatory Signs**

3 **Standard:**

4 Regulatory signs shall be used to inform road users of selected traffic laws or regulations and
5 indicate the applicability of the legal requirements.

6 Regulatory signs shall be installed at or near where the regulations apply. The signs shall clearly
7 indicate the requirements imposed by the regulations and shall be designed and installed to provide
8 adequate visibility and legibility in order to obtain compliance.

9 Regulatory signs shall be retroreflective or illuminated (see Section 2A.07) to show the same shape
10 and similar color by both day and night, unless specifically stated otherwise in the text discussion in this
11 Manual ~~of for~~ a particular sign or group of signs (~~see Section 2A.08~~).

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

14 Support:

15 Section 1A.09 contains information regarding the assistance that is available to jurisdictions that do not
16 have engineers on their staffs who are trained and/or experienced in traffic control devices.

17 **Section 2B.02 Design of Regulatory Signs**

18 ~~Support~~ **Standard:**

19 ~~Most~~ Regulatory signs ~~are~~ shall be rectangular, ~~with the longer dimension vertical~~ unless
20 specifically designated otherwise. ~~The shapes and colors of regulatory signs are listed in Tables 2A-4~~
21 ~~and 2A-5, respectively. Exceptions are specifically noted in the following Sections:~~ Regulatory signs
22 shall be designed in accordance with the sizes, shapes, colors, and legends contained in the “Standard
23 Highway Signs and Markings” book (see Section 1A.11).

24 Option: these two paragraphs were relocated from Section 2B.54

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

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

30 **Support:**

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

32 **Guidance:**

33 Changeable message signs displaying a regulatory message incorporating a prohibitory message that
34 includes a red circle and slash on a static sign should display a red symbol that approximates the same red
35 circle and slash as closely as possible.

36 **Section 2B.03 Size of Regulatory Signs**

37 **Standard:**

38 Except as provided in Section 2A.11, the sizes for regulatory signs shall be as shown in Table 2B-1.

39 ~~Guidance:~~

40 ~~The Freeway and Expressway sizes should be used for higher-speed applications to provide larger signs~~
41 ~~for increased visibility and recognition.~~

42 ~~Option:~~

43 ~~The Minimum size may be used on low-speed roadways where the reduced legend size would be adequate~~
44 ~~for the regulation or where physical conditions preclude the use of the other sizes.~~

45 ~~The Oversized size may be used for those special applications where speed, volume, or other factors result~~
46 ~~in conditions where increased emphasis, improved recognition, or increased legibility would be desirable.~~

47 ~~Signs larger than those shown in Table 2B-1 may be used (see Section 2A.12).~~

48 Support:

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

2 **Standard:**

3 Except as provided in Paragraphs 4 and 5, the minimum sizes for regulatory signs facing traffic on
4 multi-lane conventional roads shall be as shown in the Multi-lane column of Table 2B-1.

5 **Option:**

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

8 Where a regulatory sign, other than a STOP sign, is placed on the left-hand side of a multi-lane roadway
9 in addition to the installation of the same regulatory sign on the right-hand side or the roadway, the size shown
10 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
11 the left-hand side of the roadway.

12 **Standard:**

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

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

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

21 **Guidance:**

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

27 **Section 2B.04 Right-of-Way at Intersections**

28 **Support:**

29 State or local laws written in accordance with the “Uniform Vehicle Code” (see Section 1A.11) establish
30 the right-of-way rule at intersections having no regulatory traffic control signs such that the driver of a vehicle
31 approaching an intersection must yield the right-of-way to any vehicle or pedestrian already in the
32 intersection. When two vehicles approach an intersection from different streets or highways at approximately
33 the same time, the right-of-way rule requires the driver of the vehicle on the left to yield the right-of-way to
34 the vehicle on the right. The right-of-way can be modified at through streets or highways by placing YIELD
35 (R1-2) signs (see Sections 2B.08 and 2B.09) or STOP (R1-1) signs (see Sections 2B.05 through 2B.07) on
36 one or more approaches.

37 **Guidance:**

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

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

45 YIELD or STOP signs should be used at an intersection if ~~engineering judgment indicates that~~ one or
46 more of the following conditions exist: **relocated from Section 2B.05**

- 47 A. An intersection of a less important road with a main road where application of the normal right-of-
48 way rule would not be expected to provide reasonable compliance with the law;
- 49 B. A street entering a **designated** through highway or street; **and/or**
- 50 C. An unsignalized intersection in a signalized area. ~~and/or~~
- 51 ~~D. High speeds, restricted view, or crash records indicate a need for control by the STOP sign.~~

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

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

11 YIELD or STOP signs should not be used for speed control. **relocated from Section 2B.05**

12 Support:

13 Section 2B.07 contains provisions regarding the application of multi-way STOP control at an intersection.

14 Guidance:

15 Once the decision has been made to ~~install two-way stop~~ control an intersection, the decision regarding
16 the appropriate ~~street to stop~~ roadway to control should be based on engineering judgment. In most cases, the
17 ~~street~~ roadway carrying the lowest volume of traffic should be ~~stopped~~ controlled. **relocated from Section**
18 **2B.05**

19 A YIELD or STOP sign should not be installed on the ~~major street~~ higher volume roadway unless
20 justified by an ~~traffic~~ engineering study. **relocated from Section 2B.05**

21 Support:

22 The following are considerations that might influence the decision regarding the appropriate ~~street~~
23 roadway upon which to install a YIELD or STOP sign where two ~~streets~~ roadways with relatively equal
24 volumes and/or characteristics intersect: **relocated from Section 2B.05**

- 25 ~~A. Stopping~~ Controlling the direction that conflicts the most with established pedestrian crossing activity
26 or school walking routes;
- 27 ~~B. Stopping~~ Controlling the direction that has obscured vision, dips, or bumps that already require
28 drivers to use lower operating speeds; and
- 29 ~~C. Stopping the direction that has the longest distance of uninterrupted flow approaching the~~
30 ~~intersection; and~~
- 31 ~~C. Stopping~~ Controlling the direction that has the best sight distance from a controlled position to
32 observe conflicting traffic.

33 Standard:

34 **Because the potential for conflicting commands could create driver confusion, YIELD or STOP**
35 **signs shall not be ~~installed at intersections where used in conjunction with any~~ traffic control signals ~~are~~**
36 **~~installed and operating~~ operation, except as noted in Section 4D.01. in the following cases:** **relocated**
37 **from Section 2B.05**

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

44 Except as provided in Section 2B.09, STOP signs and YIELD signs shall not be installed on different
45 approaches to the same unsignalized intersection if those approaches conflict with or oppose each other.

46 Portable or part-time STOP or YIELD signs shall not be used except for emergency and temporary
47 traffic control zone purposes. **relocated from Section 2B.05**

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

53 Option:

1 A portable or part-time (folding) STOP sign that is electrically or mechanically operated such that it only
2 displays the STOP message during a power outage and ceases to display the STOP message upon restoration
3 of power may be used during a power outage to control a signalized approach.

4 Support:

5 Section 9B.03 contains provisions regarding the assignment of priority at a shared-use path/roadway
6 intersection.

7 **Section ~~2B.04~~ 2B.05 STOP Sign (R1-1) and ALL WAY Plaque (R1-3P)**

8 **Standard:**

9 ~~When a sign is used to indicate that traffic is~~ **it is determined that a full stop is always required to**
10 **stop on an approach to an intersection,** a STOP (R1-1) sign (see Figure 2B-1) shall be used.

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

12 **Secondary legends shall not be used on STOP sign faces.** ~~If appropriate, a supplemental plaque~~
13 ~~(R1-3 or R1-4) shall be used to display a secondary legend. If the number of approach legs controlled~~
14 ~~by STOP signs at an intersection is three or more, the numeral on the supplemental plaque, if used,~~
15 ~~shall correspond to the actual number of legs controlled by STOP signs.~~

16 **At intersections where all approaches are controlled by STOP signs (see Section 2B.07), an ALL**
17 **WAY supplemental plaque (R1-3P ~~or R1-4~~) shall be mounted below each STOP sign. ~~Such~~ The ALL**
18 **WAY plaques (see Figure 2B-1) shall have a white legend and border on a red background.** **the 2nd**
19 **sentence was relocated from the previous paragraph**

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

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

24 ~~Option:~~

25 ~~The ALL WAY (R1-4) supplemental plaque may be used instead of the 4 WAY (R1-3) supplemental~~
26 ~~plaque.~~

27 Support:

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

30 Guidance:

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

35 Option:

36 An EXCEPT RIGHT TURN (R1-10P) plaque (see Figure 2B-1) may be mounted below the STOP sign if
37 an engineering study determines that a special combination of geometry and traffic volumes is present that
38 makes it possible for right-turning traffic on the approach to be permitted to enter the intersection without
39 stopping.

40 Support:

41 The design and application of Stop Beacons are described in Section 4L.05.

42 **Section ~~2B.05~~ 2B.06 STOP Sign Applications** many paragraphs have been relocated to the new Section 43 **2B.04**

44 Guidance:

45 ~~STOP signs should be installed in a manner that minimizes the numbers of vehicles having to stop.~~ At
46 intersections where a full stop is not necessary at all times, consideration should first be given to using less
47 restrictive measures such as YIELD signs (see Sections 2B.08 and 2B.09).

48 The use of STOP signs on the minor-street approaches should be considered if engineering judgment
49 indicates that a stop is always required because of one or more of the following conditions:

50 A. The vehicular traffic volumes on the through street or highway exceed 6,000 vehicles per day;

- 1 B. A restricted view exists that requires road users to stop in order to adequately observe conflicting
2 traffic on the through street or highway; and/or
3 C. Crash records indicate that three or more crashes that are susceptible to correction by the installation
4 of a STOP sign have been reported within a 12-month period, or that five or more such crashes have
5 been reported within a 2-year period. Such crashes include right-angle collisions involving road users
6 on the minor-street approach failing to yield the right-of-way to traffic on the through street or
7 highway.

8 Support:

9 The use of ~~the STOP signs~~ at ~~highway-railroad~~ grade crossings is described in Sections 8B.04 and 8B.05.
10 ~~The use of the STOP sign at highway-light rail transit grade crossings is described in Section 10C.04.~~

11 ~~Section 2B.06 STOP Sign Placement~~ most of the text from this Section has been incorporated into
12 ~~Section 2B.10~~

13 ~~Standard:~~

14 ~~The STOP sign shall be installed on the right side of the approach to which it applies. When the~~
15 ~~STOP sign is installed at this required location and the sign visibility is restricted, a Stop Ahead sign~~
16 ~~(see Section 2C.29) shall be installed in advance of the STOP sign.~~

17 ~~The STOP sign shall be located as close as practical to the intersection it regulates, while optimizing~~
18 ~~its visibility to the road user it is intended to regulate.~~

19 ~~STOP signs and YIELD signs shall not be mounted on the same post.~~

20 ~~Guidance:~~

21 ~~Other than a DO NOT ENTER sign, no sign should be mounted back-to-back with a STOP sign in a~~
22 ~~manner that obscures the shape of the STOP sign.~~

23 ~~Support:~~

24 ~~Section 2A.16 contains additional information about separate and combined mounting of other signs with~~
25 ~~STOP signs.~~

26 ~~Guidance:~~

27 ~~Stop lines, when used to supplement a STOP sign, should be located at the point where the road user~~
28 ~~should stop (see Section 3B.16).~~

29 ~~If only one STOP sign is installed on an approach, the STOP sign should not be placed on the far side of~~
30 ~~the intersection.~~

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

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

35 ~~Option:~~

36 ~~At wide-throat intersections or where two or more approach lanes of traffic exist on the signed approach,~~
37 ~~observance of the stop control may be improved by the installation of an additional STOP sign on the left side~~
38 ~~of the road and/or the use of a stop line. At channelized intersections, the additional STOP sign may be~~
39 ~~effectively placed on a channelizing island.~~

40 ~~Support:~~

41 ~~Figure 2A-2 shows examples of some typical placements of STOP signs.~~

42 **Section 2B.07 Multi-Way Stop Applications**

43 Support:

44 Multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist.
45 Safety concerns associated with multi-way stops include pedestrians, bicyclists, and all road users expecting
46 other road users to stop. Multi-way stop control is used where the volume of traffic on the intersecting roads
47 is approximately equal.

48 The restrictions on the use of STOP signs described in Section 2B.04 also apply to multi-way stop
49 applications.

50 Guidance:

1 The decision to install multi-way stop control should be based on an engineering study.

2 The following criteria should be considered in the engineering study for a multi-way STOP sign
3 installation:

- 4 A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be
5 installed quickly to control traffic while arrangements are being made for the installation of the traffic
6 control signal.
- 7 B. ~~A crash problem, as indicated by 5~~ Five or more reported crashes in a 12-month period that are
8 susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-
9 turn collisions as well as right-angle collisions.
- 10 C. Minimum volumes:
- 11 1. The vehicular volume entering the intersection from the major street approaches (total of both
12 approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and
 - 13 2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor
14 street approaches (total of both approaches) averages at least 200 units per hour for the same 8
15 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle
16 during the highest hour; but
 - 17 3. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum
18 vehicular volume warrants are 70 percent of the ~~above~~ values provided in Items 1 and 2.
- 19 D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent
20 of the minimum values. Criterion C.3 is excluded from this condition.

21 Option:

22 Other criteria that may be considered in an engineering study include:

- 23 A. The need to control left-turn conflicts;
- 24 B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;
- 25 C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to ~~reasonably~~
26 ~~safely~~ negotiate the intersection unless conflicting cross traffic is also required to stop; and
- 27 D. An intersection of two residential neighborhood collector (through) streets of similar design and
28 operating characteristics where multi-way stop control would improve traffic operational
29 characteristics of the intersection.

30 **Section 2B.08 YIELD Sign (R1-2)**

31 **Standard:**

32 **The YIELD (R1-2) sign (see Figure 2B-1) shall be a downward-pointing equilateral triangle with a**
33 **wide red border and the legend YIELD in red on a white background.**

34 **Support:**

35 The YIELD sign assigns right-of-way to traffic on certain approaches to an intersection. Vehicles
36 controlled by a YIELD sign need to slow down to a speed that is reasonable for the existing conditions or stop
37 when necessary to avoid interfering with conflicting traffic.

38 **Section 2B.09 YIELD Sign Applications**

39 Option:

40 YIELD signs may be ~~used instead of STOP signs if engineering judgment indicates that one or more of~~
41 ~~the following conditions exist~~ installed:

- 42 A. ~~When the ability to see all potentially conflicting traffic is sufficient to allow a road user traveling at~~
43 ~~the posted speed, the 85th percentile speed, or the statutory speed to pass through the intersection or to~~
44 ~~stop in a reasonably safe manner~~ On the approaches to a through street or highway where conditions
45 are such that a full stop is not always required.
- 46 B. ~~If controlling a merge-type movement on the entering roadway where acceleration geometry and/or~~
47 ~~sight distance is not adequate for merging traffic operation.~~
- 48 B. At the second crossroad of a divided highway, where the median width at the intersection is 30 feet or
49 greater. In this case, a STOP or YIELD sign may be installed at the entrance to the first roadway of a
50 divided highway, and a YIELD sign may be installed at the entrance to the second roadway.
- 51 C. For a channelized turn lane that is separated from the adjacent travel lanes by an island, even if the
52 adjacent lanes at the intersection are controlled by a highway traffic control signal or by a STOP sign.

- 1 D. At an intersection where a special problem exists and where engineering judgment indicates the
2 problem to be susceptible to correction by the use of the YIELD sign.
3 E. Facing the entering roadway for a merge-type movement if engineering judgment indicates that
4 control is needed because acceleration geometry and/or sight distance is not adequate for merging
5 traffic operation.

6 **Standard:**

7 A YIELD (R1-2) sign shall be used to assign right-of-way at the entrance to a roundabout
8 ~~intersection.~~ YIELD signs at roundabouts shall be used to control the approach roadways and shall not
9 be used to control the circulatory roadway.

10 Other than for all of the approaches to a roundabout, YIELD signs shall not be placed on all of the
11 approaches to an intersection.

12 **Section 2B.10 STOP Sign or YIELD Sign Placement** this Section was edited to include the STOP sign
13 provisions from Section 2B.06

14 **Standard:**

15 The STOP or YIELD sign shall be installed on the near side of the intersection on the right-hand
16 side of the approach to which it applies. ~~YIELD signs shall be placed on both the left and right sides of~~
17 ~~approaches to roundabout intersections with more than one lane on the signed approach where raised~~
18 ~~splitter islands are available on the left side of the approach.~~ When the STOP or YIELD sign is
19 installed at this required location and the sign visibility is restricted, a Stop Ahead sign (see Section
20 2C.36) shall be installed in advance of the STOP sign or a Yield Ahead sign (see Section 2C.36) shall be
21 installed in advance of the YIELD sign.

22 The STOP or YIELD sign shall be located as close as practical to the intersection it regulates, while
23 optimizing its visibility to the road user it is intended to regulate.

24 STOP signs and YIELD signs shall not be mounted on the same post.

25 No items other than inventory stickers, sign installation dates, and bar codes shall be affixed to the
26 fronts of STOP or YIELD signs, and the placement of these items shall be in the border of the sign.

27 No items other than official traffic control signs, inventory stickers, sign installation dates, anti-
28 vandalism stickers, and bar codes shall be mounted on the backs of STOP or YIELD signs.

29 No items other than retroreflective strips (see Section 2A.21) or official traffic control signs shall be
30 mounted on the fronts or backs of STOP or YIELD sign supports.

31 **Guidance:**

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

34 ~~Other than a DO NOT ENTER sign, no sign should be~~ A sign that is mounted back-to-back with a STOP
35 or YIELD sign ~~in a manner that obscures the shape~~ should stay within the edges of the STOP or YIELD sign.
36 If necessary, the size of the STOP or YIELD sign should be increased so that any other sign installed back-to-
37 back with a STOP or YIELD sign remains within the edges of the STOP or YIELD sign.

38 **Option:**

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

42 **Support:**

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

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

46 **Guidance:**

47 Stop lines that are used to supplement a STOP sign should be located as described in Section 3B.16.
48 Yield lines, when that are used to supplement a YIELD sign, should be located ~~at a point where the road user~~
49 ~~should yield (see Section 3B.16)~~ as described in Section 3B.16.

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

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

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

5 ~~At a roundabout intersection, to prevent circulating vehicles from yielding unnecessarily, the face of the~~
6 ~~YIELD sign should not be visible from the circulatory roadway.~~

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

9 Option:

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

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

18 **Standard:**

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

21 Option:

22 For a yield-controlled channelized right-turn movement onto a roadway without an acceleration lane and
23 for an entrance ramp onto a freeway or expressway without an acceleration lane, a NO MERGE AREA (W4-
24 5P) supplemental plaque (see Section 2C.40) may be mounted below a Yield Ahead (W3-2) sign and/or below
25 a YIELD (R1-2) sign when engineering judgment indicates that road users would expect an acceleration lane
26 to be present.

27 **Section 2B.11 Yield Here To Pedestrians Signs and Stop Here For Pedestrians Signs (R1-5,**
28 **R1-5a Series)**

29 **Standard:**

30 Yield Here To (Stop Here For) Pedestrians (R1-5, R1-5a, R1-5b, or R1-5c) signs (see Figure 2B-2)
31 shall be used if yield (stop) lines are used in advance of an ~~unsignalized~~ marked ~~midblock~~ crosswalk
32 that crosses an uncontrolled multi-lane approach, ~~Yield Here To Pedestrians (R1-5 or R1-5a) signs (see~~
33 Figure 2B-2) shall be. The Stop Here for Pedestrians signs shall only be used where the law specifically
34 requires that a driver must stop for a pedestrian in a crosswalk. The legend STATE LAW may be
35 displayed at the top of the R1-5, R1-5a, R1-5b, and R1-5c signs, if applicable.

36 **Guidance:**

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

41 Yield (stop) lines and Yield Here To (Stop Here For) Pedestrians signs should not be used in advance of
42 crosswalks that cross an approach to or departure from a roundabout.

43 Option:

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

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

50 **Standard:**

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

4 Option:

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

8 In-Street Pedestrian Crossing signs and Yield Here To (Stop Here For) Pedestrians signs may be used
9 together at the same crosswalk.

10 **Section 2B.12 In-Street and Overhead Pedestrian Crossing Signs (R1-6, R1-6a, R1-9, and R1-**
11 **9a)**

12 Option:

13 The In-Street Pedestrian Crossing (R1-6 or R1-6a) sign (see Figure 2B-2) or the Overhead Pedestrian
14 Crossing (R1-9 or R1-9a) sign (see Figure 2B-2) may be used to remind road users of laws regarding right-of-
15 way at an unsignalized pedestrian ~~crossing~~ crosswalk. The legend STATE LAW may be ~~shown~~ displayed at
16 the top of the R1-6, R1-6a, R1-9, and R1-9a signs, if applicable. On the R1-6 and R1-6a signs, the legends
17 STOP ~~FOR~~ or YIELD ~~TO~~ may be used ~~in conjunction with~~ instead of the appropriate STOP sign or YIELD
18 sign symbol.

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

21 Standard:

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

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

27 An In-Street or Overhead Pedestrian Crossing sign shall not be placed in advance of the crosswalk
28 to educate road users about the State law prior to reaching the crosswalk, nor shall it be installed as an
29 educational display that is not near any crosswalk.

30 Guidance:

31 If an island (see Chapter 3I) is available, the In-Street Pedestrian Crossing sign, if used, should be placed
32 on the island.

33 Option:

34 If a Pedestrian Crossing (W11-2) warning sign is used in combination with an In-Street or an Overhead
35 Pedestrian Crossing sign, the W11-2 sign with a diagonal downward pointing arrow (W16-7P) plaque may be
36 post-mounted on the right-hand side of the roadway at the crosswalk location.

37 Standard:

38 The In-Street Pedestrian Crossing sign and the Overhead Pedestrian Crossing sign shall not be used
39 at signalized locations.

40 The STOP FOR legend shall only be used in States where the State law specifically requires that a
41 driver must stop for a pedestrian in a crosswalk.

42 If used, The In-Street Pedestrian Crossing sign shall have a black legend (except for the red STOP
43 or YIELD sign symbols) and border on either a white and/or fluorescent yellow-green background,
44 surrounded by an outer yellow or fluorescent yellow-green background area (see Figure 2B-2). The
45 Overhead Pedestrian Crossing sign shall have a black legend and border on a yellow or fluorescent
46 yellow-green background at the top of the sign and a black legend and border on a white background at
47 the bottom of the sign (see Figure 2B-2).

48 If Unless the In-Street Pedestrian Crossing sign is placed in the roadway on a physical island, the
49 sign support shall comply with the breakaway requirements of the latest edition of AASHTO’s
50 “Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals” (see Page i)
51 be designed to bend over and then bounce back to its normal vertical position when struck by a vehicle.

1 Support:

2 The Provisions of Section 2A.18 concerning mounting height are not applicable for the In-Street
3 Pedestrian Crossing sign.

4 Standard:

5 The top of an In-Street Pedestrian Crossing sign shall be a maximum of 4 feet above the pavement
6 surface. The top of an In-Street Pedestrian Crossing sign placed in an island shall be a maximum of 4
7 feet above the island surface.

8 Option:

9 The In-Street Pedestrian Crossing sign may be used seasonably to prevent damage in winter because of
10 plowing operations, and may be removed at night if the pedestrian activity at night is minimal.

11 In-Street Pedestrian Crossing signs, Overhead Pedestrian Crossing signs, and Yield Here To (Stop Here
12 For) Pedestrians signs may be used together at the same crosswalk.

13 **Section 2B.13 Speed Limit Sign (R2-1)**

14 Standard:

15 ~~After~~ Speed zones (other than statutory speed limits) shall only be established on the basis of an
16 engineering study that has been made performed in accordance with established traffic engineering
17 practices. The engineering study shall include an analysis of the current speed distribution of free-
18 flowing vehicles.

19 The Speed Limit (R2-1) sign (see Figure 2B-3) shall display the limit established by law, ordinance,
20 regulation, or as adopted by the authorized agency based on the engineering study. The speed limits
21 ~~shown~~ displayed shall be in multiples of 5 mph.

22 Speed Limit (R2-1) signs, indicating speed limits for which posting is required by law, shall be
23 located at the points of change from one speed limit to another. relocated from Section 2B.18

24 At the downstream end of the section to which a speed limit applies, a Speed Limit sign showing the
25 next speed limit shall be installed. Additional Speed Limit signs shall be installed beyond major
26 intersections and at other locations where it is necessary to remind road users of the speed limit that is
27 applicable. relocated from Section 2B.18

28 Speed Limit signs indicating the statutory speed limits shall be installed at entrances to the State
29 and, where appropriate, at jurisdictional boundaries of metropolitan in urban areas. relocated from
30 Section 2B.18

31 Support:

32 In general, the maximum speed limits applicable to rural and urban roads are established:

33 A. Statutorily – a maximum speed limit applicable to a particular class of road, such as freeways or city
34 streets, that is established by State law; or

35 B. As altered speed zones – based on engineering studies.

36 State statutory limits might restrict the maximum speed limit that can be established on a particular road,
37 notwithstanding what an engineering study might indicate.

38 Option:

39 If a jurisdiction has a policy of installing Speed Limit signs in accordance with statutory requirements
40 only on the streets that enter a city, neighborhood, or residential area to indicate the speed limit that is
41 applicable to the entire city, neighborhood, or residential area unless otherwise posted, a CITYWIDE (R2-
42 5aP), NEIGHBORHOOD (R2-5bP), or RESIDENTIAL (R2-5cP) plaque may be mounted above the Speed
43 Limit sign and an UNLESS OTHERWISE POSTED (R2-5P) plaque may be mounted below the Speed Limit
44 sign (see Figure 2B-3).

45 Guidance:

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

49 ~~At least once every 5 years,~~ States and local agencies should conduct engineering studies to reevaluate
50 non-statutory speed limits on segments of their roadways that have undergone ~~a~~ significant changes ~~in~~
51 ~~roadway characteristics or surrounding land use~~ since the last review, such as the addition or elimination of

1 [parking or driveways, changes in the number of travel lanes, changes in the configuration of bicycle lanes,](#)
2 [changes in traffic control signal coordination, or significant changes in traffic volumes.](#)

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

4 When a speed limit [within a speed zone](#) is ~~to be~~ posted, it should be within 5 mph of the 85th-percentile
5 speed of free-flowing traffic.

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

9 **Support:**

10 [Advance warning signs and other traffic control devices to attract the motorist's attention to a signalized](#)
11 [intersection are usually more effective than a reduced speed limit zone.](#)

12 **Guidance:**

13 [An advisory speed plaque \(see Section 2C.08\) mounted below a warning sign should be used to warn road](#)
14 [users of an advisory speed for a roadway condition. A Speed Limit sign should not be used for this situation.](#)

15 **Option:**

16 Other factors that may be considered when establishing [or reevaluating](#) speed limits are the following:

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

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

25 A changeable message sign that changes the speed limit for traffic and ambient conditions may be
26 installed provided that the appropriate speed limit is ~~shown~~ [displayed](#) at the proper times.

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

29 **Guidance:**

30 If a changeable message sign displaying approach speeds is installed, the legend YOUR SPEED XX MPH
31 or such similar legend should be ~~shown~~ [displayed](#). The color of the changeable message legend should be a
32 yellow legend on a black background or the reverse of these colors.

33 **Support:**

34 Advisory Speed signs [and plaques](#) are discussed in Sections 2C.08 and 2C.14. ~~and~~ Temporary Traffic
35 Control Zone Speed signs are discussed in Part 6. [The WORK ZONE \(G20-5aP\) plaque intended for](#)
36 [installation above a Speed Limit sign is discussed in Section 6F.12. School Speed Limit signs are discussed in](#)
37 [Section 7B.15.](#)

38 **Section 2B.14 Truck Speed Limit ~~Sign~~ Plaque (R2-2P)**

39 **Standard:**

40 Where a special speed limit applies to trucks or other vehicles, the legend TRUCKS XX or such
41 similar legend shall be ~~shown displayed on the same panel as~~ below the [legend](#) SPEED LIMIT [XX on](#)
42 [the same](#) sign or on a separate R2-2P [sign plaque](#) (see Figure 2B-3) below the standard legend.

43 **Section 2B.15 Night Speed Limit ~~Sign~~ Plaque (R2-3P)**

44 **Standard:**

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

46 **Guidance:**

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

49 **Option:**

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

3 **Section 2B.16 Minimum Speed Limit Sign Plaque (R2-4P)**

4 **Standard:**

5 A Minimum Speed Limit (R2-4P) ~~sign~~ plaque (see Figure 2B-3) shall be displayed only in
6 combination with a Speed Limit sign.

7 **Option:**

8 Where engineering judgment determines that slow speeds on a highway might impede the normal and
9 reasonable movement of traffic, the Minimum Speed Limit ~~sign~~ plaque may be installed below a Speed Limit
10 (R2-1) sign to indicate the minimum legal speed. If desired, ~~these two signs~~ the Speed Limit sign and the
11 Minimum Speed Limit plaque may be combined on the R2-4a sign (see Figure 2B-3).

12 **Section 2B.17 FINES Higher Fines Signs and Plaque (R2-6P, R2-10, and R2-11)**

13 **Option Standard:**

14 If increased fines are imposed for traffic violations within a designated zone of a roadway, a BEGIN
15 HIGHER FINES ZONE (R2-10) sign (see Figure 2B-3) or ~~the a~~ FINES HIGHER (R2-6P) plaque (see
16 Figure 2B-3) ~~may~~ shall be used to ~~advise~~ provide notice to road users ~~when increased fines are imposed~~
17 ~~for traffic violations within designated roadway segments.~~ If used, the FINES HIGHER plaque shall be
18 mounted below an applicable regulatory or warning sign in a temporary traffic control zone, a school
19 zone, or other applicable designated zone.

20 If an R2-10 sign or an R2-6P plaque is posted to provide notice of increased fines for traffic
21 violations, an END HIGHER FINES ZONE (R2-11) sign (see Figure 2B-3) shall be installed at the
22 downstream end of the zone to provide notice to road users of the termination of the increased fines
23 zone.

24 **Guidance:**

25 If used, the BEGIN HIGHER FINES ZONE sign or FINES HIGHER plaque should be located at the
26 beginning of the temporary traffic control zone, school zone, or other applicable designated zone and just
27 beyond any interchanges, major intersections, or other major traffic generators.

28 ~~The FINES HIGHER plaque may be mounted below an applicable regulatory or warning sign in a~~
29 ~~temporary traffic control zone, a school zone, or other applicable designated zones.~~

30 **Standard:**

31 The ~~FINES Higher~~ Fines signs and plaque shall ~~be a rectangle with~~ have a black legend and border
32 on a white rectangular background. All supplemental plaques mounted below the ~~FINES Higher~~ Fines
33 signs and plaque shall ~~be rectangles with~~ have a black legends and borders on a white rectangular
34 backgrounds.

35 ~~The FINES HIGHER plaque shall include a SCHOOL, WORK ZONE, or other applicable~~
36 ~~designated zone plaque mounted above the applicable regulatory or warning sign. The SCHOOL~~
37 ~~supplemental plaque shall be rectangular in shape with a black legend and border on a yellow or~~
38 ~~fluorescent yellow-green background (same as the S4-3 plaque). The WORK ZONE supplemental~~
39 ~~plaque shall be rectangular in shape with a black legend and border on an orange background.~~

40 **Guidance:**

41 Agencies should limit the use of the ~~FINES Higher~~ Fines signs and plaque to locations where work is
42 actually underway, or to locations where the roadway, shoulder, or other conditions, including the presence of
43 a school zone and/or a reduced school speed limit zone, require a speed reduction or extra caution on the part
44 of the road user.

45 **Option:**

46 Alternate legends such as BEGIN (or END) DOUBLE FINES ZONE may also be used for the R2-10 and
47 R2-11 signs.

48 The legend FINES HIGHER on the R2-6P plaque may be replaced by ~~multiple values such as~~ FINES
49 DOUBLE (R2-6aP) ~~or FINES TRIPLE~~, or by a specific value such as \$150 XXX FINE (R2-6bP), or another
50 legend appropriate to the specific regulation (see Figure 2B-3).

51 The following may be mounted below ~~the FINES HIGHER~~ an R2-10 sign or R2-6P plaque:

- 1 A. A supplemental plaque specifying the times that the higher fines are in effect (similar to the S4-1P
- 2 plaque shown in Figure 7B-1), or
- 3 B. A supplemental plaque WHEN CHILDREN (WORKERS) ARE PRESENT, or
- 4 C. A supplemental plaque WHEN FLASHING (similar to the S4-4P plaque shown in Figure 7B-1) if
- 5 used in conjunction with a yellow flashing beacon.

6 Support:

7 [Section 6F.12 contains information regarding other signs and plaques associated with increased fines for](#)

8 [traffic violations in temporary traffic control zones. Section 7B.10 contains information regarding other signs](#)

9 [and plaques associated with increased fines for traffic violations in designated school zones.](#)

10 ~~Section 2B.18 Location of Speed Limit Signs~~ these three paragraphs were incorporated into Section

11 ~~2B.13~~

12 ~~Standard:~~

13 ~~Speed Limit (R2-1) signs, indicating speed limits for which posting is required by law, shall be~~

14 ~~located at the points of change from one speed limit to another.~~

15 ~~At the end of the section to which a speed limit applies, a Speed Limit sign showing the next speed~~

16 ~~limit shall be installed. Additional Speed Limit signs shall be installed beyond major intersections and~~

17 ~~at other locations where it is necessary to remind road users of the speed limit that is applicable.~~

18 ~~Speed Limit signs indicating the statutory speed limits shall be installed at entrances to the State~~

19 ~~and at jurisdictional boundaries of metropolitan areas.~~

20 Section ~~2B.19~~ 2B.18 Turn Movement Prohibition Signs (R3-1 through R3-4, and R3-18, and

21 R3-27)

22 **Standard:**

23 Except as ~~noted~~ provided in the Option Paragraphs 11 and 13, where ~~turns~~ specific movements are

24 prohibited, Turn Movement Prohibition signs shall be installed.

25 **Guidance:**

26 ~~Turn Movement~~ Prohibition signs should be placed where they will be most easily seen by road users who

27 might be intending to ~~turn~~ make the movement.

28 If No Right Turn (R3-1) signs (see Figure 2B-4) are used, at least one should be placed either over the

29 roadway or at a right-hand corner of the intersection.

30 If No Left Turn (R3-2) signs (see Figure 2B-4) are used, at least one should be placed ~~either~~ over the

31 roadway, at the far left-hand corner of the intersection, on a median, or in conjunction with the STOP sign or

32 YIELD sign located on the near right-hand corner.

33 Except as ~~noted~~ provided in the Option Item C of Paragraph 9 for signalized locations, if NO TURNS

34 (R3-3) signs (see Figure 2B-4) are used, two signs should be used, one at a location specified for a No Right

35 Turn sign and one at a location specified for a No Left Turn sign.

36 If No U-Turn (R3-4) signs (see Figure 2B-4) or combination No U-Turn/No Left Turn (R3-18) signs (see

37 Figure 2B-4) are used, at least one should be used at a location specified for No Left Turn signs. this

38 paragraph and the next paragraph were combined

39 ~~If combination No U-Turn/No Left Turn (R3-18) signs (see Figure 2B-3) are used, at least one should be~~

40 ~~used at a location specified for No Left Turn signs.~~

41 **Option:**

42 If both left turns and U-turns are prohibited, the combination No U-Turn/No Left Turn (R3-18) sign (see

43 Figure 2B-4) may be used instead of separate R3-2 and R3-4 signs.

44 **Guidance:**

45 If No Straight Through (R3-27) signs (see Figure 2B-4) are used, at least one should be placed either over

46 the roadway or at a location where it can be seen by road users who might be intending to travel straight

47 through the intersection.

48 If turn prohibition signs are installed in conjunction with traffic control signals ~~are present~~:

- 49 A. The No Right Turn sign ~~may~~ should be installed adjacent to a signal face viewed by road users in the
- 50 right-hand lane.

- 1 B. The No Left Turn (or No U-Turn or combination No U-Turn/No Left Turn) sign ~~may~~ should be
2 installed adjacent to a signal face viewed by road users in the left-hand lane.
3 C. A NO TURNS sign ~~may~~ should be placed adjacent to a signal face viewed by all road users on that
4 approach, or two signs ~~may~~ should be used.

5 Option:

6 If turn prohibition signs are installed in conjunction with traffic control signals ~~are present~~, an additional
7 ~~Turn~~ Movement Prohibition sign may be ~~ground~~ post-mounted to supplement the sign mounted overhead.

8 Where ONE WAY signs are used (see Section 2B.40), ~~Turn Prohibition~~ No Left Turn and No Right Turn
9 signs may be omitted.

10 When the movement restriction applies during certain time periods only, the following ~~Turn~~ Movement
11 Prohibition signing alternatives may be used and are listed in order of preference:

- 12 A. Changeable message signs, especially at signalized intersections.
13 B. Permanently mounted signs incorporating a supplementary legend showing the hours and days during
14 which the prohibition is applicable.
15 C. Portable signs, installed by proper authority, located off the roadway at each corner of the
16 intersection. The portable signs are only to be used during the time that the ~~turn~~ movement
17 prohibition is applicable.

18 ~~Turn~~ Movement Prohibition signs may be omitted at a ramp entrance to an expressway or a channelized
19 intersection where the design is such as to indicate clearly the one-way traffic movement on the ramp or
20 turning lane.

21 Standard:

22 The No Left Turn (R3-2) sign, the No U-Turn (R3-4) sign, and the combination No U-Turn/No Left
23 Turn (R3-18) sign shall not be used at approaches to roundabouts to prohibit drivers from turning left
24 onto the circulatory roadway of a roundabout.

25 Support:

26 At roundabouts, the use of R3-2, R3-4, or R3-18 signs to prohibit left turns onto the circulatory roadway
27 might confuse drivers about the possible legal turning movements around the roundabout. Roundabout
28 Directional Arrow (R6-4 series) signs (see Section 2B.43) and/or ONE WAY (R6-1R or R6-2R) signs are the
29 appropriate signs to indicate the travel direction within a roundabout.

30 Section ~~2B.20~~ 2B.19 Intersection Lane Control Signs (R3-5 through R3-8)

31 Standard:

32 **Intersection Lane Control signs, if used, shall require road users in certain lanes to turn, shall**
33 **permit turns from a lane where such turns would otherwise not be permitted, shall require a road user**
34 **to stay in the same lane and proceed straight through an intersection, or shall indicate permitted**
35 **movements from a lane.**

36 **Intersection Lane Control signs (see Figure 2B-4) shall have three applications:**

- 37 **A. Mandatory Movement Lane Control (R3-5, R3-5a, and R3-7) signs,**
38 **B. Optional Movement Lane Control (R3-6) sign, and**
39 **C. Advance Intersection Lane Control (R3-8 series) signs.**

40 Guidance:

41 When Intersection Lane Control signs are mounted overhead, each sign should be placed over the lane or
42 a projection of the lane to which it applies.

43 On signalized approaches where through lanes that become mandatory turn lanes, multiple-lane turns that
44 include shared lanes for through and turning movements, or other lane-use regulations are present that would
45 be unexpected by unfamiliar road users, overhead lane control signs should be installed at the signalized
46 location over the appropriate lanes or projections thereof and in advance of the intersection over the
47 appropriate lanes.

48 Where overhead mounting on the approach is impractical for the advance and/or intersection lane-use
49 signs, one of the following alternatives should be employed:

- 50 A. At locations where through lanes become mandatory turn lanes, a mandatory movement lane control
51 (R3-7) sign should be post-mounted on the left-hand side of the roadway where a through lane is
52 becoming a mandatory left-turn lane on a one-way street or where a median of sufficient width for the

1 [signs is available, or on the right-hand side of the roadway where a through lane is becoming a](#)
2 [mandatory right-turn lane.](#)

3 [B. At locations where a through lane is becoming a mandatory left-turn lane on a two-way street where a](#)
4 [median of sufficient width for the signs is not available, and at locations where multiple-lane turns](#)
5 [that include shared lanes for through and turning movements are present, an Advance Intersection](#)
6 [Lane Control \(R3-8 series\) sign should be post-mounted in a prominent location in advance of the](#)
7 [intersection, and consideration should be given to the use of an oversized version in accordance with](#)
8 [Table 2B-1.](#)

9 **Standard:**

10 **Use of an overhead sign for one approach lane shall not require installation of overhead signs for**
11 **the other lanes of that approach.**

12 **Option:**

13 Where the number of through lanes on an approach is two or less, the Intersection Lane Control signs
14 (R3-5, R3-6, or R3-8) may be overhead or ~~ground~~ [post-mounted](#).

15 Intersection Lane Control signs may be omitted where:

- 16 A. ~~Turning bays have~~ [A turn bay has](#) been provided by physical construction or pavement markings, and
17 B. Only the road users using such ~~turning~~ [bays](#) are permitted to make a ~~similar~~ [turn in that direction](#).

18 [At roundabouts, Intersection Lane Control \(R3-5, R3-6, and R3-8 series\) signs may display any of the](#)
19 [arrow symbol options shown in Figure 2B-5.](#)

20 **Section ~~2B-21~~ [2B.20](#) Mandatory Movement Lane Control Signs (R3-5, R3-5a, ~~and~~ R3-7, and**
21 **[R3-20](#))**

22 **Standard:**

23 If used, [the](#) Mandatory Movement Lane Control (R3-5, R3-5a, and R3-7) signs (see Figure 2B-4)
24 shall indicate only ~~those the single~~ [vehicle movements that are is](#) required from ~~each~~ [the](#) lane. [If used,](#)
25 [the Mandatory Movement Lane Control sign and](#) shall be located [in advance of the intersection, such as](#)
26 [near the upstream end of the mandatory movement lane, and/or at the intersection](#) where the regulation
27 applies. When the mandatory movement applies to lanes exclusively designated for HOV traffic, the
28 R3-5cP supplemental plaque shall be used. When the mandatory movement applies to lanes that are
29 not HOV facilities, but are lanes exclusively designated for buses and/or taxis, the word message R3-
30 5dP and/or R3-5gP supplemental plaques shall be used.

31 The Mandatory Movement Lane Control (R3-7) sign shall include the legend RIGHT (LEFT)
32 LANE MUST TURN RIGHT (LEFT). The Mandatory Movement Lane Control ~~symbol signs~~ (R3-5
33 and R3-5a) [symbol signs](#) shall include the legend ONLY.

34 The R3-7 word message sign shall be for ~~ground~~ [post-mounting](#) only.

35 [Where the number of lanes available to through traffic on an approach is three or more,](#)
36 [Mandatory Movement Lane Control \(R3-5 and R3-5a\) symbol signs, if used, shall be mounted overhead](#)
37 [over the specific lanes to which they apply \(see Section 2B.19\).](#)

38 **Guidance:**

39 If the R3-5 or R3-5a sign is ~~ground~~ [post-mounted](#) on an ~~multi-lane~~ approach [with two or fewer through](#)
40 [lanes](#), a supplemental plaque (see Figure 2B-4), such as LEFT LANE (R3-5bP), HOV 2+ (R3-5cP), TAXI
41 LANE (R3-5dP), CENTER LANE (R3-5eP), RIGHT LANE (R3-5fP), BUS LANE (R3-5gP), or ~~LEFT 2~~
42 ~~BOTH LANES, indicating the lane with the appropriate movement shall~~ [should](#) be added ~~below~~ [above the](#)
43 [sign to indicate the specific lane to which the mandatory movement applies. If Mandatory Lane Movement](#)
44 [Control \(R3-5\) symbol signs with supplemental R3-5bP or R3-5fP plaques are used, they should be mounted](#)
45 [adjacent to and along only the full width portion of the turn lane.](#)

46 ~~Guidance:~~

47 [The use of the Mandatory Movement Lane Control \(R3-7\) word message sign should be limited to only](#)
48 [locations that are adjacent to the full-width portion of a mandatory turn lane. The R3-7 sign should not be](#)
49 [installed adjacent to a through lane in advance of a turn bay taper or adjacent to a turn bay taper.](#)

50 Mandatory Movement Lane Control signs should be accompanied by lane-use arrow markings, especially
51 where traffic volumes are high, where there is a high percentage of commercial vehicles, or where other
52 distractions exist.

1 Option:

2 The Straight Through Only (R3-5a) sign may be used to require a road user in a particular lane to proceed
3 straight through an intersection.

4 When the Mandatory Movement Lane Control sign for a left-turn lane is installed back-to-back with a
5 Keep Right (R4-7) sign, the dimensions of the Mandatory Movement Lane Control (R3-5) sign may be the
6 same as the Keep Right sign.

7 ~~Except for the R3-7 sign, Mandatory Movement Lane Control signs may be overhead or ground mounted.~~
8 replaced by new 2nd paragraph of Standard above

9 The diamond symbol may be used instead of the word message HOV on the R3-5cP supplemental plaque.

10 The BEGIN RIGHT TURN LANE (R3-20R) sign (see Figure 2B-4) may be post-mounted on the right-
11 hand side of the roadway at the upstream end of the turn lane taper of a mandatory right-turn lane. The
12 BEGIN LEFT TURN LANE (R3-20L) sign (see Figure 2B-4) may be post-mounted on a median (or on the
13 left-hand side of the roadway for a one-way street) at the upstream end of the turn lane taper of a mandatory
14 left-turn lane.

15 Section ~~2B.22~~ 2B.21 Optional Movement Lane Control Sign (R3-6)

16 Standard:

17 If used, the Optional Movement Lane Control (R3-6) sign (see Figure 2B-4) shall be used for two or
18 more movements from a specific lane or to emphasize permitted movements. If used, the Optional
19 Movement Lane Control sign shall be located in advance of the intersection, such as near the upstream
20 end of an adjacent mandatory movement lane, and/or at the intersection where the regulation applies.

21 If used, the Optional Movement Lane Control sign shall indicate all permissible movements from
22 specific lanes.

23 Optional Movement Lane Control signs shall be used for two or more movements from a specific
24 lane where a movement, not normally allowed, is permitted.

25 The Optional Movement Lane Control sign shall not be used alone to effect a turn prohibition.

26 Where the number of lanes available to through traffic on an approach is three or more, an
27 Optional Movement Lane Control (R3-6) sign, if used, shall be mounted overhead over the specific lane
28 to which it applies (see Section 2B.19).

29 Guidance:

30 If the Optional Movement Lane Control sign is post-mounted on an approach with two or fewer through
31 lanes, a supplemental plaque (see Figure 2B-4), such as LEFT LANE (R3-5bP), HOV 2+ (R3-5cP), TAXI
32 LANE (R3-5dP), CENTER LANE (R3-5eP), RIGHT LANE (R3-5fP), or BUS LANE (R3-5gP), should be
33 added above the R3-6 sign to indicate the specific lane from which the optional movements can be made.

34 Option:

35 The word message OK may be used within the border in combination with the arrow symbols of the R3-6
36 sign.

37 Standard:

38 Because more than one movement is permitted from the lane, the word message ONLY shall not be
39 used on an Optional Movement Lane Control sign.

40 Section ~~2B.23~~ 2B.22 Advance Intersection Lane Control Signs (R3-8 Series)

41 Option:

42 Advance Intersection Lane Control (R3-8, R3-8a, and R3-8b) signs (see Figure 2B-4) may be used to
43 indicate the configuration of all lanes ahead.

44 The word messages ONLY, OK, THRU, ALL, or HOV 2+ may be used within the border in combination
45 with the arrow symbols of the R3-8 sign series. The HOV 2+ (R3-5cP) supplemental plaque may be installed
46 at the top outside border of the R3-8 sign over the applicable lane designation on the sign. The diamond
47 symbol may be used instead of the word message HOV. The minimum allowable vehicle occupancy
48 requirement may vary based on the level established for a particular facility.

49 Guidance:

1 If used, an Advance Intersection Lane Control sign should be placed at an adequate distance in advance of
2 the intersection so that road users can select the appropriate lane (see Figure 2A-4). If used, the Advance
3 Intersection Lane Control sign should be installed either in advance of the tapers or at the beginning of the
4 turn lane.

5 Option:

6 An Advance Intersection Lane Control sign may be repeated closer to the intersection for additional
7 emphasis.

8 Standard:

9 Where three or more approach lanes are available to traffic, Advance Intersection Lane Control
10 (R3-8 series) signs, if used, shall be post-mounted in advance of the intersection and shall not be
11 mounted overhead (see Section 2B.19).

12 Section 2B.23 RIGHT (LEFT) LANE MUST EXIT Sign (R3-33)

13 Option:

14 A RIGHT (LEFT) LANE MUST EXIT (R3-33) sign (see Figure 2B-4) may be used to supplement an
15 overhead EXIT ONLY guide sign to inform road users that traffic in the right-hand (left-hand) lane of a
16 roadway that is approaching a grade-separated interchange is required to depart the roadway on the exit ramp
17 at the next interchange.

18 Support:

19 Section 2C.43 contains information regarding a warning sign that can be used in advance of lane drops at
20 grade-separated interchanges.

21 Section 2B.24 Two-Way Left Turn Only Signs (R3-9a, R3-9b)

22 Guidance:

23 Two-Way Left Turn Only (R3-9a or R3-9b) signs (see Figure 2B-6) should be used in conjunction with
24 the required pavement markings where a non-reversible lane is reserved for the exclusive use of left-turning
25 vehicles in either direction and is not used for passing, overtaking, or through travel.

26 Option:

27 The ~~ground-~~ post-mounted R3-9b sign may be used as an alternate to or a supplement to the overhead-
28 ~~mounted~~ R3-9a sign. The legend BEGIN or END may be used within the border of the main sign itself, or on
29 ~~a~~ an R3-9cP or R3-9dP plaque (see Figure 2B-6) mounted immediately above it.

30 Support:

31 Signing is especially helpful to drivers in areas where the two-way left turn only maneuver is new, in
32 areas subject to environmental conditions that frequently obscure the pavement markings, and on peripheral
33 streets with two-way left turn only lanes leading to an extensive system of routes with two-way left turn only
34 lanes.

35 Section 2B.25 BEGIN and END Plaques (R3-9cP, R3-9dP)

36 Option:

37 The BEGIN (R3-9cP) or END (R3-9dP) plaque (see Figure 2B-6) may be used to supplement a regulatory
38 sign to inform road users of the location where a regulatory condition begins or ends.

39 Standard:

40 If used, the BEGIN or END plaque shall be mounted directly above a regulatory sign.

41 Section 2B.26 Reversible Lane Control Signs (~~R3-9d, R3-9f~~ R3-9e through R3-9i)

42 Option:

43 A reversible lane may be used for through traffic (with left turns either permitted or prohibited) in
44 alternating directions during different periods of the day, and the lane may be used for exclusive left turns in
45 one or both directions during other periods of the day as well. Reversible Lane Control (~~R3-9d, R3-9f~~ R3-9e
46 through R3-9i) signs (see Figure 2B-6) may be either ~~be~~ static type or changeable message type. These signs
47 may be either ~~ground~~ post-mounted or overhead ~~mounted~~.

48 Standard:

1 ~~Ground~~ Post-mounted Reversible Lane Control signs shall be used only as a supplement to
2 overhead signs or signals. ~~Ground~~ Post-mounted signs shall be identical in design to the overhead
3 signs and an additional legend such as CENTER LANE shall be added to the sign (R3-9f) to indicate
4 which lane is controlled. For both word messages and symbols, this legend shall be at the top of the
5 sign.

6 Where it is determined by an engineering study that lane-use control signals or physical barriers
7 are not necessary, the lane shall be controlled by overhead Reversible Lane Control signs (see Figure
8 2B-7).

9 Option:

10 Reversing traffic flow may be controlled with pavement markings and Reversible Lane Control signs
11 (without the use of lane control signals), when all of the following conditions are met:

- 12 A. Only one lane is being reversed,
- 13 B. An engineering study indicates that the use of Reversible Lane Control signs alone would result in an
14 acceptable level of safety and efficiency, and
- 15 C. There are no unusual or complex operations in the reversible lane pattern.

16 **Standard:**

17 Reversible Lane Control signs shall contain the legend or symbols designating the allowable uses of
18 the lane and the time periods such uses are allowed. Where symbols and legends are used, their
19 meanings shall be as shown in Table 2B-2.

20 Reversible Lane Control signs shall consist of a white background with a black legend and border,
21 except for the R3-9d sign, where the color red is used.

22 Symbol signs, such as the R3-9d sign, shall consist of the appropriate symbol in the upper portion of
23 the sign with the appropriate times of the day and days of the week below it. All times of the day and
24 days of the week shall be accounted for on the sign to eliminate confusion to the road user.

25 In situations where more than one message is conveyed to the road user, such as on the R3-9d sign,
26 the sign legend shall be arranged as follows:

- 27 A. The prohibition or restriction message is the primary legend and shall be on the top for word
28 message signs and to the far left for symbol signs,
- 29 B. The permissive use message shall be ~~shown~~ displayed as the second legend, and
- 30 C. The OTHER TIMES message shall be ~~shown~~ displayed at the bottom for word message signs
31 and to the far right for symbol signs.

32 Option:

33 The symbol signs may also include a downward pointing arrow with the legend THIS LANE. The term
34 OTHER TIMES may be used for either the symbol or word message sign.

35 **Standard:**

36 A Reversible Lane Control sign shall be mounted over the center of the lane that is being reversed
37 and shall be perpendicular to the roadway alignment.

38 If the vertical or horizontal alignment is curved to the degree that a driver would be unable to see at
39 least one sign, and preferably two signs, then additional overhead signs shall be installed. The
40 placement of the signs shall be such that the driver will have a definite indication of the lanes
41 specifically reserved for use at any given time. Special consideration shall be given to major generators
42 introducing traffic between the normal sign placement.

43 Transitions at the entry to and exit from a section of roadway with reversible lanes shall be
44 carefully reviewed, and advance signs shall be installed to notify or warn drivers of the boundaries of
45 the reversible lane controls. The R3-9g or R3-9h signs shall be used for this purpose.

46 Option:

47 More than one sign may be used at the termination of the reversible lane to emphasize the importance of
48 the message (R3-9i).

49 **Standard:**

50 Flashing beacons, if used to accentuate the overhead Reversible Lane Control signs, shall comply
51 with the applicable requirements for flashing beacons in Chapter 4L.

1 **When used in conjunction with Reversible Lane Control signs, the Turn Prohibition signs (R3-1 to**
2 **R3-4, R3-18) shall be mounted overhead and separate from the Reversible Lane Control signs. The**
3 **Turn Prohibition signs shall be designed and installed in accordance with Section 2B.18.**

4 Guidance:

5 For additional emphasis, a supplemental plaque stating the distance of the prohibition, such as NEXT 1
6 MILE, should be added to the Turn Prohibition signs that are used in conjunction with Reversible Lane
7 Control signs.

8 If used, overhead signs should be located at intervals not greater than 1/4 mile. The bottom of the
9 overhead Reversible Lane Control signs should not be more than 19 feet above the pavement grade.

10 Where more than one sign is used at the termination of a reversible lane, they should be at least 250 feet
11 apart. Longer distances between signs are appropriate for streets with speeds over 35 mph, but the separation
12 should not exceed 1,000 feet.

13 Because left-turning vehicles have a significant impact on the safety and efficiency of a reversible lane
14 operation, if an exclusive left-turn lane or two-way left-turn lane cannot be incorporated into the lane-use
15 pattern for a particular peak or off-peak period, consideration should be given to prohibiting left turns and U-
16 turns during that time period.

17 Section 2B.27 Jughandle Signs (R3-23, R3-24, R3-25, and R3-26 Series)

18 Support:

19 A jughandle turn is a left-turn or U-turn that because of special geometry is made by initially making a
20 right turn. This type of turn can increase the operational efficiency of a roadway by eliminating the need for
21 exclusive left-turn lanes and can increase the operational efficiency of a traffic control signal by eliminating
22 the need for protected left-turn phases. A jughandle turn can also provide an opportunity for trucks and
23 commercial vehicles to make a U-turn where the median and roadway are not of sufficient width to
24 accommodate a traditional U-turn by these vehicles.

25 Figure 2B-8 shows the various signs that can be used for signing jughandle turns. Figure 2B-9 shows
26 examples of regulatory and destination guide signing for various types of jughandle turns.

27 Standard:

28 On multi-lane roadways, since road users generally anticipate that they need to be in the left-hand
29 lane when approaching a location where they desire to turn left or make a U-turn, an ALL TURNS
30 FROM RIGHT LANE (R3-23) or a U TURN FROM RIGHT LANE (R3-23a) sign (see Figure 2B-9)
31 shall be installed in advance of the location to inform drivers that left turns and/or U-turns will be made
32 from the right-hand lane.

33 Option:

34 Where a median of sufficient width is available, supplemental regulatory or guide signs may also be
35 placed on the left-hand side of the roadway.

36 Standard:

37 An R3-24 series sign with an upward diagonal arrow pointing to the right if the jughandle entrance
38 is designed as an exit ramp (see Drawings A and B of Figure 2B-9) or an R3-25 series sign with a
39 horizontal arrow pointing to the right if the jughandle entrance is designed as an intersection shall be
40 installed on the right-hand side of the roadway at the entrance to the jughandle. The legend on the sign
41 shall be ALL TURNS, U TURN, or U AND LEFT TURNS, as appropriate.

42 If the jughandle is designed such that the jughandle entrance is downstream of the location where
43 the turn would normally have been made (see Drawing C of Figure 2B-9), an R3-26 series sign with an
44 arrow pointing straight upward shall be installed on the right-hand side of the roadway at the
45 intersection to inform road users that they need to proceed straight through the intersection in order to
46 make a left turn or U-turn. The legend on the sign shall be U TURN or U AND LEFT TURNS, as
47 appropriate.

48 Support:

49 The R3-24, R3-25, and R3-26 series of signs are designed to be mounted below conventional guide signs.

50 Section 2C.14 contains information regarding the use of advisory exit and ramp speed signs for exit
51 ramps.

52 Section 2D.39 contains information regarding the use of guide signs for jughandles.

1 **Section ~~2B.29~~ 2B.28 DO NOT PASS Sign (R4-1)**

2 Option:

3 The DO NOT PASS (R4-1) sign (see Figure 2B-10) may be used in addition to pavement markings (see
4 Section 3B.02) to emphasize the restriction on passing. The DO NOT PASS sign may be used at the
5 beginning of, and at intervals within, a zone through which sight distance is restricted or where other
6 conditions make overtaking and passing inappropriate.

7 If signing is needed on the left-hand side of the roadway for additional emphasis, NO PASSING ZONE
8 (W14-3) signs may be used (see Section 2C.45).

9 Support:

10 Standards for determining the location and extent of no-passing zone pavement markings are set forth in
11 Section 3B.02.

12 **Section ~~2B.30~~ 2B.29 PASS WITH CARE Sign (R4-2)**

13 Guidance:

14 The PASS WITH CARE (R4-2) sign (see Figure 2B-10) should be installed at the downstream end of a
15 no-passing zone if a DO NOT PASS sign has been installed at the ~~beginning~~ upstream end of the zone.

16 **Section ~~2B.31~~ 2B.30 KEEP RIGHT EXCEPT TO PASS Sign (R4-16) and SLOWER
17 TRAFFIC KEEP RIGHT Sign (R4-3)**

18 Option:

19 The KEEP RIGHT EXCEPT TO PASS (R4-16) sign (see Figure 2B-10) may be used on multi-lane
20 roadways to direct drivers to stay in the right-hand lane except when they are passing another vehicle.

21 Guidance:

22 If used, the KEEP RIGHT EXCEPT TO PASS sign should be installed just beyond the beginning of a
23 multi-lane roadway and at selected locations along multi-lane roadways for additional emphasis.

24 Option:

25 The SLOWER TRAFFIC KEEP RIGHT (R4-3) sign (see Figure 2B-10) may be used on multi-lane
26 roadways to reduce unnecessary lane changing.

27 Guidance:

28 If used, the SLOWER TRAFFIC KEEP RIGHT sign should be installed just beyond the beginning of a
29 multi-lane pavement, and at selected locations where there is a tendency on the part of some road users to
30 drive in the left-hand lane (or lanes) below the normal speed of traffic. This sign should not be used on the
31 approach to an interchange or through an interchange area.

32 **Section ~~2B.32~~ 2B.31 Slow Moving Traffic TRUCKS USE RIGHT LANE Signs (R4-5, ~~R4-6~~)**

33 ~~Support:~~

34 ~~The Slow Moving Traffic Lane signs (see Figure 2B-8) are used to direct vehicles into an extra lane that~~
35 ~~has been provided for slow-moving vehicles.~~

36 Guidance:

37 If an extra lane has been provided for trucks and other slow-moving traffic, a SLOWER TRAFFIC KEEP
38 RIGHT (R4-3) sign (see Figure 2B-10), TRUCKS USE RIGHT LANE (R4-5) sign (see Figure 2B-10), or
39 other appropriate sign should be installed at the beginning of the lane. ~~A TRUCK LANE (R4-6) sign, with~~
40 ~~the appropriate distance shown should be installed in advance of the lane.~~

41 Option:

42 The SLOWER TRAFFIC KEEP RIGHT sign may be used as a supplement or as an alternative to the
43 TRUCKS USE RIGHT LANE sign. Both signs may be used on multi-lane roadways to improve capacity and
44 reduce lane changing.

45 The TRUCKS USE RIGHT LANE (R4-5) sign may be used on multi-lane roadways to reduce
46 unnecessary lane changing.

47 Guidance:

48 If an extra lane has been provided for trucks and other slow-moving traffic, a Lane Ends sign (see Section
49 2C.42) should be installed in advance of the point where the extra lane ends. Appropriate pavement markings

1 should be installed at both the ~~beginning~~ upstream and ~~the~~ downstream ends of the extra lane (see Section
2 3B.09 and Figure 3B-13).

3 Support:

4 Section 2D.51 contains information regarding advance information signs for extra lanes that have been
5 provided for trucks and other slow-moving traffic.

6 **Section ~~2B.33~~ 2B.32 Keep Right and Keep Left Signs (R4-7, R4-8)**

7 Option:

8 The Keep Right (R4-7) sign (see Figure 2B-10) may be used at locations where it is necessary for traffic
9 to pass only to the right-hand side of a roadway feature or obstruction. The Keep Left (R4-8) sign (see Figure
10 2B-10) may be used at locations where it is necessary for traffic to pass only to the left-hand side of a roadway
11 feature or obstruction.

12 Guidance:

13 At locations where it is not readily apparent that traffic is required to keep to the right, a Keep Right sign
14 should be used.

15 If used, the Keep Right sign should be installed as close as practical to approach ends of raised medians,
16 parkways, islands, and underpass piers, ~~and at other locations where it is not readily apparent that traffic is~~
17 ~~required to keep to the right.~~ The sign should be mounted on the face of or just in front of a pier or other
18 obstruction separating opposite directions of traffic in the center of the highway such that traffic will have to
19 pass to the right-hand side of the sign.

20 **Standard:**

21 **The Keep Right sign shall not be installed on the right-hand side of the roadway in a position where**
22 **traffic must pass to the left-hand side of the sign.**

23 Option:

24 The Keep Right sign may be omitted at intermediate ends of divisional islands and medians.

25 Word message KEEP RIGHT (LEFT) with an arrow (R4-7a or R4-7b) signs (see Figure 2B-10) may be
26 used instead of the R4-7 or R4-8 symbol signs.

27 Where the obstruction obscures the Keep Right sign, the minimum placement height may be increased for
28 better sign visibility.

29 A narrow Keep Right (R4-7c) sign (see Figure 2B-10) may be installed on the approach end of a median
30 island that is less than 4 feet wide at the point where the sign is to be located.

31 **Standard:**

32 **A narrow Keep Right (R4-7c) sign shall not be installed on a median island that has a width of 4 feet**
33 **or more at the point where the sign is to be located.**

34 **Section 2B.33 STAY IN LANE Sign (R4-9)**

35 Option:

36 A STAY IN LANE (R4-9) sign (see Figure 2B-10) may be used on multi-lane highways to direct road
37 users to stay in their lane until conditions permit shifting to another lane.

38 Guidance:

39 If a STAY IN LANE sign is used, it should be accompanied by a double solid white lane line(s) to
40 prohibit lane changing.

41 **Section 2B.34 RUNAWAY VEHICLES ONLY Sign (R4-10)**

42 Guidance:

43 A RUNAWAY VEHICLES ONLY (R4-10) sign (see Figure 2B-10) should be installed near a truck
44 escape (or runaway truck) ramp entrance to discourage other road users from entering the ramp.

45 **Section 2B.35 Slow Vehicle Turn-Out Signs (R4-12, R4-13, and R4-14)**

46 Support:

1 [On two-lane highways in areas where traffic volumes and/or vertical or horizontal curvature make passing](#)
2 [difficult, turn-out areas are sometimes provided for the purpose of giving a group of faster vehicles an](#)
3 [opportunity to pass a slow-moving vehicle.](#)

4 [Option:](#)

5 [A SLOW VEHICLES WITH XX OR MORE FOLLOWING VEHICLES MUST USE TURN-OUT \(R4-](#)
6 [12\) sign \(see Figure 2B-10\) may be installed in advance of a turn-out area to inform drivers who are driving](#)
7 [so slow that they have accumulated a specific number of vehicles behind them that they are required by the](#)
8 [traffic laws of that State to use the turn-out to allow the vehicles following them to pass.](#)

9 [Support:](#)

10 [The specific number of vehicles displayed on the R4-12 sign provides law enforcement personnel with the](#)
11 [information they need to enforce this regulation.](#)

12 [Option:](#)

13 [If an R4-12 sign has been installed in advance of a turn-out area, a SLOW VEHICLES MUST USE](#)
14 [TURN-OUT AHEAD \(R4-13\) sign \(see Figure 2B-10\) may also be installed downstream from the R4-12](#)
15 [sign, but upstream from the turn-out area, to remind slow drivers that they are required to use a turn-out that is](#)
16 [a short distance ahead.](#)

17 [Standard:](#)

18 [If an R4-12 sign has been installed in advance of a turn-out area, a SLOW VEHICLES MUST](#)
19 [TURN OUT \(with arrow\) \(R4-14\) sign \(see Figure 2B-10\) shall be installed at the entry point of the](#)
20 [turn-out area.](#)

21 [Support:](#)

22 [Section 2D.52 contains information regarding advance information signs for slow vehicle turn-out areas.](#)

23 [Section 2B.36 DO NOT DRIVE ON SHOULDER Sign \(R4-17\) and DO NOT PASS ON](#) 24 [SHOULDER Sign \(R4-18\)](#)

25 [Option:](#)

26 [The DO NOT DRIVE ON SHOULDER \(R4-17\) sign \(see Figure 2B-10\) may be installed to inform road](#)
27 [users that using the shoulder of a roadway as a travel lane is prohibited.](#)

28 [The DO NOT PASS ON SHOULDER \(R4-18\) sign \(see Figure 2B-10\) may be installed to inform road](#)
29 [users that using the shoulder of a roadway to pass other vehicles is prohibited.](#)

30 [Section ~~2B.34~~ 2B.37 DO NOT ENTER Sign \(R5-1\)](#)

31 [Standard:](#)

32 [The DO NOT ENTER \(R5-1\) sign \(see Figure 2B-11\) shall be used where traffic is prohibited from](#)
33 [entering a restricted roadway.](#)

34 [Guidance:](#)

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

39 [If the DO NOT ENTER sign would be visible to traffic to which it does not apply, the sign should be](#)
40 [turned away from, or shielded from, the view of that traffic.](#)

41 [Option:](#)

42 [The DO NOT ENTER sign may be installed where it is necessary to emphasize the one-way traffic](#)
43 [movement on a ramp or turning lane.](#)

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

46 [Support:](#)

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

49 [Section ~~2B.35~~ 2B.38 WRONG WAY Sign \(R5-1a\)](#)

1 Option:

2 The WRONG WAY (R5-1a) sign (see Figure 2B-11) may be used as a supplement to the DO NOT
3 ENTER sign where an exit ramp intersects a crossroad or a crossroad intersects a one-way roadway in a
4 manner that does not physically discourage or prevent wrong-way entry (see Figure 2B-12).

5 Guidance:

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

8 Support:

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

11 **Section ~~2B.36~~ 2B.39 Selective Exclusion Signs**

12 Support:

13 Selective Exclusion signs (see Figure 2B-11) give notice to road users that State or local statutes or
14 ordinances exclude designated types of traffic from using particular roadways or facilities.

15 **Standard:**

16 **If used, Selective Exclusion signs shall clearly indicate the type of traffic that is excluded.**

17 Support:

18 Typical exclusion messages include:

- 19 A. No Trucks (R5-2),
- 20 B. NO MOTOR VEHICLES (R5-3),
- 21 C. NO COMMERCIAL VEHICLES EXCLUDED (R5-4),
- 22 D. NO TRUCKS (VEHICLES) WITH LUGS PROHIBITED (R5-5),
- 23 E. No Bicycles (R5-6),
- 24 F. NO NON-MOTORIZED TRAFFIC PROHIBITED (R5-7),
- 25 G. NO MOTOR-DRIVEN CYCLES PROHIBITED (R5-8), ~~and~~
- 26 [H. No Pedestrians \(R9-3\),](#)
- 27 [I. No Skaters \(R9-13\),](#)
- 28 [J. No Equestrians \(R9-14\), and](#)
- 29 K. No Hazardous Material Prohibited (R14-3) (see Section 2B.62).

30 Option:

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

34 Guidance:

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

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

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

45 Option:

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

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

50 [The AUTHORIZED VEHICLES ONLY \(R5-11\) sign may be used at median openings and other](#)
51 [locations to prohibit vehicles from using the median opening or facility unless they have special permission](#)

1 [\(such as law enforcement vehicles or emergency vehicles\) or are performing official business \(such as](#)
2 [highway agency vehicles\).](#)

3 ~~Section 2B-37~~ **2B.40 ONE WAY Signs (R6-1, R6-2)**

4 **Standard:**

5 Except as ~~noted~~ **provided** in ~~the Option Paragraph 6~~, the ONE WAY (R6-1 or R6-2) sign (see Figure
6 2B-13) shall be used to indicate streets or roadways upon which vehicular traffic is allowed to travel in
7 one direction only.

8 ONE WAY signs shall be placed parallel to the one-way street at all alleys and roadways that
9 intersect one-way roadways as shown in Figures 2B-14 ~~through 2B-15~~.

10 ~~Guidance:~~

11 ~~Where~~ **At an intersection with a** divided highway ~~s are separated by that has a~~ median width ~~s~~ at the
12 intersection itself of 30 feet or more, ONE WAY signs ~~should~~ **shall** be placed, visible to each crossroad
13 approach, on the near right, and far left corners of each intersection with the directional roadways ~~as~~
14 ~~shown in~~ (see Figures 2B-12 and 2B-15).

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

21 **Option:**

22 At an intersection with a divided highway that has a median width at the intersection itself of less than 30
23 feet, ONE WAY signs may also be placed on the far right corner of the intersection as shown in Figures 2B-
24 16 and 2B-17.

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

27 ~~ONE WAY signs may be omitted (see Figure 2B-14) at intersections with divided highways that have~~
28 ~~median widths at the intersection itself of less than 30 feet.~~

29 **Standard:**

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

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

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

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

43 **Option:**

44 Where the central island of a roundabout allows for the installation of signs, ONE WAY signs may be
45 used instead of or in addition to Roundabout Directional Arrow (R6-4 series) signs (see Section 2B.43) to
46 direct traffic counter-clockwise around the central island.

47 **Guidance:**

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

51 **Support:**

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

5 [Option:](#)

6 [The BEGIN ONE WAY \(R6-6\) sign \(see Figure 2B-13\) may be used notify road users of the beginning](#)
7 [point of a one direction of travel restriction on the street or roadway. The END ONE WAY \(R6-7\) sign \(see](#)
8 [Figure 2B-13\) may be used notify road users of the ending point of a one direction of travel restriction on the](#)
9 [street or roadway.](#)

10 **[Section 2B.41 Wrong-Way Traffic Control at Interchange Ramps](#)** text was relocated from Section
11 2E.50

12 **Standard:**

13 **At interchange exit ramp terminals where the ramp intersects a crossroad in such a manner that**
14 **wrong-way entry could inadvertently be made, the following signs shall be used (see Figure 2B-18):**

- 15 **A. At least one ONE WAY sign for each direction of travel on the crossroad shall be placed where**
16 **the exit ramp intersects the crossroad.**
- 17 **B. At least one DO NOT ENTER sign shall be conspicuously placed near the [downstream](#) end of**
18 **the exit ramp in positions appropriate for full view of a road user starting to enter wrongly [from](#)**
19 **[the crossroad](#).**
- 20 **C. At least one WRONG WAY sign shall be placed on the exit ramp facing a road user traveling in**
21 **the wrong direction.**

22 **Guidance:**

23 In addition, the following pavement markings should be used (see Figure 2B-18):

- 24 A. On two-lane paved crossroads at interchanges, double solid yellow lines should be used as a
25 ~~centerline~~ [center line](#) for an adequate distance on both sides approaching the ramp intersections.
- 26 B. Where crossroad channelization or ramp geometrics do not make wrong-way movements difficult, a
27 lane-use arrow should be placed in each lane of an exit ramp near the crossroad terminal where it will
28 be clearly visible to a potential wrong-way road user.

29 **Option:**

30 The following traffic control devices may be used to supplement the ~~above~~ signs and pavement markings
31 [described in Paragraphs 1 and 2:](#)

- 32 A. Additional ONE WAY signs may be placed, especially on two-lane rural crossroads, appropriately in
33 advance of the ramp intersection to supplement the required ONE WAY sign(s).
- 34 B. Additional WRONG WAY signs may be used.
- 35 C. Slender, elongated wrong-way arrow pavement markings (see Figure 3B-24) intended primarily to
36 warn wrong-way road users that they are traveling in the wrong direction may be placed upstream
37 from the ramp terminus (see Figure 2B-18) to indicate the correct direction of traffic flow. Wrong-
38 way arrow pavement markings may also be placed on the exit ramp at appropriate locations near the
39 crossroad junction to indicate wrong-way movement. The wrong-way arrow markings may consist of
40 pavement markings or bidirectional red-and-white raised pavement markers or other units that show
41 red to wrong-way road users and white to other road users (see Figure 3B-24).
- 42 D. Lane-use arrow pavement markings may be placed on the exit ramp and crossroad near their
43 intersection to indicate the permissive direction of flow.
- 44 ~~E. Guide signs or may be used on entrance ramps near the crossroad to inform road users of the freeway~~
45 ~~or expressway entrance, as appropriate (see Figure 2E-37).~~ relocated to Section 2D.46
- 46 [E. Freeway entrance signs \(see Section 2D.46\) may be used.](#)

47 **Guidance:**

48 On interchange entrance ramps where the ramp merges with the through roadway and the design of the
49 interchange does not clearly make evident the direction of traffic on the separate roadways or ramps, a ONE
50 WAY sign visible to traffic on the entrance ramp and through roadway should be placed on each side of the
51 through roadway near the entrance ramp merging point as illustrated in Figure 2B-19.

52 **Option:**

1 At locations where engineering judgment determines that a special need exists, other standard warning or
2 prohibitive methods and devices may be used as a deterrent to the wrong-way movement.

3 Where there are no parked cars, pedestrian activity or other obstructions such as snow or vegetation, and
4 if an engineering study indicates that a lower mounting height would address wrong-way movements on
5 freeway or expressway exit ramps, a DO NOT ENTER sign(s) and/or a WRONG WAY sign(s) that is located
6 along the exit ramp facing a road user who is traveling in the wrong direction may be installed at a minimum
7 mounting height of 3 feet, measured vertically from the bottom of the sign to the elevation of the near edge of
8 the pavement.

9 Support:

10 Section 2B.41 contains further information on signing to avoid wrong-way movements at at-grade
11 intersections on expressways.

12 **Section ~~2B.38~~ 2B.42 Divided Highway Crossing Signs (R6-3, R6-3a)**

13 **Option Standard:**

14 On unsignalized minor-street approaches from which both left turns and right turns are permitted
15 onto a divided highway that has a median width at the intersection itself of 30 feet or more, except as
16 provided in Paragraph 2, a ~~The~~ Divided Highway Crossing (R6-3 or R6-3a) sign (see Figure 2B-13) ~~may~~
17 shall be used to advise road users that they are approaching an intersection with a divided highway (see
18 Figure 2B-15).

19 Option:

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

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

26 **Standard:**

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

29 **Option:**

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

32 Option:

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

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

36 Guidance:

37 Where the central island of a roundabout allows for the installation of signs, Roundabout Directional
38 Arrow (R6-4 series) signs (see Figure 2B-20) should be used in the central island to direct traffic counter-
39 clockwise around the central island, except as provided in Paragraph 11 in Section 2B.40.

40 Standard:

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

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

48 Guidance:

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

4 Option:

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

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

9 Guidance:

10 Where the central island of a roundabout does not provide a reasonable place to install a sign, Roundabout
11 Circulation (R6-5P) plaques (see Figure 2B-20) should be placed below the YIELD signs on each approach.

12 Option:

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

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

17 **Section 2B.45 Examples of Roundabout Signing**

18 Support:

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

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

23 **Section ~~2B.39~~ 2B.46 Parking, Standing, and Stopping Signs (R7 and R8 Series)**

24 Support:

25 Signs governing the parking, stopping, and standing of vehicles cover a wide variety of regulations, and
26 only general guidance can be provided here. The word “standing” when used on the R7 and R8 series of signs
27 refers to the practice of a driver keeping the vehicle in a stationary position while continuing to occupy the
28 vehicle. Typical examples of parking, stopping, and standing signs and plaques (see Figures 2B-24 and 2B-
29 25) are as follows:

- 30 1. NO PARKING ANY TIME (R7-1);
- 31 2. NO PARKING ~~8:30~~ X:XX AM TO ~~5:30~~ X:XX PM (R7-2, R7-2a);
- 32 3. NO PARKING EXCEPT SUNDAYS AND HOLIDAYS (R7-3);
- 33 4. NO STANDING ANY TIME (R7-4);
- 34 5. ~~ONE~~ XX HOUR PARKING ~~9~~ X:XX AM-~~7~~ X:XX PM (R7-5);
- 35 6. NO PARKING LOADING ZONE (R7-6);
- 36 7. NO PARKING BUS STOP (R7-7, R7-107, R7-107a);
- 37 8. RESERVED PARKING for persons with disabilities (R7-8);
- 38 9. VAN ACCESSIBLE (R7-8P);
- 39 10. Pay Station (R7-20);
- 40 11. Pay Parking (R7-21, R7-21a, R7-22);
- 41 12. Parking Permitted X:XX AM TO X:XX PM (R7-23);
- 42 13. Parking Permitted XX HOUR(S) XX AM – XX PM (R7-23a);
- 43 14. XX HR PARKING X:XX AM TO X:XX PM (R7-108);
- 44 15. NO PARKING ANYTIME/XX HOUR PARKING X:XX AM – X:XX PM (R7-200, R7-200a);
- 45 16. TOW-AWAY ZONE (R7-201P, R7-201aP);
- 46 17. THIS SIDE OF SIGN (R7-202P);
- 47 18. EMERGENCY SNOW ROUTE NO PARKING IF OVER XX INCHES (R7-203);
- 48 19. NO PARKING ON PAVEMENT (R8-1);
- 49 20. NO PARKING EXCEPT ON SHOULDER (R8-2);
- 50 ~~K. NO PARKING (R8-3);~~
- 51 21. No Parking (R8-3, R8-3a); ~~and~~
- 52 22. EXCEPT SUNDAYS AND HOLIDAYS (R8-3bP);

- 1 [23. ON PAVEMENT \(R8-3cP\);](#)
- 2 [24. ON BRIDGE \(R8-3dP\);](#)
- 3 [25. ON TRACKS \(R8-3eP\);](#)
- 4 [26. EXCEPT ON SHOULDER \(R8-3fP\);](#)
- 5 [27. LOADING ZONE \(R8-3gP\);](#)
- 6 [28. X:XX AM TO X:XX PM \(R8-3hP\);](#)
- 7 [29. EMERGENCY PARKING ONLY \(R8-4\);](#)
- 8 30. NO STOPPING ON PAVEMENT (R8-5);
- 9 [31. NO STOPPING EXCEPT ON SHOULDER \(R8-6\); and](#)
- 10 [32. EMERGENCY STOPPING ONLY \(R8-7\).](#)

11 **Section ~~2B-40~~ 2B.47 Design of Parking, Standing, and Stopping Signs**

12 Support:

13 Discussions of parking signs and parking regulations in this Section apply not only to parking, but also to
14 standing and stopping.

15 **Standard:**

16 **The legend on parking signs shall state applicable regulations. Parking signs (see Figures 2B-24**
17 **and 2B-25) shall ~~conform to~~ comply with the standards of shape, color, and location.**

18 **Where parking is prohibited at all times or at specific times, the basic design for parking signs shall**
19 **have a red legend and border on a white background (Parking Prohibition signs), except that the R8-4**
20 **and R8-7 signs and the alternate design for the R7-201aP plaque shall have a black legend and border**
21 **on a white background, and the R8-3 sign shall have a black legend and border and a red circle and**
22 **slash on a white background.**

23 **Where only limited-time parking or parking in a particular manner are permitted, the signs shall**
24 **have a green legend and border on a white background (Permissive Parking signs).**

25 Guidance:

26 Parking signs should display the following information from top to bottom of the sign, in the order listed:

- 27 A. The restriction or prohibition;
- 28 B. The times of the day that it is applicable, if not at all hours; and
- 29 C. The days of the week that it is applicable, if not every day.

30 If the parking restriction applies to a limited area or zone, the limits of the restriction should be shown by
31 arrows or supplemental plaques. If arrows are used and if the sign is at the end of a parking zone, there should
32 be a single-headed arrow pointing in the direction that the regulation is in effect. If the sign is at an
33 intermediate point in a zone, there should be a double-headed arrow pointing both ways. When a single sign
34 is used at the transition point between two parking zones, it should display a right and left arrow pointing in
35 the direction that the respective restrictions apply.

36 Where special parking restrictions are imposed during heavy snowfall, ~~Snow~~ Emergency [Snow Route](#)
37 [\(R7-203\)](#) signs (see [Figure 2B-24](#)) should be installed. The legend will vary according to the regulations, but
38 the signs should be vertical rectangles, having a white background with the upper part of the plate a red
39 background.

40 **Standard:**

41 ~~When used to direct drivers to van-accessible parking facilities, a VAN ACCESSIBLE (R7-8a)~~
42 ~~plaque (see Figure 2B-16) should be mounted below the D4-1 sign.~~ Where parking spaces that are
43 reserved for persons with disabilities are designated to accommodate wheelchair vans, a VAN
44 ACCESSIBLE (~~R7-8b~~ [R7-8P](#)) plaque (see [Figure 2B-16](#)) should shall be mounted below the R7-8 sign.
45 The R7-8 sign (see Figure 2B-24) shall have a green legend and border and a white wheelchair symbol
46 on a blue square, all on a white background. The R7-8P plaque (see Figure 2B-24) shall have a green
47 legend and border on a white background.

48 Option:

49 To minimize the number of parking signs, blanket regulations that apply to a given district may, if legal,
50 be posted at district boundary lines.

51 As an alternate to the use of arrows to show designated restriction zones, word messages such as BEGIN,
52 END, HERE TO CORNER, HERE TO ALLEY, THIS SIDE OF SIGN, or BETWEEN SIGNS may be used.

1 Where parking is prohibited during certain hours and time-limited parking or parking in a particular
2 manner is permitted during certain other time periods, the red Parking Prohibition and green Permissive
3 Parking signs may be designed as follows:

- 4 A. Two 12 x 18-inch parking signs may be used with the red Parking Prohibition sign installed above or
5 to the left of the green Permissive Parking sign; or
- 6 B. The red Parking Prohibition sign and the green Permissive Parking sign may be combined (see Figure
7 2B-24) to form an R7-200 sign on a single 24 x 18-inch sign, or [an R7-200a sign](#) on a single 12 x 30-
8 inch sign.

9 At the transition point between two parking zones, a single sign or two signs mounted side by side may be
10 used.

11 The words NO PARKING may be used as an alternative to the No Parking symbol. The supplemental
12 educational plaque, NO PARKING, with a red legend and border on a white background, may be used above
13 signs incorporating the No Parking symbol.

14 Alternate designs for the R7-107 sign may be developed such as the R7-107a sign (see Figure 2B-24).
15 Alternate designs may include, on a single ~~panel~~ [sign](#), a transit logo, an approved bus symbol, a parking
16 prohibition, the words BUS STOP, and an arrow. The preferred bus symbol color is black, but other dark
17 colors may be used. Additionally, the transit logo may be ~~shown~~ [displayed](#) on the bus face in the appropriate
18 colors instead of placing the logo separately. The reverse side of the sign may contain bus routing
19 information.

20 To make the parking regulations more effective and to improve public relations by giving a definite
21 warning, a [TOW-AWAY ZONE \(R7-201P\) sign plaque](#) (see Figure 2B-24) ~~reading TOW-AWAY ZONE~~
22 ~~(R7-201)~~ may be appended to, or incorporated in, any parking prohibition sign. The Tow-Away Zone (R7-
23 201aP) symbol [sign plaque](#) may be used instead of the R7-201P word message [sign plaque](#). The R7-201aP
24 [sign plaque](#) may have either a black or red legend and border on a white background.

25 Guidance:

26 [If a fee is charged for parking and a midblock pay station is used instead of individual parking meters for](#)
27 [each parking space, pay parking signs should be used. Pay Parking \(R7-22\) signs \(see Figure 2B-24\) should](#)
28 [be used to define the area where the pay station parking applies. Pay Station \(R7-20\) signs \(see Figure 2B-24\)](#)
29 [should be used at the pay station or to direct road users to the pay station.](#)

30 Standard:

31 [If the pay parking is subject to a maximum time limit, the appropriate time limit \(number of hours](#)
32 [or minutes\) shall be displayed on the Pay Parking \(R7-21 or R7-21a\) and Pay Station \(R7-20\) signs.](#)

33 Option:

34 In rural areas (see Figure 2B-25), the legends NO PARKING ON PAVEMENT (R8-1) or NO STOPPING
35 ON PAVEMENT (R8-5) ~~is~~ [are](#) generally suitable and may be used. If a roadway has paved shoulders, the NO
36 PARKING EXCEPT ON SHOULDER sign (R8-2) or the NO STOPPING EXCEPT ON SHOULDER sign
37 (R8-6) may be used as ~~it is~~ [these signs would be](#) less likely to cause confusion. The R8-3~~a~~ symbol sign or the
38 word message NO PARKING (R8-3a) sign may be used to prohibit any parking along a given highway.
39 Word message supplemental plaques (see Figure 2B-17), such as ~~ON PAVEMENT (R8-3c) or ON BRIDGE~~
40 ~~(R8-3d)~~, may be mounted below the R8-3 or R8-3a sign. [These word message supplemental plaques may](#)
41 [include legends such as EXCEPT SUNDAYS AND HOLIDAYS \(R8-3bP\), ON PAVEMENT \(R8-3cP\), ON](#)
42 [BRIDGE \(R8-3dP\), ON TRACKS \(R8-3eP\), EXCEPT ON SHOULDERS \(R8-3fP\), LOADING ZONE \(with](#)
43 [arrow\) \(R8-3gP\), and X:XX AM TO X:XX PM \(with arrow\) \(R8-3hP\).](#)

44 [Colors that are in compliance with the provisions of Section 2A.10 may be used for color coding of](#)
45 [parking time limits.](#)

46 Guidance:

47 [If colors are used for color coding of parking time limits, the colors green, red, and black should be the](#)
48 [only colors that are used.](#)

49 **Section ~~2B-41~~ 2B.48 Placement of Parking, Stopping, and Standing Signs**

50 Guidance:

51 When signs with arrows are used to indicate the extent of the restricted zones, the signs should be set at an
52 angle of not less than 30 degrees or more than 45 degrees with the line of traffic flow in order to be visible to
53 approaching traffic.

1 Spacing of signs should be based on legibility and sign orientation.

2 If the zone is unusually long, signs showing a double arrow should be used at intermediate points within
3 the zone.

4 **Standard:**

5 **If the signs are mounted at an angle of 90 degrees to the curb line, two signs shall be mounted back
6 to back at the transition point between two parking zones, each with ~~the~~ an appended ~~message~~ THIS
7 SIDE OF SIGN (R7-202P) supplemental plaque.**

8 **Guidance:**

9 If the signs are mounted at an angle of 90 degrees to the curb line, At intermediate points within a zone, a
10 ~~single~~ signs without any arrows or appended plaques should be used at intermediate points within a parking
11 zone, facing in the direction of approaching traffic. Otherwise the standards of placement should be the same
12 as for signs using directional arrows.

13 **Section ~~2B.42~~ 2B.49 Emergency Restriction Signs (R8-4, R8-7, R8-8)**

14 **Option:**

15 The EMERGENCY PARKING ONLY (R8-4) sign (see Figure 2B-25) or the EMERGENCY STOPPING
16 ONLY (R8-7) sign (see Figure 2B-25) may be used to discourage or prohibit shoulder parking, particularly
17 where scenic or other attractions create a tendency for road users to stop temporarily, ~~even though a turnout or~~
18 ~~rest areas have not been provided.~~

19 The DO NOT STOP ON TRACKS (R8-8) sign (see Figure 8B-1) may be used to discourage or prohibit
20 parking or stopping on railroad or light rail transit tracks (see Section 8B.09).

21 **Standard:**

22 **Emergency Restriction signs shall be rectangular and shall have a red or black legend and border
23 on a white background.**

24 **Section ~~2B.43~~ 2B.50 WALK ON LEFT FACING TRAFFIC and No Hitchhiking Signs (R9-1,
25 R9-4, R9-4a)**

26 **Option:**

27 The WALK ON LEFT FACING TRAFFIC (R9-1) sign (see Figure 2B-26) may be used on highways
28 where no sidewalks are provided.

29 **Standard:**

30 **If used, the WALK ON LEFT FACING TRAFFIC sign shall be installed on the right-hand side of
31 the road where pedestrians walk on the pavement or shoulder in the absence of pedestrian pathways or
32 sidewalks.**

33 **Option:**

34 The No Hitchhiking (R9-4~~a~~) sign (see Figure 2B-26) may be used to prohibit standing in or adjacent to
35 the roadway for the purpose of soliciting a ride. The R9-4~~a~~ word message sign (see Figure 2B-26) may be
36 used as an alternate to the R9-4~~a~~ symbol sign.

37 **Section ~~2B.44~~ 2B.51 Pedestrian Crossing Signs (R9-2, R9-3)**

38 **Option:**

39 Pedestrian Crossing signs (see Figure 2B-26) may be used to limit pedestrian crossing to specific
40 locations.

41 **Standard:**

42 **If used, Pedestrian Crossing signs shall be installed to face pedestrian approaches.**

43 **Option:**

44 Where crosswalks are clearly defined, the CROSS ONLY AT CROSSWALKS (R9-2) sign may be used
45 to ~~discourage jaywalking or unauthorized crossing~~ prohibit pedestrians from crossing at locations away from
46 crosswalks.

47 The No Pedestrian Crossing (R9-3~~a~~) sign may be used to prohibit pedestrians from crossing a roadway at
48 an undesirable location or in front of a school or other public building where a crossing is not designated.

1 The NO PEDESTRIAN CROSSING (R9-3a) word message sign may be used as an alternate to the R9-3a
2 symbol sign. The USE CROSSWALK (R9-3bP) supplemental plaque, along with an arrow, may be installed
3 below either sign to designate the direction of the crossing.

4 Support:

5 One of the most frequent uses of the Pedestrian Crossing signs is at signalized intersections that have three
6 crossings that can be used and one leg that cannot be crossed.

7 Guidance:

8 The R9-3bP ~~sign~~ plaque should not be installed in combination with educational plaques.

9 **Section 2B.52 Traffic Signal Pedestrian and Bicycle Actuation Signs (R10-1 through R10-4,**
10 **and R10-24 through R10-26)** this text was relocated from Section 2B.45

11 **Standard:**

12 **Traffic Signal signs applicable to pedestrian actuation (see Figure 2B-26) or bicyclist actuation (see**
13 **Figure 9B-2) shall be mounted immediately above or incorporated into the ~~pedestrian~~ pushbutton**
14 **detector units (see Section 4E.08).**

15 Support:

16 Traffic Signal signs applicable to pedestrians include:

- 17 A. CROSS ONLY ON GREEN ~~LIGHT ONLY~~ (symbolic circular green) (R10-1);
- 18 B. CROSS ONLY ON ~~WALK~~ (symbolic walk indication) SIGNAL ~~ONLY~~ (R10-2);
- 19 C. Push Button for ~~GREEN LIGHT~~ Walk Signal (R10-3 series); and
- 20 D. Push Button for ~~WALK SIGNAL~~ Green Signal (R10-4 series).

21 Option:

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

- 23 A. Push Button to Cross Street (~~arrow~~), ~~PUSH BUTTON~~ Wait for ~~GREEN LIGHT~~ Walk Signal (R10-
24 3a); or
- 25 B. Push Button to Cross Street (~~arrow~~), ~~PUSH BUTTON WALK SIGNAL~~ Wait for Green Signal (R10-
26 4a).

27 The name of the street to be crossed may be substituted for the word STREET in the legends on the R10-
28 3a and R10-4a signs.

29 Guidance:

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

32 Option:

33 ~~The symbol sign R10-2a may be used as an alternate to sign R10-2.~~ Where symbol-type pedestrian signal
34 indications are used, an educational sign (R10-3b) may be used instead of the R10-3 sign to improve
35 pedestrian understanding of pedestrian indications at signalized intersections. Where word-type pedestrian
36 signal indications are being retained for the remainder of their useful service life, the legends WALK/DONT
37 WALK may be substituted for the symbols on the educational sign R10-3b, thus creating educational sign
38 R10-3c. The R10-3d educational sign may be used if to inform pedestrians that the pedestrian clearance time
39 is sufficient only for the pedestrian to cross to the median at locations where pedestrians cross in two stages
40 using a median refuge island. ~~The diagrammatic sign R10-4b may also be used as an alternate to sign R10-4.~~
41 ~~At intersections where pedestrians cross in two stages using a median refuge island, the word message~~
42 ~~“CROSS TO MEDIAN” may be placed on the near corner of the refuge island along with the educational~~
43 ~~plaque.~~ The R10-3e educational sign may be used where countdown pedestrian signals have been provided.
44 In order to assist the pedestrian in understanding which pushbutton to push, the R10-3f to R10-3i educational
45 signs that provide the name of the street to be crossed may be used instead of the R10-3b to R10-3e
46 educational signs.

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

49 The R10-25 sign (see Figure 2B-26) may be used where a pushbutton detector has been installed for
50 pedestrians to activate In-Roadway Warning Lights (see Chapter 4N) or flashing beacons that have been
51 added to the pedestrian warning signs.

52 Support:

1 [Section 4E.08 contains information regarding the application of the R10-32P plaque.](#)

2 **Section ~~2B.45~~ 2B.53 Traffic Signal Signs (~~R10-1~~ R10-5 through ~~R10-21~~ R10-30)**

3 Option:

4 To supplement traffic signal control, Traffic Signal signs ~~R10-1~~ R10-5 through ~~R10-21~~ R10-30 may be
5 used to regulate road users.

6 **Guidance:**

7 ~~When used, Traffic Signal signs should be located adjacent to the signal face to which they apply.~~

8 Traffic Signal signs (see Figure 2B-27) may be installed at certain locations to clarify signal control.
9 Among the legends [that may be used](#) for this purpose are LEFT ON GREEN ARROW ONLY (R10-5), STOP
10 HERE ON RED (R10-6 or R10-6a) for observance of stop lines, DO NOT BLOCK INTERSECTION (R10-7)
11 for avoidance of traffic obstructions, USE LANE(S) WITH GREEN ARROW (R10-8) for obedience to ~~Lane-~~
12 ~~Control~~ lane-use control signals (see Chapter 4M), LEFT TURN YIELD ON GREEN (symbolic [circular](#)
13 green ~~ball~~) (R10-12), and ~~LEFT TURN SIGNAL YIELD ON GREEN (symbolic circular green ball) (R10-21)~~
14 (~~see Section 4D.06~~) [LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP \(R10-27\)](#).

15 **Guidance:**

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

19 **Option:**

20 [If needed for additional emphasis, an additional LEFT TURN YIELD ON GREEN \(symbolic circular](#)
21 [green\) \(R10-12\) sign with an AT SIGNAL \(R10-31P\) supplemental plaque \(see Figure 2B-27\) may be](#)
22 [installed in advance of the intersection.](#)

23 In situations where traffic control signals are coordinated for progressive timing, the Traffic Signal Speed
24 (I1-1) sign may be used (see Section 2H.03).

25 **Standard:**

26 [The CROSSWALK STOP ON RED \(symbolic circular red\) \(R10-23\) sign \(see Figure 2B-27\) shall](#)
27 [only be used in conjunction with pedestrian hybrid beacons \(see Section 4F.02\).](#)

28 The EMERGENCY SIGNAL (R10-13) sign (see Figure 2B-27) shall be used in conjunction with
29 emergency-vehicle traffic control signals (see Section 4G.02).

30 [The EMERGENCY SIGNAL—STOP ON FLASHING RED \(R10-14 or R10-14a\) sign \(see Figure](#)
31 [2B-27\) shall be used in conjunction with emergency-vehicle hybrid beacons \(see Section 4G.04\).](#)

32 Option:

33 In order to remind drivers who are making turns to yield to pedestrians, ~~especially at intersections where~~
34 ~~right turn on red is permitted and pedestrian crosswalks are marked,~~ a ~~TURNING TRAFFIC MUST YIELD-~~
35 ~~TO PEDESTRIANS~~ [Turning Vehicles Yield to Pedestrians](#) (R10-15) sign (see Figure 2B-27) may be used.

36 A U-TURN YIELD TO RIGHT TURN (R10-16) sign (see Figure 2B-27) may be installed near the left-
37 turn signal face if U-turns are allowed on a protected left-turn movement on an approach from which ~~drivers~~
38 ~~making a right turn from the conflicting approach to their left are~~ a [right-turn GREEN ARROW signal](#)
39 [indication is](#) simultaneously being ~~shown displayed~~ ~~a right-turn GREEN ARROW signal indication~~ [to drivers](#)
40 [making a right turn from the conflicting approach to their left.](#)

41 [Section 2B.54 No Turn on Red Signs \(R10-11 Series, R10-17a, and R10-30\)](#) this text was
42 relocated from Section 2B.45

43 **Standard:**

44 ~~The NO TURN ON RED (R10-11a, R10-11b) sign (see Figure 2B-19) shall be used to prohibit~~
45 [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](#)
46 [prohibited, a symbolic NO TURN ON RED \(symbolic circular red\) \(R10-11\) sign \(see Figure 2B-27\) or](#)
47 [a NO TURN ON RED \(R10-11a, R10-11b\) word message sign \(see Figure 2B-27\) shall be used.](#)

48 **Option:**

49 ~~A symbolic NO TURN ON RED (R10-11) sign (see Figure 2B-19) may be used as an alternate to the~~
50 ~~R10-11a and R10-11b signs.~~ incorporated into previous paragraph

1 Guidance:

2 If used, the No Turn on Red sign should be installed near the appropriate signal head.

3 A No Turn on Red sign should be considered when an engineering study finds that one or more of the
4 following conditions exists:

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

14 Option:

15 A supplemental R10-20aP plaque (see Figure 2B-27) showing times of day (similar to the S4-1P plaque
16 shown in Figure 7B-1) with a black legend and border on a white background may be mounted below a No
17 Turn on Red sign to indicate that the restriction is in place only during certain times.

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

21 On signalized approaches with more than one right-turn lane, a NO TURN ON RED EXCEPT FROM
22 RIGHT LANE (R10-11c) sign (see Figure 2B-27) may be post-mounted at the intersection or a NO TURN
23 ON RED FROM THIS LANE (with down arrow) (R10-11d) sign (see Figure 2B-27) may be mounted directly
24 over the center of the lane from which turns on red are prohibited.

25 Guidance:

26 Where turns on red are permitted and the signal indication is a steady RED ARROW, the RIGHT (LEFT)
27 ON RED ARROW AFTER STOP (R10-17a) sign (see Figure 2B-27) should be installed adjacent to the RED
28 ARROW signal indication.

29 Option:

30 A RIGHT TURN ON RED MUST YIELD TO U-TURN (R10-30) sign (see Figure 2B-27) may be
31 installed to remind road users that they must yield to conflicting U-turn traffic on the street or highway onto
32 which they are turning right on a red signal after stopping.

33 **Section ~~2B.46~~ 2B.55 Photo Enforced Signs and Plaques (R10-18, R10-19P, R10-19aP)**

34 Option:

35 A TRAFFIC LAWS PHOTO ENFORCED (R10-18) sign (see Figure 2B-3) may be installed at a
36 jurisdictional boundary to advise road users that some of the traffic regulations within that jurisdiction are
37 being enforced by photographic equipment.

38 A Photo Enforced (R10-19P) plaque or a PHOTO ENFORCED (R10-19aP) word message ~~sign~~ plaque
39 (see Figure 2B-3) may be mounted below a regulatory sign to advise road users that the regulation is being
40 enforced by photographic equipment.

41 **Standard:**

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

44 **Section 2B.56 Ramp Metering Signs (R10-28 and R10-29)**

45 Option:

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

49 For entrance ramps with only one controlled lane, an XX VEHICLE(S) PER GREEN (R10-28) sign (see
50 Figure 2B-28) may be used to inform road users of the number of vehicles that are permitted to proceed
51 during each short display of the green signal indication. For entrance ramps with more than one controlled

1 [lane, an XX VEHICLE\(S\) PER GREEN EACH LANE \(R10-29\) \(see Figure 2B-28\) sign may be used to](#)
2 [inform road users of the number of vehicles that are permitted to proceed from each lane during each short](#)
3 [display of the green signal indication.](#)

4 **Section ~~2B.47~~ [2B.57](#) KEEP OFF MEDIAN Sign (R11-1)**

5 Option:

6 The KEEP OFF MEDIAN (R11-1) sign (see Figure 2B-29) may be used to prohibit driving into or
7 parking on the median.

8 Guidance:

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

11 **Section ~~2B.48~~ [2B.58](#) ROAD CLOSED Sign (R11-2) and LOCAL TRAFFIC ONLY Signs (R11-
12 3 Series, R11-4)**

13 Guidance:

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

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

19 **Standard:**

20 **The Road Closed (R11-2, R11-3 series, and R11-4) signs (see Figure 2B-29) shall be designed as**
21 **horizontal rectangles. These signs shall be preceded by the applicable Advance Road Closed warning**
22 **sign with the secondary legend AHEAD and, if applicable, an Advance Detour warning sign (see Section**
23 **6F.19).**

24 Option:

25 [An intersecting street name or a well-known destination may be substituted for the XX MILES AHEAD](#)
26 [legend in urban areas.](#)

27 The word message BRIDGE OUT may be substituted for the ROAD CLOSED ~~message~~ [legend](#) where
28 applicable.

29 **Section ~~2B.49~~ [2B.59](#) Weight Limit Signs (R12-1 through R12-5)**

30 Option:

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

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

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

38 In areas where multiple regulations of the type described ~~above~~ [in Paragraphs 1 through 3](#) are applicable,
39 a sign combining the necessary messages on a single ~~panel~~ [sign](#) may be used, such as WEIGHT LIMIT XX
40 TONS PER AXLE, XX TONS GROSS (R12-4).

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

46 **Standard:**

47 **If used, the Weight Limit sign (see Figure 2B-29) shall be located in advance of the applicable**
48 **section of highway or structure.**

49 Guidance:

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

3 **Section ~~2B.50~~ 2B.60 Weigh Station Signs (R13 Series)**

4 Guidance:

5 An ~~ALL TRUCKS/COMMERCIAL VEHICLES NEXT RIGHT (R13-1)~~ sign [with the legend TRUCKS](#)
6 [OVER XX TONS MUST ENTER WEIGH STATION NEXT RIGHT](#) (see Figure 2B-30) should be used to
7 direct appropriate traffic into a weigh station.

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

9 Option:

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

12 **Section ~~2B.51~~ 2B.61 TRUCK ROUTE Sign (R14-1)**

13 Guidance:

14 The TRUCK ROUTE (R14-1) sign (see Figure 2B-30) should be used to mark a route that has been
15 designated to allow truck traffic.

16 Option:

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

18 **Section ~~2B.52~~ 2B.62 Hazardous Material Signs (R14-2, R14-3)**

19 Option:

20 The Hazardous Material Route (R14-2) sign (see Figure 2B-30) may be used to identify routes that have
21 been designated by proper authority for vehicles transporting hazardous material.

22 On routes where the transporting of hazardous material is prohibited, the Hazardous Material Prohibition
23 (R14-3) sign (see Figure 2B-30) may be used.

24 Guidance:

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

27 **Section ~~2B.53~~ 2B.63 National Network Signs (R14-4, R14-5)**

28 Support:

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

30 **Standard:**

31 **When a National Network route is signed, the National Network (R14-4) sign (see Figure 2B-30)**
32 **shall be used.**

33 Option:

34 The National Network Prohibition (R14-5) sign (see Figure 2B-30) may be used to identify routes,
35 portions of routes, and ramps where trucks are prohibited. The R14-5 sign may also be used to mark the ends
36 of designated routes.

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

38 Support:

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

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

43 Option:

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

1 Guidance:

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

7 Option:

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

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

13 Option:

14 A FENDER BENDER MOVE VEHICLES FROM TRAVEL LANES (R16-4) sign (see Figure 2B-32)
15 may be installed to require motorists to move their vehicle out of the travel lanes if they have been involved in
16 a crash.

17 **Section ~~2B.54~~ 2B.66 ~~Other Regulatory Signs~~ Seat Belt Symbol**

18 ~~Option:~~ **these two paragraphs were relocated to Section 2B.02**

19 ~~Regulatory word message signs other than those classified and specified in this Manual and the “Standard~~
20 ~~Highways Sign” book (see Section 1A.11) may be developed to aid the enforcement of other laws or~~
21 ~~regulations.~~

22 ~~Except for symbols on regulatory signs, minor modifications in the design may be permitted provided that~~
23 ~~the essential appearance characteristics are met.~~

24 **Standard:**

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

26 Guidance:

27 The seat belt symbol should not be used alone ~~but in connection with mandatory seat belt regulatory~~
28 ~~messages.~~ If used, the seat belt symbol should be incorporated into regulatory sign messages for mandatory
29 seat belt use.

30 **Section ~~3F.04~~ 2B.67 Barricades**

31 Option:

32 Barricades may be used to mark any of the following conditions:

- 33 A. A roadway ends,
- 34 B. A ramp or lane closed for operational purposes, or
- 35 C. The permanent or semi-permanent closure or termination of a roadway.

36 **Standard:**

37 **When used to warn and alert road users of the terminus of a roadway in other than temporary**
38 **traffic control zones, barricades shall meet the design criteria of Section 6F.68 for a Type ~~III~~ **3****
39 **Barricade, except that the colors of the stripes shall be retroreflective white and retroreflective red.**

40 Option:

41 An end-of-roadway marker or markers may be used as described in Section 2C.66.

42 Guidance:

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

44 **Section 2B.68 Gates**

45 Support:

46 Gates described in this section used for weather or other emergency conditions are typically permanently
47 installed to enable the gate to be immediately deployed as needed to prohibit the entry of traffic to the
48 highway segment(s).

1 A gate typically features a gate arm that is moved from a vertical to a horizontal position or is rotated in a
2 horizontal plane from parallel to traffic to perpendicular to traffic. Traffic is obstructed and required to stop
3 when the gate arm is placed in a horizontal position perpendicular to traffic. Another type of gate consists of a
4 segment of fence (usually on rollers) that swings open and closed, or that is retracted to open and then
5 extended to close.

6 Gates are sometimes used to enforce a required stop. Some examples of such uses are the following:

- 7 A. Parking facility entrances and exits,
- 8 B. Private community entrances and exits,
- 9 C. Military base entrances and exits,
- 10 D. Toll plaza lanes,
- 11 E. Movable bridges (see Chapter 4J),
- 12 F. Automated Flagger Assistance Devices (see Chapter 6E), and
- 13 G. Grade crossings (see Part 8).

14 Gates are sometimes used to periodically close a roadway or a ramp. Some examples of such uses are the
15 following:

- 16 A. Closing ramps to implement counter-flow operations for evacuations,
- 17 B. Closing ramps that lead to reversible lanes, and
- 18 C. Closing roadways for weather events such as snow, ice, or flooding, or for other emergencies.

19 **Standard:**

20 **Except as provided in Paragraph 6, gate arms, if used, shall be fully retroreflectORIZED on both sides,**
21 **have vertical stripes alternately red and white at 16-inch intervals measured horizontally as shown in**
22 **Figure 8C-1.**

23 **Option:**

24 If used on a one-way roadway or ramp, the retroreflectORIZATION may be omitted on the side of the gate
25 facing away from approaching traffic.

26 Where gate arms are used to block off ramps into reversible lanes or to redirect approaching traffic, the
27 red and white striping may be angled such that the stripes slope downward at an angle of 45 degrees toward
28 the side of the gate arm on which traffic is to pass.

29 **Standard:**

30 **The gate arm shall extend across the approaching lane or lanes of traffic to effectively block motor**
31 **vehicle and/or pedestrian travel as appropriate.**

32 **When gate arms are in the vertical position or rotated to an open position, the closest part of the**
33 **gate arm and support shall have a lateral offset of at least 2 feet from the face of the curb or the edge of**
34 **the traveled way.**

35 **When gate arms that are located in the median or on an island are in the horizontal position or**
36 **rotated to a closed position, the closest part of the counterweight or its supports shall have a lateral**
37 **offset of at least 2 feet from the face of the curb or the edge of the traveled way of the open roadway on**
38 **the opposite side of the median or island.**

39 **Guidance:**

40 When a gate that is rotated in a horizontal plane is in the position where it is parallel to traffic (indicating
41 that the roadway is open), the outer end of the gate arm should be rotated to the downstream direction (from
42 the perspective of traffic in the lane adjacent to the gate support) to prevent spearing if the gate is struck by an
43 errant vehicle.

44 If a pedestrian route is present and if it is not intended that pedestrian traffic be controlled by the gate, a
45 minimum of 2 feet of lateral offset from supports, posts, counterweights, and gate mechanisms should be
46 provided when the gate arm is in the open position and when the gate arm is in the closed position such that
47 pedestrian travel is not impeded.

48 **Option:**

49 Red lights may be attached to traffic gates.

50 **Standard:**

1 If red lights are attached to a traffic gate, the red lights shall be steadily illuminated or flashed only
2 during the period when the gate is in the horizontal or closed position and when the gate is in the
3 process of being opened or closed.

4 Except as provided in Paragraph 16, rolling sections of fence, if used, shall include either a
5 horizontal strip of retroreflectorized sheeting on both sides of the fence with vertical stripes alternately
6 red and white at 16-inch intervals measured horizontally to simulate the appearance of a gate arm in
7 the horizontal position, or one or more Type 4 object markers (see Section 2C.66), or both. If a
8 horizontal strip of retroreflectorized sheeting is used, the bottom of the sheeting shall be located 3.5 to
9 4.5 feet above the roadway surface.

10 Option:

11 If used on a one-way roadway or ramp, the retroreflectorization may be omitted on the side of the fence
12 facing away from approaching traffic.

CHAPTER 2C. WARNING SIGNS AND OBJECT MARKERS

Section 2C.01 Function of Warning Signs

Support:

Warning signs call attention to unexpected conditions on or adjacent to a highway, ~~or~~ street, or private roads open to public travel and to situations that might not be readily apparent to road users. Warning signs alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations.

Section 2C.02 Application of Warning Signs Option paragraph was relocated to Section 2C.03

Standard:

The use of warning signs shall be based on an engineering study or on engineering judgment.

Guidance:

The use of warning signs should be kept to a minimum as the unnecessary use of warning signs tends to breed disrespect for all signs. In situations where the condition or activity is seasonal or temporary, the warning sign should be removed or covered when the condition or activity does not exist.

Option:

Consistent with the provisions of Chapter 2L, changeable message signs may be used to display a warning message.

Consistent with the provisions of Chapter 4L, a Warning Beacon may be used in combination with a standard warning sign.

Support:

The categories of warning signs are shown in Table 2C-1.

Warning signs ~~specified provided herein in this Manual~~ cover most of the conditions that are likely to be encountered. Additional warning signs for low-volume roads (as defined in Section 5A.01), temporary traffic control zones, school areas, ~~highway-rail~~ grade crossings, and bicycle facilities, ~~and highway light rail transit grade crossings~~ are discussed in Parts 5 through 10, respectively.

Section 1A.09 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.

Section 2C.03 Design of Warning Signs

Standard:

Except as provided in Paragraph 2 or unless specifically designated otherwise, all warning signs shall be diamond-shaped (square with one diagonal vertical) with a black legend and border on a yellow background ~~unless specifically designated otherwise~~. Warning 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:

A warning sign that is larger than the size shown in the Oversized column in Table 2C-2 for that particular sign may be diamond-shaped or may be rectangular or square in shape.

Except for symbols on warning signs, minor modifications may be made to the design provided that the essential appearance characteristics are met. Modifications may be made to the symbols shown on combined horizontal alignment/intersection signs (see Section 2C.11) and intersection warning signs (see Section 2C.46) in order to approximate the geometric configuration of the intersecting roadway(s).

Word message warning signs other than those ~~specified provided~~ in this Manual may be developed and installed by State and local highway agencies. relocated from Section 2C.02

Warning signs regarding conditions associated with pedestrians, bicyclists, and playgrounds, ~~school buses, and schools~~ may have a black legend and border on a yellow or fluorescent yellow-green background ~~or a black legend and border on a fluorescent yellow-green background.~~

Standard:

1 Warning signs regarding conditions associated with school buses and schools and their related
2 supplemental plaques shall have a black legend and border on a fluorescent yellow-green background
3 (see Section 7B.07).

4 **Section 2C.04 Size of Warning Signs**

5 **Standard:**

6 Except as provided in Section 2A.11, the sizes for warning signs shall be as shown in Table 2C-2.

7 ~~Guidance:~~

8 ~~The Conventional Road size should be used on conventional roads.~~

9 ~~The Freeway and Expressway sizes should be used for higher speed applications to provide larger signs~~
10 ~~for increased visibility and recognition.~~

11 ~~Option:~~

12 ~~The Minimum size may be used on low speed roadways where the reduced legend size would be adequate~~
13 ~~for the warning or where physical conditions preclude the use of the other sizes.~~

14 ~~Guidance:~~

15 ~~Oversized signs and larger sizes may be used for those special applications where speed, volume, or other~~
16 ~~factors result in conditions where increased emphasis, improved recognition, or increased legibility would be~~
17 ~~desirable.~~

18 Support:

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

20 **Standard:**

21 Except as provided in Paragraph 5, the minimum size for all diamond-shaped warning signs facing
22 traffic on a multi-lane conventional road where the posted speed limit is higher than 35 mph shall be 36
23 x 36 inches.

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

26 Option:

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

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

31 Guidance:

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

36 **Section 2C.05 Placement of Warning Signs**

37 Support:

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

39 ~~The total time needed to perceive and complete a reaction to a sign is the sum of the times necessary for~~
40 ~~Pereception, Identification (understanding), Emotion (decision making), and Volition (execution of decision),~~
41 ~~and is called the PIEV time. The PIEV time can vary from several seconds for general warning signs to 6~~
42 ~~seconds or more for warning signs requiring high road user judgment.~~

43 The time needed for detection, recognition, decision, and reaction is called the Perception-Response Time
44 (PRT). Table 2C-4 ~~lists suggested sign placement distances for two conditions. This table~~ is provided as an
45 aid for determining warning sign location. The distances shown in Table 2C-4 can be adjusted for roadway
46 features, other signing, and to improve visibility.

47 Guidance:

48 Warning signs should be placed so that they provide an adequate ~~PIEV time~~ PRT. The distances
49 contained in Table 2C-4 are for guidance purposes and should be applied with engineering judgment.

1 Warning signs should not be placed too far in advance of the condition, such that drivers might tend to forget
2 the warning because of other driving distractions, especially in urban areas.

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

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

7 Option:

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

11 Section 2C.06 Horizontal Alignment Warning Signs

12 Support:

13 A variety of horizontal alignment warning signs (see Figure 2C-1), pavement markings (see Chapter 3B),
14 and delineation (see Chapter 3F) can be used to advise motorists of a change in the roadway alignment.
15 Uniform application of these traffic control devices with respect to the amount of change in the roadway
16 alignment conveys a consistent message establishing driver expectancy and promoting effective roadway
17 operations. The design and application of horizontal alignment warning signs to meet those requirements are
18 addressed in Sections 2C.06 through 2C.15.

19 Standard:

20 In advance of horizontal curves on freeways, on expressways, and on roadways with more than
21 1,000 AADT that are functionally classified as arterials or collectors, horizontal alignment warning
22 signs shall be used in accordance with Table 2C-5 based on the speed differential between the
23 roadway's posted or statutory speed limit or 85th-percentile speed, whichever is higher, or the
24 prevailing speed on the approach to the curve, and the horizontal curve's advisory speed.

25 Option:

26 Horizontal Alignment Warning signs may also be used on other roadways or on arterial and collector
27 roadways with less than 1,000 AADT based on engineering judgment.

28 ~~Section 2C.06~~ 2C.07 Horizontal Alignment Signs (W1-1 through W1-5, W1-11, W1-15)

29 Standard:

30 ~~When engineering judgment determines the need for~~ If Table 2C-5 indicates that a horizontal
31 alignment sign (see Figure 2C-1) is required, recommended, or allowed, one of the W1-1 through W1-5,
32 ~~W1-10, W1-11 or W1-15 signs~~ the sign installed in advance of the curve shall be used a Curve (W1-2)
33 sign unless a different sign is recommended or allowed by the provisions of this Section.

34 A Turn (W1-1) sign shall be used instead of a Curve sign in advance of curves that have advisory
35 speeds of 30 mph or less (see Figure 2C-2).

36 Guidance:

37 Where there are two changes in roadway alignment in opposite directions that are separated by a tangent
38 distance of less than 600 feet, the Reverse Turn (W1-3) sign should be used instead of multiple Turn (W1-1)
39 signs and the Reverse Curve (W1-4) sign should be used instead of multiple Curve (W1-2) signs.

40 Option:

41 A Winding Road (W1-5) sign may be used instead of multiple Turn (W1-1) or Curve (W1-2) signs where
42 there are three or more changes in roadway alignment each separated by a tangent distance of less than 600
43 feet.

44 ~~The~~ A NEXT XX MILES (W7-3aP) supplemental distance plaque (see Section 2C.55) NEXT XX MILES
45 ~~(W7-3a)~~ may be installed below the Winding Road sign where continuous roadway curves exist for a specific
46 distance (see Section 2C.45).

47 ~~The horizontal alignment Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), or~~
48 ~~Winding Road (W1-5) signs (see Figure 2C-1) may be used in advance of situations where the horizontal~~
49 ~~roadway alignment changes. A One-Direction Large Arrow (W1-6) sign (see Figure 2C-1 and Section 2C.09)~~
50 ~~may be used on the outside of the turn or curve.~~

1 If the curve has a change in horizontal alignment ~~is of~~ 135 degrees or more, the Hairpin Curve (W1-11)
2 sign (~~see Figure 2C-1~~) may be used instead of a Curve or Turn sign.

3 If the curve has a change ~~in horizontal alignment is of direction of~~ approximately 270 degrees, such as on
4 a cloverleaf interchange ramp, the 270-degree Loop (W1-15) sign (~~see Figure 2C-1~~) may be used instead of a
5 Curve or Turn sign.

6 Guidance:

7 ~~The application of these signs should conform to Table 2C-5.~~

8 When the Hairpin Curve sign or the 270-degree Loop sign is installed, either a One-Direction Large
9 Arrow (W1-6) sign or Chevron Alignment (W1-8) signs should be installed on the outside of the turn or
10 curve.

11 ~~Option:~~

12 ~~An Advisory Speed (W13-1) plaque (see Section 2C.46) may be used to indicate the speed for the change~~
13 ~~in horizontal alignment. The combination Horizontal Alignment/Advisory Speed sign (see Section 2C.07),~~
14 ~~combination Horizontal Alignment/Intersection sign (see Section 2C.08), or the Curve Speed sign (see Section~~
15 ~~2C.36) may also be used.~~

16 ~~If the reduction in speed is 15 mph or greater, a supplemental combination Horizontal~~
17 ~~Alignment/Advisory Speed sign or Curve Speed (W13-5) sign may be installed as near as practical to the~~
18 ~~point of curvature. If the reduction in speed is 25 mph or greater, one or more additional Curve Speed signs~~
19 ~~may be installed along the curve.~~

20 ~~Section 2C.46~~ 2C.08 **Advisory Speed Plaque (W13-1P)**

21 Option:

22 The Advisory Speed (W13-1P) plaque (see Figure 2C-1) may be used to supplement any warning sign to
23 indicate the advisory speed for a condition.

24 **Standard:**

25 **The use of the Advisory Speed plaque for horizontal curves shall be in accordance with the**
26 **information shown in Table 2C-5. The Advisory Speed plaque shall also be used where an engineering**
27 **study indicates a need to advise road users of the advisory speed for ~~a~~ other roadway conditions.**

28 **If used, the Advisory Speed plaque shall carry the message XX MPH. The speed ~~shown~~ displayed**
29 **shall be a multiple of 5 mph.**

30 **Except in emergencies or when the condition is temporary, an Advisory Speed plaque shall not be**
31 **installed until the advisory speed has been determined by an engineering study.**

32 **The Advisory Speed plaque shall only be used to supplement a warning sign and shall not be**
33 **installed as a separate sign installation.**

34 **The advisory speed shall be determined by an engineering study that follows established**
35 **engineering practices.**

36 Support:

37 Among the established engineering practices that are appropriate for the determination of the
38 recommended advisory speed for a horizontal curve are the following:

- 39 A. An accelerometer that provides a direct determination of side friction factors
- 40 B. A design speed equation
- 41 C. A traditional ball-bank indicator using the following criteria:
 - 42 1. 16 degrees of ball-bank for speeds of 20 mph or less
 - 43 2. 14 degrees of ball-bank for speeds of 25 to 30 mph
 - 44 3. 12 degrees of ball-bank for speeds of 35 mph and higher

45 The 16, 14, and 12 degrees of ball-bank criteria are comparable to the current AASHTO horizontal curve
46 design guidance. Research has shown that drivers often exceed existing posted advisory curve speeds by 7 to
47 10 mph.

48 Guidance:

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

1 Because changes in conditions, such as roadway geometrics, surface characteristics, or sight distance,
2 might affect the advisory speed, each location should be evaluated periodically ~~evaluated and the Advisory~~
3 ~~Speed plaque changed if necessary~~ or when conditions change.

4 ~~Option:~~

5 ~~The advisory speed may be the 85th percentile speed of free-flowing traffic, the speed corresponding to a~~
6 ~~16-degree ball-bank indicator reading, or the speed otherwise determined by an engineering study because of~~
7 ~~unusual circumstances.~~

8 ~~Support:~~

9 ~~A 10-degree ball-bank indicator reading, formerly used in determining advisory speeds, is based on~~
10 ~~research from the 1930s. In modern vehicles, the 85th percentile speed on curves approximates a 16-degree~~
11 ~~reading. This is the speed at which most drivers' judgment recognizes incipient instability along a ramp or~~
12 ~~curve.~~

13 **Section ~~2C.10~~ 2C.09 Chevron Alignment Sign (W1-8)**

14 **~~Option~~ Standard:**

15 The use of the Chevron Alignment (W1-8) sign (see Figures 2C-1 and 2C-2) to provide additional
16 emphasis and guidance for a change in horizontal alignment ~~may shall~~ ~~be used to provide additional~~
17 ~~emphasis and guidance for a change in horizontal alignment~~ in accordance with the information shown
18 in Table 2C-5.

19 Option:

20 When used, ~~A~~ Chevron Alignment signs may be used as an alternate ~~instead of~~ or supplement ~~in addition~~
21 to standard delineators ~~on curves or to the One-Direction Large Arrow (W1-6) sign.~~

22 **Standard:**

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

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

29 ~~Option:~~

30 ~~A Chevron Alignment sign may be used on the far side of an intersection to inform drivers of a change of~~
31 ~~horizontal alignment for through traffic.~~

32 **Guidance:**

33 The approximate spacing of Chevron Alignment signs on the turn or curve measured from the point of
34 curvature (PC) should be ~~such that the road user always has at least two in view, until the change in alignment~~
35 ~~eliminates the need for the signs~~ as shown in Table 2C-6.

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

38 **Standard:**

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

42 Chevron Alignment signs shall not be used to mark obstructions within or adjacent to the roadway,
43 including the beginning of guardrails or barriers, as this is the function of an object marker (see Section
44 2C.63).

45 **Section ~~2C.07~~ 2C.10 Combination Horizontal Alignment/Advisory Speed Signs (W1-1a, W1-**
46 **2a)**

47 **Option:**

48 The Turn (W1-1) sign or the Curve (W1-2) sign may be combined with the Advisory Speed (W13-1P)
49 plaque (see Section 2C.08) to create a combination Turn/Advisory Speed (W1-1a) sign ~~(see Figure 2C-1)~~, or
50 combination Curve/Advisory Speed (W1-2a) sign (see Figure 2C-1).

1 [The combination Horizontal Alignment/Advisory Speed sign may be used to supplement the advance](#)
2 [Horizontal Alignment warning sign and Advisory Speed plaque based upon an engineering study.](#)

3 **Standard:**

4 **~~When~~ If used, the combination Horizontal Alignment/Advisory Speed sign shall not be used alone**
5 **and shall not be used as a substitute for a Horizontal Alignment warning sign and Advisory Speed**
6 **plaque at the advance warning location. The combination Horizontal Alignment/Advisory Speed sign**
7 **shall only be used as a supplement to ~~other~~ the advance Horizontal Alignment warning signs. ~~and~~ If**
8 **used, the combination Horizontal Alignment/Advisory Speed sign shall be installed at the beginning of**
9 **the turn or curve.**

10 **Guidance:**

11 [The advisory speed displayed on the combination Horizontal Alignment/Advisory Speed sign should be](#)
12 [based on the advisory speed for the horizontal curve using recommended engineering practices \(see Section](#)
13 [2C.08\).](#)

14 **Section ~~2C.08~~ 2C.11 Combination Horizontal Alignment/Intersection Signs (W1-10 Series)**

15 **Option:**

16 The Turn (W1-1) sign or the Curve (W1-2) sign may be combined with the Cross Road (W2-1) sign or the
17 Side Road (W2-2 or W2-3) sign to create a combination Horizontal Alignment/Intersection (W1-10 [series](#))
18 sign (see Figure 2C-1) that depicts the condition where an intersection occurs within [or immediately adjacent](#)
19 [to](#) a turn or curve.

20 **Guidance:**

21 Elements of the combination Horizontal Alignment/Intersection sign related to horizontal alignment
22 should ~~conform to~~ [comply with the provisions of](#) Section 2C.07, and elements related to intersection
23 configuration should ~~conform to~~ [comply with the provisions of](#) Section 2C.46. [The symbol design should](#)
24 [approximate the configuration of the intersecting roadway\(s\).](#) No more than one Cross Road or two Side
25 Road symbols should be ~~shown~~ [displayed](#) on any one combination Horizontal Alignment/Intersection sign.

26 **Standard:**

27 [The use of the combination Horizontal Alignment/Intersection sign shall be in accordance with the](#)
28 [appropriate Turn or Curve sign information shown in Table 2C-5.](#)

29 **Section ~~2C.09~~ 2C.12 One-Direction Large Arrow Sign (W1-6)**

30 **Option:**

31 A One-Direction Large Arrow (W1-6) sign (see Figure 2C-1) may be used [either as a supplement or](#)
32 [alternative to Chevron Alignment signs in order to](#) delineate a change in horizontal alignment ([see Figure 2C-](#)
33 [2\).](#)

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

36 **Standard:**

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

39 [The use of the One-Direction Large Arrow sign shall be in accordance with the information shown](#)
40 [in Table 2C-5.](#)

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

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

45 [The One-Direction Large Arrow sign directing traffic to the right shall not be used in the central](#)
46 [island of a roundabout.](#)

47 **Guidance:**

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

50 **Section ~~2C.11~~ 2C.13 Truck Rollover Warning Sign (W1-13)**

1 Option:

2 A Truck Rollover Warning (W1-13) sign (see Figure 2C-1) may be used to warn drivers of vehicles with a
3 high center of gravity, such as trucks, tankers, and recreational vehicles, of a curve or turn ~~having~~ where
4 geometric conditions ~~that are prone to cause such vehicles to lose~~ might contribute to a loss of control and
5 ~~overturn~~ a rollover as determined by an engineering study.

6 Support:

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

9 A. An accelerometer that provides a direct determination of side friction factors

10 B. A design speed equation

11 C. A traditional ball-bank indicator using 10 degrees of ball-bank

12 **Standard:**

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

16 Option:

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

20 Support:

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

23 **Section ~~2C.36~~ 2C.14 ~~Advisory Exit, and Ramp, and Curve Speed Signs (W13-2, and W13-3,~~**
24 **~~W13-5)~~**

25 **Standard:**

26 **Advisory Exit, Speed (W13-2) and Advisory Ramp, and Curve Speed (W13-3) signs (see Figure 2C-**
27 **1) shall be vertical rectangles. ~~The advisory Exit Speed (W13-2), Ramp Speed (W13-3), or Curve Speed~~**
28 **~~(W13-5) signs (see Figure 2C-5) shall be used where engineering judgment indicates the need to advise~~**
29 **~~road users of the recommended speed on an exit, a ramp, or a curve. The use of Advisory Exit Speed~~**
30 **and Advisory Ramp Speed signs on freeway and expressway ramps shall be in accordance with the**
31 **information shown in Table 2C-5.**

32 Guidance:

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

37 If used, the Advisory Exit Speed sign should be visible in time for the road user to ~~make a reasonably safe~~
38 ~~slowing~~ decelerate and make an exiting maneuver.

39 Support:

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

42 Guidance:

43 If used, the Advisory Ramp Speed sign should be ~~visible in time for the road user to reduce to the~~
44 ~~recommended~~ installed on the ramp to confirm the ramp advisory speed.

45 If used, Chevron Alignment (W1-8) signs and/or One-Direction Large Arrow (W1-6) signs should be
46 installed on the outside of the exit curve as described in Sections 2C.09 and 2C.12.

47 Option:

48 Where there is a need to remind road users of the recommended advisory speed, a horizontal alignment
49 warning sign with an advisory speed plaque may be installed at or beyond the beginning of the exit curve or
50 on the outside of the curve, provided that it is apparent that the sign applies only to exiting traffic. These

1 [signs may also be used at intermediate points along the ramp, especially if the ramp curvature changes and the](#)
2 [subsequent curves on the ramp have a different advisory speed than the initial ramp curve.](#)

3 **Support:**

4 [Figure 2C-3 shows an example of advisory speed signing for an exit ramp.](#)

5 **Option:**

6 ~~One or more Ramp Speed signs may be used along the deceleration lane, beyond the gore, or along the~~
7 ~~ramp (see Figure 2C-7). Based on engineering judgment, the Ramp Speed sign may be installed on the inside~~
8 ~~or outside of the curve to enhance its visibility.~~

9 ~~A Turn (W1-1) or Curve (W1-2) sign with an Advisory Speed (W13-1) plaque may be used in place of a~~
10 ~~Ramp Speed sign if it is located such that it clearly does not apply to drivers on the main roadway.~~

11 ~~A Curve Speed sign may be used at and beyond the beginning of a curve following a Horizontal~~
12 ~~Alignment and Advisory Speed sign combination, or when there is a need to remind road users of the~~
13 ~~recommended speed, or where the recommended speed changes because of a change in curvature (see Section~~
14 ~~2C.06). Based on engineering judgment, the Curve Speed sign may be installed on the inside or outside of the~~
15 ~~curve to enhance its visibility.~~

16 ~~The advisory speed may be the 85th percentile speed of free-flowing traffic, the speed corresponding to a~~
17 ~~16-degree ball bank indicator reading, or the speed otherwise determined by an engineering study because of~~
18 ~~unusual circumstances.~~

19 **Support:**

20 ~~A 10-degree ball bank indicator reading, formerly used in determining advisory speeds, is based on~~
21 ~~research from the 1930s. In modern vehicles, the 85th percentile speed on curves approximates a 16-degree~~
22 ~~reading. This is the speed at which most drivers' judgment recognizes incipient instability along a ramp or~~
23 ~~curve.~~

24 **Section 2C.15 Combination Horizontal Alignment/Advisory Exit and Ramp Speed Signs** 25 **(W13-6 and W13-7)**

26 **Option:**

27 [A horizontal alignment sign \(see Section 2C.07\) may be combined with an Advisory Exit Speed or](#)
28 [Advisory Ramp Speed sign to create a combination Horizontal Alignment/Advisory Exit Speed \(W13-6\) sign](#)
29 [or a combination Horizontal Alignment/Advisory Ramp Speed \(W13-7\) sign \(see Figure 2C-1\). These](#)
30 [combination signs may be used where the severity of the exit ramp curvature might not be apparent to road](#)
31 [users in the deceleration lane or where the curvature needs to be specifically identified as being on the exit](#)
32 [ramp rather than on the mainline.](#)

33 **Section ~~2C.12~~ 2C.16 Hill Signs (W7-1, W7-1a, ~~W7-1b~~)**

34 **Guidance:**

35 The Hill (W7-1) sign (see Figure 2C-4) should be used in advance of a downgrade where the length,
36 percent of grade, horizontal curvature, and/or other physical features require special precautions on the part of
37 road users.

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

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

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

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

51 **Standard:**

1 ~~When If~~ the percent grade is ~~shown~~ displayed on a supplemental plaque, the ~~message X%~~ plaque
2 shall be placed below the ~~inclined ramp/truck symbol~~ Hill (W7-1) ~~or the word message HILL (W7-1a)~~
3 sign.

4 Option:

5 ~~The word message HILL (W7-1a) sign may be used as an alternate to the symbol (W7-1) sign. The~~
6 ~~percent grade message may be included within these signs.~~

7 A USE LOW GEAR (W7-2P) or TRUCKS USE LOWER GEAR (W7-2bP) supplemental plaque (see
8 Figure 2C-4) may be used to indicate a situation where downshifting as well as braking might be advisable.

9 ~~Section 2C.13~~ 2C.17 Truck Escape Ramp Signs (W7-4 Series)

10 Guidance:

11 Where applicable, truck escape (or runaway truck) ramp advance warning signs (see Figure 2C-4) should
12 be located approximately 1 mile, and 1/2 mile in advance of the grade, and of the ramp. A sign also should be
13 placed at the gore. A RUNAWAY VEHICLES ONLY (R4-10) sign (see ~~Figure 2B-8~~ Section 2B.35) should
14 be installed near the ramp entrance to discourage other road users from entering the ramp. No Parking (R8-3)
15 signs should be placed near the ramp entrance.

16 **Standard:**

17 **When truck escape ramps are installed, at least one of the W7-4 series signs shall be used.**

18 Option:

19 A SAND (W7-4dP), GRAVEL (W7-4eP), or PAVED (W7-4fP) supplemental plaque (see Figure 2C-4)
20 may be used to describe the ramp surface. State and local highway agencies may develop appropriate word
21 message signs for the specific situation.

22 ~~Section 2C.14~~ 2C.18 HILL BLOCKS VIEW Sign (W7-6)

23 Option:

24 A HILL BLOCKS VIEW (W7-6) sign (see Figure 2C-4) may be used in advance of a crest vertical curve
25 to advise road users to reduce speed as they approach and traverse the hill as only limited stopping sight
26 distance is available.

27 Guidance:

28 When a HILL BLOCKS VIEW sign is used, it should be supplemented by an Advisory Speed (W13-1P)
29 plaque indicating the recommended speed for traveling over the hillcrest based on available stopping sight
30 distance.

31 ~~Section 2C.15~~ 2C.19 ROAD NARROWS Sign (W5-1)

32 Guidance:

33 Except as provided in Paragraph 2, a ROAD NARROWS (W5-1) sign (see Figure 2C-5) should be used in
34 advance of a transition on two-lane roads where the pavement width is reduced abruptly to a width such that
35 vehicles ~~might not be able to pass~~ traveling in opposite directions cannot simultaneously travel through the
36 narrow portion of the roadway without reducing speed.

37 Option:

38 The ROAD NARROWS (W5-1) sign may be omitted on low-volume local streets that have speed limits
39 of 30 mph or less.

40 Additional emphasis may be provided by the use of object markers and delineators (see Sections 2B.63
41 through 2B.65 and Chapters ~~3C and~~ 3F). The Advisory Speed (W13-1P) plaque (see Section 2C.08) may be
42 used to indicate the recommended speed.

43 ~~Section 2C.16~~ 2C.20 NARROW BRIDGE Sign (W5-2)

44 Guidance:

45 A NARROW BRIDGE (W5-2) sign (see Figure 2C-5) should be used in advance of any bridge or culvert
46 having a two-way roadway clearance width of 16 to 18 feet, or any bridge or culvert having a roadway
47 clearance less than the width of the approach travel lanes.

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

1 Option:

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

4 **Section ~~2C.17~~ 2C.21 ONE LANE BRIDGE Sign (W5-3)**

5 Guidance:

6 A ONE LANE BRIDGE (W5-3) sign (see Figure 2C-5) should be used on two-way roadways in advance
7 of any bridge or culvert:

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

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

15 **Section ~~2C.18~~ 2C.22 Divided Highway (~~Road~~) Sign (W6-1)**

16 Guidance:

17 A Divided Highway (W6-1) ~~symbol~~ sign (see Figure 2C-5) should be used on the approaches to a section
18 of highway (not an intersection or junction) where the opposing flows of traffic are separated by a median or
19 other physical barrier.

20 ~~Option:~~

21 ~~The word message DIVIDED HIGHWAY (W6-1a) or DIVIDED ROAD (W6-1b) sign (see Figure 2C-3)~~
22 ~~may be used as an alternate to the symbol sign.~~

23 **Standard:**

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

26 **Section ~~2C.19~~ 2C.23 Divided Highway (~~Road~~) Ends Sign (W6-2)**

27 Guidance:

28 A Divided Highway Ends (W6-2) ~~symbol~~ sign (see Figure 2C-5) should be used in advance of the end of
29 a section of physically divided highway (not an intersection or junction) as a warning of two-way traffic
30 ahead.

31 ~~Option:~~

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

34 ~~The word message DIVIDED HIGHWAY ENDS (W6-2a) or DIVIDED ROAD ENDS (W6-2b) sign (see~~
35 ~~Figure 2C-3) may be used as an alternate to the symbol sign.~~

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

37 Option:

38 A FREEWAY ENDS XX MILES (W19-1) sign or a FREEWAY ENDS (W19-3) sign (see Figure 2C-5)
39 may be used in advance of the end of a freeway.

40 An EXPRESSWAY ENDS XX MILES (W19-2) sign or an EXPRESSWAY ENDS (W19-4) sign (see
41 Figure 2C-5) may be used in advance of the end of an expressway.

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

44 Guidance:

45 If the reason that the freeway is ending is that the next portion of the freeway is not yet constructed and as
46 a result all traffic must use an exit ramp to leave the freeway, an ALL TRAFFIC MUST EXIT (W19-5) sign
47 (see Figure 2C-5) should be used in addition to the Freeway Ends signs in advance of the downstream end of
48 the freeway.

1 **Section ~~2C.20~~ 2C.25 Double Arrow Sign (W12-1)**

2 Option:

3 The Double Arrow (W12-1) sign (see Figure 2C-5) may be used to advise road users that traffic is
4 permitted to pass on either side of an island, obstruction, or gore in the roadway. Traffic separated by this
5 sign may either rejoin or change directions.

6 Guidance:

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

8 If used in front of a pier or obstruction, the Double Arrow sign should be mounted on the face of, or just
9 in front of, the obstruction. Where stripe markings are used on the obstruction, they should be discontinued to
10 leave a 3-inch space around the outside of the sign.

11 **Section ~~2C.24~~ 2C.26 DEAD END/NO OUTLET Signs (W14-1, W14-1a, W14-2, W14-2a)**

12 Option:

13 The DEAD END (W14-1) sign (see Figure 2C-5) may be used at the entrance of a single road or street
14 that terminates in a dead end or cul-de-sac. The NO OUTLET (W14-2) sign ([see Figure 2C-5](#)) may be used at
15 the entrance to a road or road network from which there is no other exit.

16 DEAD END (W14-1a) or NO OUTLET (W14-2a) signs (see Figure 2C-5) may be used in combination
17 with Street Name (D3-1) signs (see Section 2D.43) to warn turning traffic that the cross street ends in the
18 direction indicated by the arrow.

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

21 **Standard:**

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

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

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

30 **Section ~~2C.22~~ 2C.27 Low Clearance Signs (W12-2 and ~~W12-2p~~ W12-2a)**

31 **Standard:**

32 **The Low Clearance (W12-2) sign (see Figure 2C-5) shall be used to warn road users of clearances**
33 **less than 12 inches above the statutory maximum vehicle height.**

34 Guidance:

35 The actual clearance should be ~~shown~~ [displayed](#) on the Low Clearance sign to the nearest 1 inch not
36 exceeding the actual clearance. However, in areas that experience changes in temperature causing frost
37 action, a reduction, not exceeding 3 inches, should be used for this condition.

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

41 In the case of an arch or other structure under which the clearance varies greatly, two or more signs should
42 be used as necessary on the structure itself to give information as to the clearances over the entire roadway.

43 Clearances should be evaluated periodically, particularly when resurfacing operations have occurred.

44 Option:

45 The Low Clearance sign may be installed on or in advance of the structure. If a sign is placed on the
46 structure, it may be a rectangular shape (~~W12-2p~~ [W12-2a](#)) with the appropriate legend (see Figure 2C-5).

47 **Section ~~2C.23~~ 2C.28 BUMP and DIP Signs (W8-1, W8-2)**

48 Guidance:

1 BUMP (W8-1) and DIP (W8-2) signs (see Figure 2C-6) should be used to give warning of a sharp rise or
2 depression in the profile of the road.

3 Option:

4 These signs may be supplemented with an Advisory Speed plaque (see Section 2C.08).

5 **Standard:**

6 **The DIP sign shall not be used at a short stretch of depressed alignment that might momentarily**
7 **hide a vehicle.**

8 Guidance:

9 A short stretch of depressed alignment that might momentarily hide a vehicle should be treated as a no-
10 passing zone when ~~centerline~~ [center line](#) striping is provided on a two-lane or three-lane road (see Section
11 3B.02).

12 **Section ~~2C.24~~ [2C.29](#) SPEED HUMP Sign (W17-1)**

13 Guidance:

14 The SPEED HUMP (W17-1) sign (see Figure 2C-6) should be used to give warning of a vertical
15 deflection in the roadway that is designed to limit the speed of traffic.

16 If used, the SPEED HUMP sign should be supplemented by an Advisory Speed plaque (see Section
17 2C.08).

18 Option:

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

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

22 Support:

23 Speed humps generally provide more gradual vertical deflection than speed bumps. Speed bumps limit
24 the speed of traffic more severely than speed humps. [Other forms of speed humps include speed tables and](#)
25 [raised intersections](#). However, ~~the~~ [these](#) differences in engineering terminology ~~is~~ [are](#) not well known by the
26 public, so for signing purposes ~~the~~ [these](#) terms are interchangeable.

27 **Section ~~2C.25~~ [2C.30](#) PAVEMENT ENDS Sign (W8-3)**

28 Guidance:

29 A PAVEMENT ENDS (W8-3) word message sign (see Figure 2C-6) should be used where a paved
30 surface changes to either a gravel treated surface or an earth road surface.

31 Option:

32 An Advisory Speed plaque (see Section 2C.08) may be used when the change in roadway condition
33 requires a reduced speed.

34 **Section ~~2C.26~~ [2C.31](#) Shoulder Signs (W8-4, W8-9, ~~and W8-9a~~ W8-17, W8-23, and W8-25)**

35 Option:

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

37 The LOW SHOULDER (W8-9) sign (see Figure 2C-6) may be used to warn of a shoulder condition
38 where there is an elevation difference of less than 3 inches between the shoulder and the travel lane.

39 Guidance:

40 The Shoulder Drop Off (~~W8-9a~~ [W8-17](#)) sign (see Figure 2C-6) should be used ~~when~~ [where](#) an
41 unprotected shoulder drop-off, adjacent to the travel lane, exceeds 3 inches in depth for a significant
42 continuous length along the roadway, based on engineering judgment.

43 [Option:](#)

44 [A SHOULDER DROP-OFF \(W8-17P\) supplemental plaque \(see Figure 2C-6\) may be mounted below the](#)
45 [W8-17 sign.](#)

46 [The NO SHOULDER \(W8-23\) sign \(see Figure 2C-6\) may be used to warn road users that a shoulder](#)
47 [does not exist along a portion of the roadway.](#)

1 [The SHOULDER ENDS \(W8-25\) sign \(see Figure 2C-6\) may be used to warn road users that a shoulder](#)
2 [is ending.](#)

3 **Standard:**

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

5 **Guidance:**

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

8 **Section ~~2C.27~~ [2C.32 Slippery When Wet Sign \(W8-5\) Surface Condition Signs \(W8-5, W8-7,](#)
9 [W8-8, W8-11, W8-13, and W8-14\)](#)**

10 **Option:**

11 The Slippery When Wet (W8-5) sign (see Figure 2C-6) may be used to warn ~~that a~~ [of unexpected](#) slippery
12 conditions ~~might exist.~~ [Supplemental plaques with legends such as ICE, WHEN WET, STEEL DECK, or](#)
13 [EXCESS OIL may be used with the W8-5 sign to indicate the reason that the slippery conditions might be](#)
14 [present.](#)

15 [The LOOSE GRAVEL \(W8-7\) sign \(see Figure 2C-6\) may be used to warn of loose gravel on the](#)
16 [roadway surface.](#)

17 [The ROUGH ROAD \(W8-8\) sign \(see Figure 2C-6\) may be used to warn of a rough roadway surface.](#)

18 [An UNEVEN LANES \(W8-11\) sign \(see Figure 2C-6\) may be used to warn of a difference in elevation](#)
19 [between travel lanes.](#)

20 [The BRIDGE ICES BEFORE ROAD \(W8-13\) sign \(see Figure 2C-6\) may be used in advance of bridges](#)
21 [to advise bridge users of winter weather conditions. The BRIDGE ICES BEFORE ROAD sign may be](#)
22 [removed or covered during seasons of the year when its message is not relevant.](#) **this paragraph was relocated**
23 **from Section 2C.28**

24 [The FALLEN ROCKS \(W8-14\) sign \(see Figure 2C-6\) may be used in advance of an area that is adjacent](#)
25 [to a hillside, mountain, or cliff where rocks frequently fall onto the roadway.](#)

26 **Guidance:**

27 When used, ~~a Slippery When Wet~~ [Surface Condition](#) signs should be placed in advance of the beginning
28 of the affected section (see Table 2C-4), and additional signs should be placed at appropriate intervals along
29 the road where the condition exists.

30 **~~Section 2C.28 BRIDGE ICES BEFORE ROAD Sign (W8-13)~~**

31 **~~Option:~~**

32 ~~A BRIDGE ICES BEFORE ROAD (W8-13) sign (see Figure 2C-4) may be used in advance of bridges to~~
33 ~~advise bridge users of winter weather conditions.~~

34 ~~The BRIDGE ICES BEFORE ROAD sign may be removed or covered during seasons of the year when~~
35 ~~its message is not relevant.~~ **this paragraph and the previous paragraph were combined and relocated to Section**
36 **2C.32**

37 **[Section 2C.33 Warning Signs and Plaques for Motorcyclists \(W8-15, W8-15P, and W8-16\)](#)**

38 **Support:**

39 [The signs and plaques described in this Section are intended to give motorcyclists advance notice of](#)
40 [surface conditions that might adversely affect their ability to maintain control of their motorcycle under wet or](#)
41 [dry conditions. The use of some of the advance surface condition warning signs described in Section 2C.32,](#)
42 [such as Slippery When Wet, LOOSE GRAVEL, or ROUGH ROAD, can also be helpful to motorcyclists if](#)
43 [those conditions exist.](#)

44 **Option:**

45 [If a portion of a street or highway features a roadway pavement surface that is grooved or textured instead](#)
46 [of smooth, such as a grooved skid resistance treatment for a horizontal curve or a brick pavement surface, a](#)
47 [GROOVED PAVEMENT \(W8-15\) sign \(see Figure 2C-6\) may be used to provide advance warning of this](#)
48 [condition to motorcyclists, bicyclists, and other road users. Alternate legends such as TEXTURED](#)
49 [PAVEMENT or BRICK PAVEMENT may also be used on the W8-15 sign.](#)

1 If a bridge or a portion of a bridge includes a metal or grated surface, a METAL BRIDGE DECK (W8-16)
2 sign (see Figure 2C-6) may be used to provide advance warning of this condition to motorcyclists, bicyclists,
3 and other road users.

4 A Motorcycle (W8-15P) plaque (see Figure 2C-6) may be mounted below or above a W8-15 or W8-16
5 sign if the warning is intended to be directed primarily to motorcyclists.

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

7 Option:

8 The NO CENTER LINE (W8-12) sign (see Figure 2C-6) may be used to warn of a roadway without
9 center line pavement markings.

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

11 Option:

12 The ROAD MAY FLOOD (W8-18) sign (see Figure 2C-6) may be used to warn road users that a section
13 of roadway is subject to frequent flooding. A Depth Gauge (W8-19) sign (see Figure 2C-6) may also be
14 installed within a roadway section that frequently floods.

15 **Standard:**

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

18 Option:

19 The GUSTY WINDS AREA (W8-21) sign (see Figure 2C-6) may be used to warn road users that wind
20 gusts frequently occur along a section of highway that are strong enough to impact the stability of trucks,
21 recreational vehicles, and other vehicles with high centers of gravity. A NEXT XX MILES (W7-3a)
22 supplemental plaque may be mounted below the W8-21 sign to inform road users of the length of roadway
23 that frequently experiences strong wind gusts.

24 The FOG AREA (W8-22) sign (see Figure 2C-6) may be used to warn road users that foggy conditions
25 frequently reduce visibility along a section of highway. A NEXT XX MILES (W7-3a) supplemental plaque
26 may be mounted below the W8-22 sign to inform road users of the length of roadway that frequently
27 experiences foggy conditions.

28 **Section ~~2C.29~~ 2C.36 Advance Traffic Control Signs (W3-1, W3-2, W3-3, W3-4)**

29 **Standard:**

30 **The Advance Traffic Control symbol signs (see Figure 2C-6) include the Stop Ahead (W3-1), Yield**
31 **Ahead (W3-2), and Signal Ahead (W3-3) signs. These signs shall be installed on an approach to a**
32 **primary traffic control device that is not visible for a sufficient distance to permit the road user to**
33 **respond to the device (see Table 2C-4). The visibility criteria for a traffic control signal shall be based**
34 **on having a continuous view of at least two signal faces for the distance specified in Table 4D-2.**

35 **Support:**

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

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

39 **Guidance:**

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

42 **Option:**

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

45 ~~Word messages (W3-1a, W3-2a, W3-3a) may be used as alternates to the Advance Traffic Control symbol~~
46 ~~signs.~~

47 An ~~supplemental~~ advance street name plaque (see Section 2C.58) may be installed above or below an
48 Advance Traffic Control sign.

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

1 A BE PREPARED TO STOP (W3-4) sign (see Figure 2C-6) may be used to warn of stopped traffic
2 caused by a traffic control signal or in advance of a section of roadway that regularly experiences traffic
3 congestion.

4 **Standard:**

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

7 **Option:**

8 The BE PREPARED TO STOP sign may be supplemented with a warning beacon (see Section 4L.03).

9 **Guidance:**

10 When the warning beacon is interconnected with a traffic control signal or queue detection system, the BE
11 PREPARED TO STOP sign should be supplemented with a WHEN FLASHING (W16-13P) plaque (see
12 [Figure 2C-12](#)).

13 **Support:**

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

16 **[Section 2C.37 Advance Ramp Control Signal Signs \(W3-7 and W3-8\)](#)**

17 **Option:**

18 [A RAMP METER AHEAD \(W3-7\) sign \(see Figure 2C-6\) may be used to warn road users that a freeway](#)
19 [entrance ramp is metered and that they will encounter a ramp control signal \(see Chapter 4I\).](#)

20 **Guidance:**

21 [When the ramp control signals are operated only during certain periods of the day, a RAMP METERED](#)
22 [WHEN FLASHING \(W3-8\) sign \(see Figure 2C-6\) should be installed in advance of the ramp control signal](#)
23 [near the entrance to the ramp, or on the arterial on the approach to the ramp, to alert road users to the presence](#)
24 [and operation of ramp meters.](#)

25 **Standard:**

26 **[The RAMP METERED WHEN FLASHING sign shall be supplemented with a warning beacon \(see](#)**
27 **[Section 4L.03\) that flashes when the ramp control signal is in operation.](#)**

28 **[Section ~~2C.30~~ 2C.38 Reduced Speed ~~Reduction~~ Limit Ahead Signs \(W3-5, W3-5a\)](#)**

29 **Guidance:**

30 A [Reduced Speed ~~Reduction~~ Limit Ahead](#) (W3-5 or W3-5a) sign (see Figure 2C-7) should be used to
31 inform road users of a reduced speed zone ~~when~~ [where the speed limit is being reduced by more than 10 mph,](#)
32 [or where](#) engineering judgment indicates the need for advance notice to comply with the posted speed limit
33 ahead.

34 **Standard:**

35 **If used, [Reduced Speed ~~Reduction~~ Limit Ahead](#) signs shall be followed by a Speed Limit (R2-1) sign**
36 **installed at the beginning of the zone where the speed limit applies.**

37 **The speed limit displayed on the [Reduced Speed ~~Reduction~~ Limit Ahead](#) sign shall be identical to**
38 **the speed limit displayed on the subsequent Speed Limit sign.**

39 **[Section 2C.39 DRAW BRIDGE Sign \(W3-6\)](#)**

40 **Standard:**

41 [A DRAW BRIDGE \(W3-6\) sign \(see Figure 2C-6\) shall be used in advance of movable bridge](#)
42 [signals and gates \(see Section 4J.02\) to give warning to road users, except in urban conditions where](#)
43 [such signing would not be practical.](#)

44 **[Section ~~2C.31~~ 2C.40 Merge Signs \(W4-1, W4-5\)](#)**

45 **Option:**

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

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

3 Guidance:

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

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

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

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

14 The Merge sign should not be used in place of a Lane Ends sign ([see Section 2C.42](#)) where lanes of traffic
15 moving on a single roadway must merge because of a reduction in the actual or usable pavement width (~~see~~
16 ~~Section 2C.33~~).

17 Option:

18 An Entering Roadway Merge (W4-5) sign with a NO MERGE AREA (W4-5P) supplemental plaque (see
19 Figure 2C-8) mounted below it may be used to warn road users on an entering roadway that they will
20 encounter an abrupt merging situation without an acceleration lane at the downstream end of the ramp.

21 A Merge (W4-1) sign with a NO MERGE AREA (W4-5P) supplemental plaque mounted below it may be
22 used to warn road users on the major roadway that traffic on an entering roadway will encounter an abrupt
23 merging situation without an acceleration lane at the downstream end of the ramp.

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

28 **Section ~~2C.32~~ 2C.41 Added Lane Signs (W4-3, W4-6)**

29 Guidance:

30 The Added Lane (W4-3) sign (see Figure 2C-8) should be installed in advance of a point where two
31 roadways converge and merging movements are not required. When possible, the Added Lane sign should be
32 placed such that it is visible from both roadways; if this is not possible, an Added Lane sign should be placed
33 on the side of each roadway.

34 When an Added Lane sign is to be installed on a roadway that curves before converging with another
35 roadway that has a tangent alignment at the point of convergence, the Entering Roadway Added Lane (W4-6)
36 sign (see Figure 2C-8) should be used to better portray the actual geometric conditions to road users on the
37 curving roadway.

38 **Section ~~2C.33~~ 2C.42 Lane Ends Signs (W4-2, W9-1, W9-2)**

39 Guidance:

40 The LANE ENDS MERGE LEFT (RIGHT) (W9-2) ~~word~~ sign, or the Lane Ends (W4-2) ~~symbol~~ sign,
41 should be used to warn of the reduction in the number of traffic lanes in the direction of travel on a multi-lane
42 highway (see Figure 2C-8).

43 Option:

44 The RIGHT (LEFT) LANE ENDS (W9-1) ~~word~~ sign (see Figure 2C-8) may be used in advance of the
45 Lane Ends (W4-2) ~~symbol~~ sign or the LANE ENDS MERGE LEFT (RIGHT) (W9-2) ~~word~~ sign as additional
46 warning or to emphasize that the traffic lane is ending and that a merging maneuver will be required.

47 Guidance:

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

50 Option:

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

4 Support:

5 ~~The reduction in the number of traffic lanes may also be delineated with roadway edge lines (see Section~~
6 ~~3B.09) and/or roadway delineation (see Chapter 3D).~~ Section 3B.09 contains information regarding the use of
7 pavement markings in conjunction with a lane reduction.

8 Guidance:

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

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

13 Standard:

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

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

18 Option:

19 The RIGHT (LEFT) LANE EXIT ONLY AHEAD (W9-7) sign (see Figure 2C-8) may be used to provide
20 advance warning to road users that traffic in the right-hand (left-hand) lane of a roadway that is approaching a
21 grade-separated interchange will be required to depart the roadway on an exit ramp at the next interchange.

22 Standard:

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

25 Guidance:

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

29 Support:

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

32 **Section ~~2C.34~~ 2C.44 Two-Way Traffic Sign (W6-3)**

33 Guidance:

34 A Two-Way Traffic (W6-3) sign (see Figure 2C-8) should be used to warn road users of a transition from
35 a multi-lane divided section of roadway to a two-lane, two-way section of roadway.

36 A Two-Way Traffic (W6-3) sign with an AHEAD (W16-9P) plaque (see Figure 2C-12) should be used to
37 warn road users of a transition from a one-way street to a two-lane, two-way section of roadway (see Figure
38 2B-14).

39 Option:

40 The Two-Way Traffic sign may be used at intervals along a two-lane, two-way roadway and may be used
41 to supplement the Divided Highway (Road) Ends (W6-2) sign discussed in Section 2C.23.

42 **Section ~~2C.35~~ 2C.45 NO PASSING ZONE Sign (W14-3)**

43 Standard:

44 The NO PASSING ZONE (W14-3) sign (see Figure 2C-8) shall be a pennant-shaped isosceles
45 triangle with its longer axis horizontal and pointing to the right. When used, the NO PASSING ZONE
46 sign shall be installed on the left side of the roadway at the beginning of no-passing zones identified by
47 either pavement markings or DO NOT PASS signs or both (see Sections 2B.28 and 3B.02).

48 ~~Section 2C.36 Advisory Exit, Ramp, and Curve Speed Signs (W13-2, W13-3, W13-5)~~ relocated
49 to Section 2C.14

1 **Section ~~2C.37~~ 2C.46 Intersection Warning Signs (W2-1 through ~~W2-6~~ W2-8)**

2 Option:

3 A Cross Road (W2-1) symbol, Side Road (W2-2 or W2-3) symbol, T-Symbol (W2-4), or Y-Symbol (W2-
4 5) sign (see Figure 2C-9) may be used in advance of an intersection to indicate the presence of an intersection
5 and the possibility of turning or entering traffic.

6 The Circular Intersection (W2-6) symbol sign ~~accompanied by an educational TRAFFIC CIRCLE (W16-~~
7 ~~12p) plaque~~ (see Figure 2C-9) may be installed in advance of a circular intersection (see Figures 2B-21
8 through 2B-23).

9 Guidance:

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

12 Option:

13 An educational plaque (see Figure 2C-9) with a legend such as ROUNDABOUT (W16-17P) or TRAFFIC
14 CIRCLE (W16-12P) may be mounted below a Circular Intersection symbol sign.

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

17 An advance street name plaque (see Section 2C.58) may be installed above or below an Intersection
18 Warning sign.

19 Guidance:

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

22 Intersection Warning signs, other than the Circular Intersection (W2-6) symbol sign and the T-intersection
23 (W2-4) symbol sign should not be used on approaches controlled by STOP signs, YIELD signs, or signals.
24 ~~The Circular Intersection (W2-6) symbol sign should be installed on the approach to a YIELD sign controlled~~
25 ~~roundabout intersection.~~

26 If an Intersection Warning sign is used where the side roads are not opposite of each other, the ~~symbol for~~
27 ~~the intersection should indicate a slight~~ Offset Side Roads (W2-7) symbol sign (see Figure 2C-9) should be
28 used instead of the Cross Road symbol sign.

29 If an Intersection Warning sign is used where two closely-spaced side roads are on the same side of the
30 highway, the Double Side Roads (W2-8) symbol sign (see Figure 2C-9) should be used instead of the Side
31 Road symbol sign.

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

35 Support:

36 Figure 2A-4 shows the typical placement of an Intersection Warning sign.

37 **Section ~~2C.38~~ 2C.47 Two-Direction Large Arrow Sign (W1-7)**

38 **Standard:**

39 **The Two-Direction Large Arrow (W1-7) sign (see Figure 2C-9) shall be a horizontal rectangle.**

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

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

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

46 Guidance:

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

49 **Section ~~2C.39~~ 2C.48 Traffic Signal Signs (W25-1, W25-2)**

1 **Standard:**

2 ~~Unless a separate left turn signal face is provided and is operated as described in Sections 4D.06, if~~
3 ~~the possibility exists that a CIRCULAR YELLOW signal indication could be displayed to an approach~~
4 ~~from which drivers are turning left permissively without the simultaneous display of a CIRCULAR~~
5 ~~YELLOW signal indication to the opposing approach (see [At locations where either a W25-1 or a W25-](#)~~
6 ~~2 sign is required based on the provisions in Section 4D.05), either a the W25-1 or a W25-2 sign (see~~
7 ~~Figure 2C-9) shall be installed near the left-most signal head. If the operation described in the previous~~
8 ~~sentence occurs on a cycle-by-cycle basis during all times that the traffic control signal is operated in~~
9 ~~the stop-and-go mode, the ONCOMING TRAFFIC HAS EXTENDED GREEN (W25-1) sign shall be~~
10 ~~used; if the operation occurs only occasionally, the ONCOMING TRAFFIC MAY HAVE EXTENDED~~
11 ~~GREEN (W25-2) sign shall be used. [The W25-1 and W25-2 signs shall be vertical rectangles.](#)~~

12 **Section ~~2C-40~~ 2C.49 Vehicular Traffic Warning Signs (W8-6, W11-1, W11-5, W11-5a, W11-8,**
13 **W11-10, W11-11, W11-12P, W11-14, W11-15, and W11-15a)**

14 Option:

15 Vehicular Traffic [Warning](#) (W8-6, W11-1, W11-5, W11-5a, W11-8, W11-10, W11-11, W11-12P, W11-
16 14, [W11-15, and W11-15a](#)) signs (see Figure 2C-10) may be used to alert road users to locations where
17 unexpected entries into the roadway by trucks, bicyclists, farm vehicles, emergency vehicles, golf carts, horse-
18 drawn vehicles, or other vehicles might occur. The TRUCK CROSSING (W8-6) word message sign may be
19 used as an alternate to the Truck Crossing (W11-10) symbol sign.

20 Support:

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

22 Guidance:

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

25 If the condition or activity is seasonal or temporary, the Vehicular Traffic [Warning](#) sign should be
26 removed or covered when the condition or activity does not exist.

27 Option:

28 [The combined Bicycle/Pedestrian \(W11-15\) sign may be used where both bicyclists and pedestrians might](#)
29 [be crossing the roadway, such as at an intersection with a shared-use path. A TRAIL X-ING \(W11-15P\)](#)
30 [supplemental plaque \(see Figure 2C-10\) may be mounted below the W11-15 sign. The TRAIL CROSSING](#)
31 [\(W11-15a\) sign may be used to warn of shared-use path crossings where pedestrians, bicyclists, and other user](#)
32 [groups might be crossing the roadway.](#)

33 [The W11-1, W11-15, and W11-15a signs and their related supplemental plaques may have a fluorescent](#)
34 [yellow-green background with a black legend and border.](#)

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

38 [Guidance:](#)

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

42 **[Standard:](#)**

43 [If a post-mounted W11-1, W11-11, W11-15, or W11-15a sign is placed at the location of the crossing](#)
44 [point where golf carts, pedestrians, bicyclists, or other shared-use path users might be crossing the](#)
45 [roadway, a diagonal downward pointing arrow \(W16-7P\) plaque \(see Figure 2C-12\) shall be mounted](#)
46 [below the sign. If the W11-1, W11-11, W11-15, or W11-15a sign is mounted overhead, the W16-7P](#)
47 [supplemental plaque shall not be used.](#)

48 [Option:](#)

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

51 **Standard:**

1 **The Emergency Vehicle (W11-8) sign (see Figure 2C-10) with the EMERGENCY SIGNAL AHEAD**
2 **(W11-12P) supplemental plaque (see Figure 2C-10) shall be placed in advance of all emergency-vehicle**
3 **traffic control signals (see Chapter 4G).**

4 Option:

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

8 A Warning Beacon (see Section 4L.03) may be used with any Vehicular Traffic Warning sign to indicate
9 specific periods when the condition or activity is present or is likely to be present, or to provide enhanced sign
10 conspicuity.

11 A supplemental WHEN FLASHING (W16-13P) plaque (see Figure 2C-12) may be used with any
12 Vehicular Traffic Warning sign that is supplemented with a Warning Beacon to indicate specific periods when
13 the condition or activity is present or is likely to be present.

14 **Section ~~2C.41~~ 2C.50 Non-Vehicular Warning Signs (W11-2, W11-3, W11-4, W11-6, W11-7,**
15 **W11-9, and W11-16 through W11-22)**

16 Option:

17 Non-Vehicular Warning (W11-2, W11-3, W11-4, W11-6, W11-7, W11-9, and W11-16 through W11-22)
18 signs (see Figure 2C-11) may be used to alert road users in advance of locations where unexpected entries into
19 the roadway might occur or where shared use of the roadway by pedestrians, animals, ~~and other crossing~~
20 ~~activities~~ or equestrians might occur.

21 Support:

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

23 ~~Option~~ Guidance:

24 ~~When~~ If used in advance of a pedestrian, snowmobile, or equestrian crossing, ~~the Nonvehicular W11-2,~~
25 W11-6, W11-7, and W11-9 ~~warning~~ signs ~~may~~ should be supplemented with ~~supplemental~~ plaques (see
26 Section 2C.55) with the legend AHEAD, or XX FEET, or NEXT XX MILES to ~~provide advance notice to~~
27 inform road users ~~of~~ that they are approaching a point where crossing activity might occur.

28 **Standard:**

29 ~~When used~~ If a post-mounted W11-2, W11-6, W11-7, or W11-9 sign is placed at the location of the
30 crossing point where pedestrians, snowmobilers, or equestrians might be crossing the roadway,
31 ~~Nonvehicular signs shall be supplemented with~~ a diagonal downward pointing arrow (W16-7P) plaque
32 (see Figure 2C-12) ~~showing the location of the crossing shall be mounted below the sign. If the W11-2,~~
33 W11-6, W11-7, or W11-9 sign is mounted overhead, the W16-7P plaque shall not be used.

34 Option:

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

38 **Standard:**

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

42 Option:

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

46 The crossing location identified by a W11-2, W11-6, W11-7, or W11-9 sign may be defined with
47 crosswalk markings (see Section 3B.18).

48 ~~Pedestrian, Bicycle, and School~~ The W11-2 and W11-9 signs and their related supplemental plaques may
49 have a fluorescent yellow-green background with a black legend and border.

50 Guidance:

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

4 ~~Nonvehicular signs should be used only at locations where the crossing activity is unexpected or at~~
5 ~~locations not readily apparent.~~

6 Option:

7 A Warning Beacon (see Section 4L.03) may be used with any Non-Vehicular Warning sign to indicate
8 specific periods when the condition or activity is present or is likely to be present, or to provide enhanced sign
9 conspicuity.

10 A supplemental WHEN FLASHING (W16-13P) plaque (see Figure 2C-12) may be used with any Non-
11 Vehicular Warning sign that is supplemented with a Warning Beacon to indicate specific periods when the
12 condition or activity is present or is likely to be present.

13 ~~Section 2C.42~~ 2C.51 **Playground Sign (W15-1)**

14 Option:

15 The Playground (W15-1) sign (see Figure 2C-11) may be used to give advance warning of a designated
16 children's playground that is located adjacent to the road.

17 The Playground sign may have a fluorescent yellow-green background with a black legend and border.

18 Guidance:

19 If the access to the playground area requires a roadway crossing, the application of crosswalk pavement
20 markings (see Section 3B.18) and Non-Vehicular Warning signs (see Section 2C.50) should be considered.

21 Section 2C.52 NEW TRAFFIC PATTERN AHEAD Sign (W23-2)

22 Option:

23 A NEW TRAFFIC PATTERN AHEAD (W23-2) sign (see Figure 2C-6) may be used on the approach to
24 an intersection or along a section of roadway to provide advance warning of a change in traffic patterns, such
25 as revised lane usage, roadway geometry, or signal phasing.

26 Guidance:

27 The NEW TRAFFIC PATTERN AHEAD sign should be removed when the traffic pattern returns to
28 normal, when the changed pattern is no longer considered to be new, or within six months.

29 ~~Section 2C.43~~ 2C.53 **Use of Supplemental Warning Plaques**

30 Option:

31 A supplemental warning plaque (see Figure 2C-12) may be displayed with a warning or regulatory sign
32 when engineering judgment indicates that road users require additional warning information beyond that
33 contained in the main message of the warning or regulatory sign.

34 **Standard:**

35 Supplemental warning plaques shall be used only in combination with warning or regulatory signs.
36 They shall not be mounted alone or displayed alone. If used, a supplemental warning plaque shall be
37 installed on the same post(s) as the warning or regulatory sign that it supplements.

38 Unless otherwise provided in this Manual for a particular plaque, supplemental warning plaques
39 shall be mounted below the sign they supplement.

40 ~~Section 2C.44~~ 2C.54 **Design of Supplemental Warning Plaques**

41 **Standard:**

42 A supplemental warning plaque used with a warning sign shall have the same ~~color~~ legend, border,
43 and background color as the warning sign with which it is displayed. A supplemental warning plaque
44 used with a regulatory sign shall have a black legend and border on a yellow background.

45 Supplemental warning plaques shall be square or rectangular.

46 ~~Section 2C.45~~ 2C.55 **Distance Plaques (W16-2 Series, W16-3 Series, W16-4P, W7-3aP)**

47 Option:

1 The Distance Ahead (W16-2 series and W16-3 series) plaques (see Figure 2C-12) may be used to inform
2 the road user of the distance to the condition indicated by the warning sign.

3 The Next Distance (W7-3aP and W16-4P) plaques (see Figures 2C-4 and 2C-12) may be used to inform
4 road users of the length of roadway over which the condition indicated by the warning sign exists.

5 ~~Section 2C.46 Advisory Speed Plaque (W13-1)~~ relocated to Section 2C.08

6 **Section ~~2C.47~~ 2C.56 Supplemental Arrow Plaques (W16-5P, W16-6P, ~~W16-7P~~)**

7 Guidance:

8 If the condition indicated by a warning sign is located on an intersecting road and the distance between
9 the intersection and condition is not sufficient to provide adequate advance placement of the warning sign, a
10 Supplemental Arrow (W16-5P; or W16-6P; ~~W16-7P~~) plaque (see Figure 2C-12) should be used below the
11 warning sign.

12 **Standard:**

13 Supplemental Arrow plaques (~~see Figure 2C-2~~) shall have the same legend design as the Advance
14 Turn Arrow and Directional Arrow auxiliary signs (see Sections 2D.26 and 2D.28) except that they shall
15 have a black legend and border on a yellow or fluorescent yellow-green background, as appropriate.

16 **Section ~~2C.48~~ 2C.57 Hill-Related Plaques (W7-2 Series, W7-3 Series)**

17 Guidance:

18 Hill-Related (W7-2 series, W7-3 series) plaques (see Figure 2C-4) or other appropriate legends and larger
19 signs should be used for emphasis or where special hill characteristics exist.

20 On longer grades, the use of the distance plaque (W7-3aP or W7-3bP) at periodic intervals of
21 approximately 1-mile spacing should be considered.

22 **Section ~~2C.49~~ 2C.58 Advance Street Name Plaque (W16-8P, W16-8aP)**

23 Option:

24 An Advance Street Name (W16-8P or W16-8aP) plaque (see Figure 2C-12) may be used with any
25 Intersection sign (W2 series, W10-2, W10-3, or W10-4) or Advance Traffic Control (W3 series) sign to
26 identify the name of the intersecting street.

27 **Standard:**

28 The lettering on Advance Street Name plaques shall be composed of a combination of lower-case
29 letters with initial upper-case letters.

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

34 **Guidance:**

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

- 37 A. For a single intersection, the name of the street to the left should be displayed above the name of the
38 street to the right; or
39 B. For two sequential intersections, such as where the plaque is used with an Offset Side Roads (W2-7)
40 or a Double Side Road (W2-8) symbol sign, the name of the first street encountered should be
41 displayed above the name of the second street encountered, and the arrow associated with the second
42 street encountered should be an advance arrow, such as the arrow shown on the W16-6P arrow plaque
43 (see Figure 2C-12).

44 **Section ~~2C.50~~ 2C.59 CROSS TRAFFIC DOES NOT STOP Plaque (W4-4P)**

45 Option:

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

1 ~~Alternate~~ Alternative messages (see Figure 2C-9) such as TRAFFIC FROM LEFT (RIGHT) DOES NOT
2 STOP (W4-4aP) or ONCOMING TRAFFIC DOES NOT STOP (W4-4bP) may be used ~~on the W4-4p plaque~~
3 when such messages more accurately describe the traffic controls established at the intersection.

4 Guidance:

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

9 **Standard:**

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

12 **Section ~~2C.51~~ 2C.60 SHARE THE ROAD Plaque (W16-1P)**

13 Option:

14 In situations where there is a need to warn drivers to watch for other slower forms of transportation
15 traveling along the highway, such as bicycles, golf carts, horse-drawn vehicles, or farm machinery, a SHARE
16 THE ROAD (W16-1P) plaque (see Figure 2C-12) may be used.

17 Standard:

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

22 **Section ~~2C.53~~ 2C.61 Photo Enforced Plaque (W16-10P)**

23 Option:

24 A Photo Enforced (W16-10P) plaque or a PHOTO ENFORCED (W16-10aP) word message plaque (see
25 Figure 2C-12) may be mounted below a warning sign to advise road users that the regulations associated with
26 the condition being warned about (such as a traffic control signal or a toll plaza) are being enforced by
27 photographic equipment.

28 **Standard:**

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

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

32 Option:

33 A NEW (W16-15P) plaque (see Figure 2C-12) may be mounted above a regulatory sign when a new
34 regulation takes effect in order to alert road users to the new traffic regulation. A NEW plaque may also be
35 mounted above an advance warning sign (such as a Signal Ahead sign for a newly-installed traffic control
36 signal) for a new traffic regulation.

37 Standard:

38 The NEW plaque shall not be used alone.

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

40 **Section ~~3C.01~~ 2C.63 Object Marker Design and Placement Height**

41 Support:

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

44 **Standard:**

45 **When used, object markers (see Figure 2C-13) shall not have a border and shall consist of an**
46 **arrangement of one or more of the following types:**

47 **Type 1—~~either a marker~~ diamond-shaped sign, at least 18 inches on a side, consisting of either a**
48 **yellow (OM1-1) or black (OM1-2) sign with nine yellow ~~retroreflectors~~ retroreflective devices, each**

1 with a minimum diameter of 3 inches, mounted symmetrically on ~~a yellow (OM1-1) or black (OM1-~~
2 ~~2) diamond panel 18 inches or more on a side~~ the sign, or ~~on~~ an all-yellow retroreflective ~~diamond-~~
3 ~~panel sign~~ (OM1-3) ~~of the same size.~~

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

8 Type 3—a striped marker, 12 x 36 inches, consisting of a vertical rectangle with alternating black
9 and retroreflective yellow stripes sloping downward at an angle of 45 degrees toward the side of the
10 obstruction on which traffic is to pass. The minimum width of the yellow and black stripes shall be
11 3 inches.

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

15 Support:

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

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

21 Guidance:

22 When used for marking ~~objects in~~ obstructions within the roadway or ~~objects~~ obstructions that are 8 feet
23 or less from the shoulder or curb, the minimum mounting height, measured to from the bottom of the object
24 marker to the elevation of the near edge of the traveled way, should be ~~at least~~ 4 feet ~~above the surface of the~~
25 ~~nearest traffic lane.~~

26 When used to mark ~~objects~~ obstructions more than 8 feet from the shoulder or curb, the ~~mounting height~~
27 clearance from the ground to the bottom of the object marker should be at least 4 feet ~~above the ground.~~

28 Object markers should not present a vertical or horizontal clearance obstacle for pedestrians. **relocated**
29 **from last paragraph of Section 3A.03**

30 Option:

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

33 Support:

34 Section 9B.26 contains information regarding the use of object markers on shared-use paths.

35 **Section ~~3C.02~~ 2C.64 ~~Markings~~ Object Markers for Objects in Obstructions Within the** 36 **Roadway**

37 **Standard:**

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

41 Option:

42 To provide additional emphasis, a Type 1 or Type 3 object marker may be installed at or near the
43 approach end of a median island.

44 To provide additional emphasis, large surfaces such as bridge piers may be painted with diagonal stripes,
45 12 inches or greater in width, similar in design to the Type 3 object marker.

46 **Standard:**

47 **The alternating black and retroreflective yellow stripes (~~OM-3L~~ OM3-L, ~~OM-3R~~ OM3-R) shall be**
48 **sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction. If**
49 **traffic can pass to either side of the obstruction, the alternating black and retroreflective yellow stripes**
50 **(~~OM-3C~~ OM3-C) shall form chevrons that point upwards.**

51 Option:

1 Appropriate signs (see Sections 2B.32 and 2C.25) directing traffic to one or both sides of the obstruction
2 may be used instead of the object marker.

3 **Section ~~3C.03~~ 2C.65 Markings Object Markers for Objects Obstructions Adjacent to the**
4 **Roadway**

5 Support:

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

12 ~~Option:~~

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

15 **Standard:**

16 **If a Type 2 or Type 3 object marker is used to mark an obstruction adjacent to the roadway, the**
17 **~~inside~~ edge of the object marker that is closest to the road user shall be installed in line with the ~~inner~~**
18 **closest edge of the obstruction.**

19 Where Type 3 object markers are applied to the approach ends of guardrail and other roadside
20 appurtenances, sheeting without a substrate shall be directly affixed to the approach end of the guardrail
21 in a rectangular shape conforming to the size of the approach end of the guardrail with alternating
22 black and retroreflective yellow stripes sloping downward at a angle of 45 degrees toward the side of
23 the obstruction on which traffic is to pass.

24 Type 1 and Type 4 object markers shall not be used to mark obstructions adjacent to the roadway.

25 Guidance:

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

27 **Section ~~3C.04~~ 2C.66 End-of-Roadway Object Markers for Ends of Roadways**

28 Support:

29 The ~~end-of-roadway~~ Type 4 object marker is used to warn and alert road users of the end of a roadway in
30 other than construction or maintenance areas.

31 **Standard:**

32 If an object marker is used to mark the end of a roadway, a Type 4 object marker shall be used.

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

37 Option:

38 The ~~end-of-roadway~~ Type 4 object marker may be used in instances where there are no alternate vehicular
39 paths.

40 Where conditions warrant, more than one marker, or a larger marker with or without a Type ~~III~~ 3
41 Barricade (see Section 2B.67), may be used at the end of the roadway.

42 **Standard:**

43 **The minimum mounting height, measured vertically from ~~to~~ the bottom of an end-of-roadway a**
44 **Type 4 object marker to the elevation of the near edge of the traveled way, shall be 4 feet ~~above the edge~~**
45 **of the pavement.**

46 Guidance:

47 Appropriate advance warning signs (~~see in this~~ Chapter ~~2C~~) should be used.

1 **CHAPTER 2D. GUIDE SIGNS—CONVENTIONAL ROADS**

2 **Section 2D.01 Scope of Conventional Road Guide Sign Standards**

3 **Standard:**

4 ~~Standards for conventional road guide signs~~ [The provisions of this Chapter](#) shall apply to any road
5 or street other than low-volume roads (as defined in Section 5A.01), expressways, and freeways.

6 **Section 2D.02 Application**

7 Support:

8 Guide signs are essential to direct road users along streets and highways, to inform them of intersecting
9 routes, to direct them to cities, towns, villages, or other important destinations, to identify nearby rivers and
10 streams, parks, forests, and historical sites, and generally to give such information as will help them along
11 their way in the most simple, direct manner possible.

12 Chapter 2A addresses placement, location, and other general criteria for signs.

13 **Section 2D.03 Color, Retroreflection, and Illumination**

14 Support:

15 Requirements for illumination, retroreflection, and color are stated under the specific headings for
16 individual guide signs or groups of signs. General provisions are given in Sections 2A.07, 2A.08, and 2A.10.

17 **Standard:**

18 Except where otherwise ~~specified~~ [provided herein in this Manual](#) for individual signs or groups of
19 signs, **guide signs on streets and highways shall have a white message and border on a green**
20 **background. All messages, borders, and legends shall be retroreflective and all backgrounds shall be**
21 **retroreflective or illuminated.**

22 Support:

23 Color coding is sometimes used to help road users distinguish between multiple potentially confusing
24 destinations. Examples of valuable uses of color coding include guide signs for roadways approaching or
25 inside an airport property with multiple terminals serving multiple airlines, and [community](#) wayfinding [guide](#)
26 signs for various traffic generator destinations within a community or area.

27 **Standard:**

28 [Except where otherwise provided in this Manual](#), different color sign backgrounds shall not be used
29 to provide color coding of destinations. The color coding shall be accomplished by the use of different
30 colored square or rectangular [sign](#) panels on the face of the guide signs.

31 Option:

32 The different colored [sign](#) panels may include a black or white (whichever provides the better contrast
33 with the panel color) letter, numeral, or other appropriate designation to identify ~~the~~ [an](#) airport terminal or
34 other destination.

35 Support:

36 Two examples of color-coded sign assemblies are shown in Figure 2D-1. [Section 2D.50 contains specific](#)
37 [provisions regarding Community Wayfinding guide signs.](#)

38 **Section 2D.04 Size of Signs**

39 **Standard:**

40 [Except as provided in Section 2A.11, the sizes of conventional road guide signs that have](#)
41 [standardized designs shall be as shown in Table 2D-1.](#)

42 Support:

43 [Section 2A.11 contains information regarding the applicability of the various columns in Table 2D-1.](#)

44 Option:

45 [Signs larger than those shown in Table 2D-1 may be used \(see Section 2A.11\).](#)

46 Support:

47 For ~~most~~ other guide signs, the legends are so variable that a standardized [design or](#) size is not
48 appropriate. The sign size is determined primarily by the length of the message, and the size of lettering and

1 spacing necessary for proper legibility. ~~However, for signs with standardized designs, such as route signs, it~~
2 ~~is practical to use the prescribed sizes that are given in the “Standard Highway Signs” book (see Section~~
3 ~~1A.11).~~

4 Option:

5 Reduced letter height, reduced interline spacing, and reduced edge spacing may be used on guide signs if
6 sign size must be limited by factors such as lane width or vertical or lateral clearance.

7 Guidance:

8 Reduced spacing between the letters or words on a line of legend should not be used as a means of
9 reducing the overall size of a guide sign, except where determined necessary by engineering judgment to meet
10 unusual lateral space constraints. In such cases, the legibility distance of the sign legend should be the
11 primary consideration in determining whether to reduce the spacing between the letters or the words or
12 between the words and the sign border, or to reduce the letter height.

13 When a reduction in the prescribed size is necessary, the design used should be as similar as possible to
14 the design for the standard size.

15 Section 2D.05 Lettering Style

16 Standard:

17 The design of upper-case letters, lower-case letters, ~~capital letters~~, numerals, route shields, and
18 spacing shall be as provided in the “Standard Highway Signs and Markings” book (see Section 1A.11).

19 The lettering for names of places, streets, and highways on conventional road guide signs shall be a
20 combination of lower-case letters with initial upper-case letters, ~~or all capital letters~~ (see Section 2A.13).
21 ~~When a combination of upper and lower case letters are used, The initial upper case letters shall be~~
22 ~~approximately 1.33 times the nominal “loop” height of the lower-case letters shall be 3/4 the height of~~
23 ~~the initial upper-case letter. When a mixed-case legend letter height is specified referring only to the~~
24 ~~initial upper-case letter, the height of the lower-case letters that follow shall be determined by this~~
25 ~~proportion. When the height of a lower-case letter is referenced, the reference is made to the nominal~~
26 ~~loop height and the height of the initial upper-case letter shall also be determined by this proportion.~~

27 All other word legends on conventional road guide signs shall be in ~~capital~~ upper-case letters.

28 The unique letter forms for each of the Standard Alphabet series shall not be stretched, compressed,
29 warped, or otherwise manipulated. Modifications to the length of a word for a given letter height and
30 series shall be accomplished only by the methods described in Section 2D.04.

31 Section 2D.06 Size of Lettering

32 Support:

33 Sign legibility is a direct function of letter size and spacing. Legibility distance has to be sufficient to
34 give road users enough time to read and comprehend the sign. Under optimum conditions, a guide sign
35 message can be read and understood in a brief glance. The legibility distance ~~includes a reasonable safety~~
36 ~~factor for~~ takes into account factors such as inattention, blocking of view by other vehicles, unfavorable
37 weather, inferior eyesight, or other causes for delayed or slow reading. Where conditions permit, repetition of
38 guide information on successive signs gives the road user more than one opportunity to obtain the information
39 needed.

40 Standard:

41 Design layouts for conventional road guide signs showing interline spacing, edge spacing, and other
42 specification details shall be as shown in the “Standard Highway Signs and Markings” book (see
43 Section 1A.11).

44 The principal legend on guide signs shall be in letters and numerals at least 6 inches in height for all
45 ~~capital~~ upper-case letters, or a combination of 6 inches in height for upper-case letters ~~with~~ and 4.5
46 inches in height for lower-case letters. On low-volume roads (as defined in Section 5A.01) with speeds
47 of 25 mph or less, and on urban streets with speeds of 25 mph or less, the principal legend shall be in
48 letters at least 4 inches in height for all upper-case letters, or a combination of 4 inches in height for
49 upper-case letters and 3 inches in height for lower-case letters.

50 Guidance:

51 Lettering sizes should be consistent on any particular class of highway.

1 The minimum lettering sizes ~~specified~~ provided herein in this Manual should be exceeded where
2 conditions indicate a need for greater legibility.

3 **Section 2D.07 Amount of Legend**

4 Support:

5 The longer the legend on a guide sign, the longer it will take road users to comprehend it, regardless of
6 letter size.

7 Guidance:

8 Except where otherwise provided in this Manual, guide signs should be limited to no more than three lines
9 of principal legend destinations, which include place names, route numbers, street names, and cardinal
10 directions. Where two or more signs are included in the same overhead display, the amount of legend should
11 be further minimized. ~~The principal legend should include only place names, route numbers, and street~~
12 ~~names.~~ Where appropriate, a distance message or action information, such as an exit number, NEXT RIGHT,
13 or directional arrows, should be provided on guide signs in addition to the destinations.

14 ~~Option:~~

15 ~~Symbols, action information, cardinal directions, and exit numbers may be used in addition to the~~
16 ~~principal legend where sign space is available.~~

17 **Section 2D.08 Arrows**

18 Support:

19 Arrows are used for lane assignment and to indicate the direction toward designated routes or destinations.
20 Figure 2D-2 shows the ~~up arrow and the down~~ various standard arrow designs that have been approved for
21 use on guide signs. Detailed drawings and standardized sizes based on ranges of letter heights ~~of these arrows~~
22 are shown for these arrows in the “Standard Highway Signs and Markings” book (see Section 1A.11).

23 **Standard:**

24 On overhead signs where it is desirable to indicate a lane to be followed, a down arrow shall be
25 positioned approximately over the center of the lane and shall point vertically downward toward the
26 approximate center of that lane. Down arrows shall be used only on overhead guide signs that restrict
27 the use of specific lanes to traffic bound for the destination(s) and/or route(s) indicated by these arrows.
28 Down arrows shall not be used unless an arrow can be located over and pointed to the approximate
29 center of each lane that can be used to reach the destination ~~shown~~ displayed on the sign.

30 If down arrows are used, having more than one down arrow pointing to the same lane on a single
31 overhead sign (or on multiple signs on the same overhead sign structure) shall not be permitted.

32 Where a roadway is leaving the through lanes, an up a directional arrow shall point upward at an
33 angle ~~representative of~~ that approximates the alignment of the exit roadway.

34 ~~Option:~~

35 Curved-stem arrows (see Figure 2D-8) that represent the intended driver paths to destinations involving
36 left-turn movements may be used on guide signs on approaches to circular intersections.

37 **Standard:**

38 Curved-stem arrows shall not be used on any sign that is not associated with a circular intersection.

39 **Guidance:**

40 If curved-stem arrows are used, the principles set forth in Sections 2D.26 through 2D.29 should be
41 followed.

42 The Type A directional arrow should be used on guide signs on freeways, expressways, and conventional
43 roads to indicate the direction to a specific destination or group of destinations, except as otherwise provided
44 in this Section and in Section 2E.19.

45 When a directional arrow in a vertical, upward-pointing orientation is placed to the side of a group of
46 destinations to indicate a through movement, the Type A directional arrow should be used. When a
47 directional arrow in a vertical, upward-pointing orientation is placed to the side of a single destination or
48 under a destination or group of destinations, the Type B directional arrow should be used.

49 The Type B directional arrow should be used on guide signs on conventional roads when placed at any
50 angle to the side of a single destination or when placed in a horizontal orientation to the side of a group of
51 destinations.

1 The Type C advance turn directional arrow should be used on conventional road guide signs placed in
2 advance of an intersection where a turn must be made to reach a posted destination or group of destinations.

3 The Type D directional arrow should be used primarily for sign applications other than guide signs,
4 except as provided in Paragraph 15.

5 Option:

6 The Type A-Extended directional arrow may be used on guide signs where additional emphasis regarding
7 the direction is needed relative to the amount of legend on the sign.

8 The Type C directional arrow may be used to the side of the legend of an overhead guide sign to
9 accentuate a sharp turn exit maneuver from a mainline roadway (see Section 2E.36 for additional information
10 regarding Exit Direction signs for low advisory ramp speeds).

11 On conventional roads on the approach to an intersection where the Combination Lane-Use/Destination
12 overhead guide sign (see Section 2D.33) is not used, the Type C advance turn directional arrow may be used
13 beneath the legend of an overhead guide sign to indicate the fact that a turn must be made from a mandatory
14 movement lane over which the sign is placed to reach the destination or destinations displayed on the sign.

15 The Type D directional arrow may be used on post-mounted guide signs on conventional roads with lower
16 operating speeds if the height of the text on the sign is 8 inches or less.

17 The directional and down arrows shown in Figure 2D-2 may be used on signs other than guide signs for
18 the purposes of providing directional guidance and lane assignment.

19 Guidance:

20 Arrows used on guide signs to indicate the directions toward designated routes or destinations should be
21 pointed at the appropriate angle to clearly convey the direction to be taken. A horizontally oriented ~~up-arrow~~
22 directional arrow design should be used at right-angle intersections.

23 On a ~~ground-~~ post-mounted guide sign, a directional arrow for a straight-through movement should point
24 upward. Except as provided in Section 2D.46, for a turn, the arrow on a guide sign should point horizontally
25 or at an upward ~~and-at-an~~ angle ~~related to that approximates~~ the sharpness of the turn.

26 At an exit, an arrow should be placed at the side of the sign ~~which that~~ will reinforce the movement of
27 exiting traffic. The ~~up-arrow~~ directional arrow design should be used.

28 Option:

29 Arrows may be placed below the principal sign legend or on the appropriate side of the legend.

30 On a post-mounted sign at an exit where placement of the arrow to the side of the legend farthest from the
31 roadway would create an unusually wide sign that limits the road user's view of the arrow, the directional
32 arrow may be placed at the bottom portion of the sign, centered under the legend.

33 Guidance:

34 The width across the arrowhead for the Types A, B, and C directional arrows should be between 1.5 and
35 1.75 times the height of the upper-case letters of the principal legend on the sign. The width across the
36 arrowhead for the Type D directional arrow should be at least equal to the height of the ~~largest~~ upper-case
37 letters of the principal legend on the sign. For ~~short~~ downward-pointing arrows used on overhead signs, the
38 width across the arrowhead should be ~~1.75~~ approximately two times the ~~letter~~ height of the upper-case letters
39 of the principal legend on the sign.

40 Arrows used in Overhead Arrow-per-Lane and Diagrammatic guide signing, if used on conventional
41 roads, except for signs on approaches to roundabouts, should follow the principles set forth in Section 2E.19.
42 Arrows used in Diagrammatic guide signing on approaches to roundabouts should follow the principles set
43 forth in Section 2D.38.

44 Support:

45 The “Standard Highway Signs and Markings” book (see Section 1A.11) contains design details and
46 standardized sizes of the various arrows based on ranges of letter heights of principal legends.

47 **Section 2D.09 Numbered Highway Systems**

48 Support:

49 The purpose of numbering and signing highway systems is to identify routes and facilitate travel.

50 The Interstate and United States (U.S.) highway systems are numbered by the American Association of
51 State Highway and Transportation Officials (AASHTO) upon recommendations of the State highway

1 organizations because the respective States own these systems. State and county road systems are numbered
2 by the appropriate authorities.

3 The basic policy for numbering the ~~U.S. and~~ Interstate and U.S. highway systems is contained in the
4 following Purpose and Policy statements published by AASHTO (see Page i for AASHTO's address):

- 5 A. "Establishment and Development of United States Numbered Highways," and
- 6 B. "Establishment of a Marking System of the Routes Comprising the National System of Interstate and
7 Defense Highways."

8 Guidance:

9 The principles of these policies should be followed in establishing the ~~above~~ highway systems described
10 in Paragraph 2 and any other systems, with effective coordination between adjacent jurisdictions. Care should
11 be taken to avoid the use of numbers or other designations that have been assigned to Interstate, U.S., or State
12 routes in the same geographic area. Overlapping numbered routes should be kept to a minimum.

13 **Standard:**

14 **Route systems shall be given preference in this order: Interstate, United States, State, and county.**
15 **The preference shall be given by installing the highest-priority legend on the top or the left of the sign**
16 **panel.**

17 Support:

18 Section 2D.53 contains information regarding the signing of unnumbered highways to enhance route
19 guidance and facilitate travel.

20 **Section 2D.10 Route Signs and Auxiliary Signs**

21 **Standard:**

22 **All numbered highway routes shall be identified by route signs and auxiliary signs.**

23 **The signs for each system of numbered highways, which are distinctive in shape and color, shall be**
24 **used only on that system and the approaches thereto.**

25 ~~Route signs and any auxiliary signs that accompany them shall be retroreflective.~~

26 Option:

27 Route signs and auxiliary signs may be proportionally enlarged where greater legibility is needed.

28 Support:

29 Route signs are typically mounted in assemblies with auxiliary signs.

30 Section 2D.55 contains information regarding the signing for National Scenic Byways.

31 Section 2H.07 contains information regarding the signing for Auto Tour Routes.

32 **Section 2D.11 Design of Route Signs**

33 **Standard:**

34 **The "Standard Highway Signs and Markings" book (see Section 1A.11) shall be used for designing**
35 **route signs. Other route sign designs shall be established by the authority having jurisdiction.**

36 **Interstate Route signs (see Figure 2D-3) shall consist of a cutout shield, with the route number in**
37 **white letters on a blue background, the word INTERSTATE in white ~~capital~~ upper-case letters on a red**
38 **background, and a white border. This sign shall be used on all Interstate routes and in connection with**
39 **route sign assemblies on intersecting highways.**

40 **A 24 x 24-inch minimum sign size shall be used for Interstate route numbers with one or two digits,**
41 **and a 30 x 24-inch minimum sign size shall be used for Interstate route numbers having three digits.**

42 Option:

43 Interstate Route signs may contain the State name in white upper-case letters on a blue background.

44 **Standard:**

45 **Off-Interstate Business Route signs (see Figure 2D-3) shall consist of a cutout shield carrying the**
46 **number of the connecting Interstate route and the words BUSINESS and either LOOP or SPUR in**
47 **~~capital~~ upper-case letters. The legend and border shall be white on a green background, and the shield**
48 **shall be the same shape and dimensions as the Interstate Route sign. In no instance shall the word**
49 **INTERSTATE appear on the Off-Interstate Business Route sign.**

1 Option:

2 The Off-Interstate Business Route sign may be used on a major highway that is not a part of the Interstate
3 system, but one that serves the business area of a city from an interchange on the system.

4 When used on a green guide sign, a white square or rectangle may be placed behind the shield to improve
5 contrast.

6 **Standard:**

7 **U.S. Route signs (see Figure 2D-3) shall consist of black numerals on a white shield surrounded by a**
8 **rectangular black background without a border. This sign shall be used on all U.S. routes and in**
9 **connection with route sign assemblies on intersecting highways.**

10 **A 24 x 24-inch minimum sign size shall be used for U.S. route numbers with one or two digits, and a**
11 **30 x 24-inch minimum sign size shall be used for U.S. route numbers having three digits.**

12 **State Route signs shall be designed by the individual State highway agencies.**

13 **Guidance:**

14 State Route signs (see Figure 2D-3) should be rectangular and should be approximately the same size as
15 the U.S. Route sign. State Route signs should also be similar to the U.S. Route sign by containing
16 approximately the same size black numerals on a white area surrounded by a rectangular black background
17 without a border. The shape of the white area should be circular in the absence of any determination to the
18 contrary by the individual State concerned.

19 Where U.S. or State Route signs are used as components of guide signs, only the ~~outline of the shield or~~
20 ~~other~~ distinctive shape of the shield itself and the route numerals within should be used. The rectangular
21 background upon which the distinctive shape of the shield is mounted, such as the black area around the
22 outside of the shields on the M1-4 and standard M1-5 signs, should not be included on the guide sign. Where
23 U.S. or State Route signs are used as components of other signs of non-contrasting background colors, the
24 rectangular background should be used to so that recognition of the distinctive shape of the shield can be
25 maintained. **relocated from Section 2D.14**

26 **Standard:**

27 **If county road authorities elect to establish and identify a special system of important county roads,**
28 **a statewide policy for such signing shall be established that includes a uniform numbering system to**
29 **uniquely identify each route. The County Route (M1-6) sign (see Figure 2D-3) shall consist of a**
30 **pentagon shape with a yellow county name and route number and border on a blue background.**
31 **County Route signs displaying two digits or the equivalent (letter and numeral, or two letters) shall be a**
32 **minimum size of 18 x 18 inches; those carrying three digits or the equivalent shall be a minimum size of**
33 **24 x 24 inches.**

34 **If a jurisdiction uses letters instead of numbers to identify routes, all references to numbered routes**
35 **in this Chapter shall be interpreted to also include lettered routes.**

36 **Guidance:**

37 If used with other route signs in common assemblies, the County Route sign should be of a size
38 compatible with that of the other route signs.

39 **Option:**

40 When used on a green guide sign, a yellow square or rectangle may be placed behind the County Route
41 sign to improve contrast.

42 **Standard:**

43 **Route signs (see Figure 2D-3) for park and forest roads shall be designed with adequate**
44 **distinctiveness and legibility and of a size compatible with other route signs used in common assemblies.**

45 **Section 2D.12 Design of Route Sign Auxiliaries**

46 **Standard:**

47 **Route sign auxiliaries carrying word legends, except the JCT sign, shall have a standard size of 24 x**
48 **12 inches. Those carrying arrow symbols, or the JCT sign, shall have a standard size of 21 x 15 inches.**
49 **All route sign auxiliaries shall match the color combination of the route sign that they supplement.**

50 **Guidance:**

1 ~~Auxiliary signs carrying word messages and mounted with 30 x 24-inch Interstate Route signs should be~~
2 ~~30 x 15 inches.~~ With route signs of larger ~~sizes~~ heights, auxiliary signs should be suitably enlarged, but not
3 such that they exceed the width of the route sign.

4 The background, legend, and border of a route sign auxiliary should have the same colors as those of the
5 route sign with which the auxiliary is mounted in a route sign assembly (see Section 2D.29). For a route sign
6 design that uses multiple background colors, such as the Interstate route sign, the background color of the
7 corresponding auxiliary should be that of the background area on which the route number is placed on the
8 route sign.

9 Option:

10 A route sign and any auxiliary signs used with it may be combined on a single ~~panel~~ sign as a guide sign.

11 Guidance:

12 If a route sign and its auxiliary signs are combined to form a single guide sign, the background color of
13 the sign should be green and the design should comply with the basic principles for the design of guide signs.

14 Standard:

15 If a route sign and its auxiliary signs are combined on a single sign with a green background, the
16 auxiliary messages shall be white legends placed directly on the green background. Auxiliary signs
17 shall not be mounted directly to a guide sign or other type of sign.

18 Support:

19 Chapter 2F contains information regarding auxiliary signs for toll highways.

20 **Section 2D.13 Junction Auxiliary Sign (M2-1)**

21 **Standard:**

22 The Junction (M2-1) auxiliary sign (see Figure 2D-4) shall carry the abbreviated legend JCT and
23 shall be mounted at the top of an assembly (see Section 2D.30) ~~either~~ directly above the route sign, ~~or~~
24 ~~above a~~ the sign for an alternative route (see Section 2D.17) that is part of the route designation, or the
25 Cardinal Direction auxiliary sign where access is available only to one direction of the intersected route.
26 **The minimum size of the Junction auxiliary sign shall be 21 x 15 inches for compatibility with auxiliary**
27 **signs carrying arrow symbols.**

28 **Section 2D.14 Combination Junction Sign (M2-2)**

29 Option:

30 As an alternative to the standard Junction assembly where more than one route is to be intersected or
31 joined, a rectangular guide sign may be used carrying the word JUNCTION above the route numbers.

32 ~~Other designs may be used to accommodate State and County Route signs.~~

33 **Standard:**

34 **The Combination Junction (M2-2) sign (see Figure 2D-4) shall have a green background with white**
35 **border and lettering for the word JUNCTION.**

36 **Guidance:**

37 ~~Where U.S. or State Route signs are used as components of guide signs, only the outline of the shield or~~
38 ~~other distinctive shape should be used.~~ **relocated to Section 2D.11**

39 The Combination Junction sign should comply with the specific provisions of Section 2D.11 regarding the
40 incorporation of the route signs as components of guide signs.

41 Although the size of the Combination Junction sign will depend on the number of routes involved, the
42 numerals should be large enough for clear legibility and should be of a size comparable with those in the
43 individual route signs.

44 **Section 2D.15 Cardinal Direction Auxiliary Signs (M3-1 through M3-4)**

45 **Guidance:**

46 Cardinal Direction auxiliary signs (see Figure 2D-4) carrying the legend NORTH, EAST, SOUTH, or
47 WEST should be used to indicate the general direction of the entire route.

48 **Standard:**

1 To improve the readability **and recognition of the cardinal directions**, the first letter of the cardinal
2 direction words shall be ten percent larger, rounded up to the nearest whole number size.

3 If used, the Cardinal Direction auxiliary sign shall be mounted directly above a route sign or, **if**
4 **used**, an auxiliary sign for an alternative route.

5 **Section 2D.16 Auxiliary Signs for Alternative Routes (M4 Series)**

6 Option:

7 Auxiliary signs, carrying legends such as ALTERNATE, BY-PASS, BUSINESS, or TRUCK, may be
8 used to indicate an alternate route of the same number between two points on that route.

9 **Standard:**

10 **If used, the auxiliary signs for alternative routes shall be mounted directly above a route sign.**

11 **Section 2D.17 ALTERNATE Auxiliary Signs (M4-1, M4-1a)**

12 Option:

13 The ALTERNATE (M4-1) or the ALT (M4-1a) auxiliary sign (see Figure 2D-4) may be used to indicate
14 an officially designated alternate routing of a numbered route between two points on that route.

15 **Standard:**

16 **If used, the ALTERNATE or ALT auxiliary sign shall be mounted directly above a route sign.**

17 Guidance:

18 The shorter (time or distance) or better-constructed route should retain the regular route number, and the
19 longer or worse-constructed route should be designated as the alternate route.

20 **Section 2D.18 BY-PASS Auxiliary Sign (M4-2)**

21 Option:

22 The BY-PASS (M4-2) auxiliary sign (see Figure 2D-4) may be used to designate a route that branches
23 from the numbered route through a city, bypasses a part of the city or congested area, and rejoins the
24 numbered route beyond the city.

25 **Standard:**

26 **If used, the BY-PASS auxiliary sign shall be mounted directly above a route sign.**

27 **Section 2D.19 BUSINESS Auxiliary Sign (M4-3)**

28 Option:

29 The BUSINESS (M4-3) auxiliary sign (see Figure 2D-4) may be used to designate an alternate route that
30 branches from a numbered route, passes through the business portion of a city, and rejoins the numbered route
31 beyond that area.

32 **Standard:**

33 **If used, the BUSINESS auxiliary sign shall be mounted directly above a route sign.**

34 **Section 2D.20 TRUCK Auxiliary Sign (M4-4)**

35 Option:

36 The TRUCK (M4-4) auxiliary sign (see Figure 2D-4) may be used to designate an alternate route that
37 branches from a numbered route, when it is desirable to encourage or require commercial vehicles to use the
38 alternate route.

39 **Standard:**

40 **If used, the TRUCK auxiliary sign shall be mounted directly above a route sign.**

41 **Section 2D.21 TO Auxiliary Sign (M4-5)**

42 Option:

43 The TO (M4-5) auxiliary sign (see Figure 2D-4) may be used to provide directional guidance to a
44 particular road facility from other highways in the vicinity (see Section 2D.35).

45 **Standard:**

1 If used, the TO auxiliary sign shall be mounted directly above a route sign or an auxiliary sign for
2 an alternative route. If a Cardinal Direction auxiliary sign is also included in the assembly, the TO
3 auxiliary sign shall be mounted directly above the Cardinal Direction auxiliary sign.

4 **Section 2D.22 END Auxiliary Sign (M4-6)**

5 Guidance:

6 The END (M4-6) auxiliary sign (see Figure 2D-4) should be used where the route being traveled ends,
7 usually at a junction with another route.

8 **Standard:**

9 If used, the END auxiliary sign shall be mounted either directly above a route sign or above a sign
10 for an alternative route that is part of the designation of the route being terminated.

11 **Section 2D.23 BEGIN Auxiliary Sign (M4-14)**

12 Option:

13 The BEGIN (M4-14) auxiliary sign (see Figure 2D-4) may be used where a route begins, usually at a
14 junction with another route.

15 Standard:

16 If used, the BEGIN auxiliary sign shall be mounted at the top of the first Confirming assembly (see
17 Section 2D.34) for the route that is beginning.

18 Guidance:

19 If a BEGIN auxiliary sign is included in the first Confirming assembly, a Cardinal Direction auxiliary sign
20 should also be included in the assembly.

21 Standard:

22 If a Cardinal Direction auxiliary sign is also included in the assembly, the BEGIN auxiliary sign
23 shall be mounted directly above the Cardinal Direction auxiliary sign.

24 **Section ~~2D.23~~ 2D.24 TEMPORARY Auxiliary Signs (M4-7, M4-7a)**

25 Option:

26 The TEMPORARY (M4-7) or the TEMP (M4-7a) auxiliary sign (see Figure 2D-4) may be used for an
27 interim period to designate a section of highway that is not planned as a permanent part of a numbered route,
28 but that connects completed portions of that route.

29 **Standard:**

30 If used, the TEMPORARY or TEMP auxiliary sign shall be mounted ~~either~~ directly above the route
31 sign, above a Cardinal Direction sign, or above a sign for an alternate route that is a part of the route
32 designation.

33 TEMPORARY or TEMP auxiliary signs shall be promptly removed when the temporary route is
34 abandoned.

35 **Section ~~2D.24~~ 2D.25 Temporary Detour and Auxiliary Signs**

36 Support:

37 Chapter 6F contains information regarding Temporary Detour and Auxiliary signs.

38 **Section ~~2D.25~~ 2D.26 Advance Turn Arrow Auxiliary Signs (M5-1, M5-2, and M5-3)**

39 **Standard:**

40 If used, the Advance Turn Arrow auxiliary sign (see Figure 2D-5) shall be mounted directly below
41 the route sign in Advance Route Turn assemblies, and displays a right or left arrow, the shaft of which
42 is bent at a 90-degree angle (M5-1) or at a 45-degree angle (M5-2).

43 If used, the curved-stem Advance Turn Arrow auxiliary (M5-3) sign shall be used only on the
44 approach to a circular intersection to depict a movement along the circulatory roadway around the
45 central island and to the left, relative to the approach roadway and entry into the intersection.

46 Guidance:

1 If the M5-3 sign is used, then this arrow type should also be used consistently on any regulatory lane-use
2 signs (see Chapter 2B), Destination signs (see Section 2D.37), and pavement markings (see Part 3) for a
3 particular destination or movement.

4 **Section 2D.27 Lane Designation Auxiliary Signs (M5-4, M5-5, and M5-6)**

5 Option:

6 A Lane Designation (M5-4, M5-5, or M5-6) auxiliary sign (see Figure 2D-5) may be mounted directly
7 below the route sign in an Advance Route Turn assembly on multi-lane roadways to allow road users to move
8 into the appropriate lane prior to reaching the intersection or interchange.

9 Standard:

10 If used, the Lane Designation auxiliary signs shall be used only where the designated lane is a
11 mandatory movement lane and shall be located adjacent to the full-width portion of the mandatory
12 movement lane. The Lane Designation auxiliary signs shall not be installed adjacent to a through lane
13 in advance of a lane that is being added or along the taper for a lane that is being added.

14 **Section ~~2D.26~~ 2D.28 Directional Arrow Auxiliary Signs (M6 Series)**

15 Standard:

16 If used, the Directional Arrow auxiliary sign (see Figure 2D-5) shall be mounted below the route
17 sign **and any other auxiliary signs** in Directional assemblies (see Section 2D.32), and displays a single- or
18 double-headed arrow pointing in the general direction that the route follows.

19 A Directional Arrow auxiliary sign that displays a double-headed arrow shall not be mounted in
20 any Directional assembly in advance of or at a circular intersection.

21 Option:

22 The downward pointing diagonal arrow auxiliary (M6-2a) sign may be used in a Directional assembly at
23 the far corner of an intersection to indicate the immediate entry point to a freeway or expressway entrance
24 ramp (see Section 2D.46).

25 Standard:

26 The M6-2a sign shall not be used on the approach to or on the near side of an intersection, such as
27 to designate an approach lane.

28 **Section ~~2D.27~~ 2D.29 Route Sign Assemblies**

29 Standard:

30 A Route Sign assembly shall consist of a route sign and auxiliary signs that further identify the
31 route and indicate the direction. Route Sign assemblies shall be installed on all approaches to
32 numbered routes that intersect with other numbered routes.

33 Where two or more routes follow the same section of highway, the route signs for Interstate, U.S.,
34 State, and county routes shall be mounted in that order from the left in horizontal arrangements and
35 from the top in vertical arrangements. Subject to this order of precedence, route signs for lower-
36 numbered routes shall be placed at the left or top.

37 Within groups of assemblies, information for routes intersecting from the left shall be mounted at
38 the left in horizontal arrangements and at the top or center of vertical arrangements. Similarly,
39 information for routes intersecting from the right shall be at the right or bottom, and for straight-
40 through routes at the center in horizontal arrangements or top in vertical arrangements.

41 Route Sign assemblies shall be mounted in accordance with the general specifications for **highway**
42 signs (Chapter 2A), with the lowest sign in the assembly at the height prescribed for single signs.

43 Guidance:

44 Assemblies for two or more routes, or for different directions on the same route, should be mounted in
45 groups on a common support.

46 Option:

47 Route Sign assemblies may be installed on the approaches to numbered routes on unnumbered roads and
48 streets that carry an appreciable amount of traffic destined for the numbered route.

1 [The diagrammatic route guide sign format, such as the D1-5 and D1-5a signs shown in Figure 2D-8, may](#)
2 [be used on approaches to roundabouts.](#)

3 If engineering judgment indicates that groups of assemblies that include overlapping routes or multiple
4 turns might be confusing, route signs or auxiliary signs may be omitted or combined, provided that clear
5 directions are given to road users.

6 Support:

7 Figure 2D-6 shows typical placements of route signs.

8 **Section ~~2D.28~~ 2D.30 Junction Assembly**

9 **Standard:**

10 **A Junction assembly shall consist of a Junction auxiliary sign and a route sign. The route sign shall**
11 **carry the number of the intersected or joined route.**

12 **The Junction assembly shall be installed in advance of every intersection where a numbered route is**
13 **intersected or joined by another numbered route.**

14 **Guidance:**

15 In urban areas, ~~the Junction assembly shall should~~ be installed in the block preceding the intersection=
16 ~~and. In urban areas where speeds are low, the Junction assembly should not be installed more than 300 feet in~~
17 ~~advance of the intersection.~~ **relocated from below to improve continuity**

18 In rural areas, ~~the Junction assembly shall should~~ be installed at least 400 feet in advance of the
19 intersection. In rural areas, the minimum distance between ~~the a Junction assembly and either a~~ Destination
20 sign ~~and the or an Advance~~ Route Turn assembly ~~shall should~~ be 200 feet, ~~and the minimum distance between~~
21 ~~the Route Turn assembly and the Junction assembly shall be 400 feet.~~

22 ~~Guidance:~~

23 ~~In urban areas where speeds are low, the Junction assembly should not be installed more than 300 feet in~~
24 ~~advance of the intersection.~~ **relocated to above to improve continuity**

25 Where ~~prevailing~~ speeds are high, greater spacings should be used.

26 Option:

27 Where two or more routes are to be indicated, a single Junction auxiliary sign may be used for the
28 assembly and all route signs grouped in a single mounting, or a Combination Junction ([M2-2](#)) sign (see
29 Section 2D.14) may be used.

30 **Section ~~2D.29~~ 2D.31 Advance Route Turn Assembly**

31 **Standard:**

32 **An Advance Route Turn assembly shall consist of a route sign, an Advance Turn Arrow or word**
33 **message auxiliary sign, and a Cardinal Direction auxiliary sign, if needed. It shall be installed in**
34 **advance of an intersection where a turn must be made to remain on the indicated route.**

35 Option:

36 The Advance Route Turn assembly may be used to supplement the required Junction assembly in advance
37 of intersecting routes.

38 Guidance:

39 Where a multiple-lane highway approaches an interchange or intersection with a numbered route, the
40 Advance Route Turn assembly should be used to pre-position turning vehicles in the correct lanes from which
41 to make their turn.

42 **Option:**

43 [Lane Designation auxiliary signs \(see Section 2D.27\) may be used in Advance Route Turn Assemblies in](#)
44 [place of the Advance Turn Arrow auxiliary signs where engineering judgment indicates that specific lane](#)
45 [information associated with each route is needed and overhead signing is not practical and the designated lane](#)
46 [is a mandatory movement lane. An assembly with the Lane Designation auxiliary signs may supplement or](#)
47 [substitute for an assembly with Advance Turn Arrow auxiliary signs.](#)

48 **Guidance:**

49 In low-speed areas, the Advance Route Turn assembly should be installed not less than 200 feet in
50 advance of the turn. In high-speed areas, the Advance Route Turn assembly should be installed not less than

1 300 feet in advance of the turn. [In rural areas, the minimum distance between an Advance Route Turn](#)
2 [assembly and either a Destination sign or a Junction assembly should be 200 feet.](#)

3 **Standard:**

4 **An assembly that includes an Advance Turn Arrow auxiliary sign shall not be placed where there is**
5 **an intersection between it and the designated turn.**

6 **Guidance:**

7 Sufficient distance should be allowed between the assembly and any preceding intersection that could be
8 mistaken for the indicated turn.

9 **Section ~~2D.30~~ 2D.32 Directional Assembly**

10 **Standard:**

11 A Directional assembly shall consist of a [Cardinal Direction auxiliary sign, if needed; a route sign;](#)
12 [and a Directional Arrow auxiliary sign,](#) ~~and a Cardinal Direction auxiliary sign, if needed.~~ The various
13 uses of Directional assemblies shall be as ~~outlined provided below~~ [in Items A through D:](#)

- 14 A. Turn movements (indicated in advance by an Advance Route Turn assembly) shall be marked
15 by a Directional assembly with a route sign displaying the number of the turning route and a
16 single-headed arrow pointing in the direction of the turn.
- 17 B. The beginning of a route (indicated in advance by a Junction assembly) shall be marked by a
18 Directional assembly with a route sign displaying the number of that route and a single-headed
19 arrow pointing in the direction of the route.
- 20 ~~C. The end of a route shall be marked by a Directional assembly with an END auxiliary sign and a~~
21 ~~route sign displaying the number of that route.~~
- 22 C. An intersected route (indicated in advance by a Junction assembly) [on a crossroad where the](#)
23 [route is designated on both legs](#) shall be designated by:
- 24 1. Two Directional assemblies, each with a route sign displaying the number of the intersected
25 route, a Cardinal Direction auxiliary sign, and a single-headed arrow pointing in the
26 direction of movement on that route; or
 - 27 2. A Directional assembly with a route sign displaying the number of the intersected route and
28 a double-headed arrow, pointing at appropriate angles to the left, right, or ahead.
- 29 [D. An intersected route \(indicated in advance by a Junction assembly\) on a side road or on a](#)
30 [crossroad where the route is designated only on one of the legs shall be designated by a](#)
31 [Directional assembly with a route sign displaying the number of the intersected route, a](#)
32 [Cardinal Direction auxiliary sign, and a single-headed arrow pointing in the direction of](#)
33 [movement on that route.](#)

34 **Guidance:**

35 Straight-through movements should be indicated by a Directional assembly with a route sign displaying
36 the number of the continuing route and a vertical arrow. A Directional assembly should not be used for a
37 straight-through movement in the absence of other assemblies indicating right or left turns, as the Confirming
38 assembly sign beyond the intersection normally provides adequate guidance.

39 Directional assemblies should be located on the near right corner of the intersection. At major
40 intersections and at Y or offset intersections, additional Directional assemblies should be installed on the far
41 right or left corner to confirm the near-side assemblies. When the near-corner position is not practical for
42 Directional assemblies, the far right corner should be the preferred alternative, with oversized signs, if
43 necessary, for legibility. Where unusual conditions exist, the location of a Directional assembly should be
44 determined by engineering judgment with the goal being to provide the best possible combination of view and
45 safety.

46 **Support:**

47 It is more important that guide signs be readable, [and that the information and direction displayed thereon](#)
48 [be readily understood,](#) at the ~~right~~ [appropriate](#) time and place than to be located with absolute uniformity.

49 Figure 2D-6 shows typical placements of Directional assemblies.

50 **Section 2D.33 Combination Lane-Use/Destination Overhead Guide Sign (D15-1)**

51 **Option:**

1 At complex intersection approaches involving multiple turn lanes and destinations, a Combination Lane-
2 Use/Destination (D15-1) overhead guide sign that combines a lane-use regulatory sign with destination
3 information such as a cardinal direction, a route number, a street name, and/or a place name may be used.

4 Support:

5 At such locations, the combined information on the D15-1 signs can be even more effective than separate
6 lane-use and guide signs for conveying to unfamiliar drivers which lane or lanes to use for a particular
7 destination.

8 Figure 2D-7 shows an example of a D15-1 sign that combines lane-use and route number information and
9 an example of a D15-1 sign that combines lane-use and street name information.

10 Standard:

11 The Combination Lane-Use/Destination (D15-1) overhead guide sign shall be used only where the
12 designated lane is a mandatory movement lane. The D15-1 sign shall not be used for lanes with
13 optional movements.

14 The D15-1 sign shall have a green background with a white border. As shown in Figure 2D-7, the
15 lane-use sign (see Chapter 2B) shall be placed near the bottom of the sign and the destination
16 information shall be placed near the top of the sign. The D15-1 sign shall be located approximately
17 over the center of the lane to which it applies.

18 ~~Section 2D.31~~ 2D.34 Confirming or Reassurance Assemblies

19 Standard:

20 **If used, Confirming or Reassurance assemblies shall consist of a Cardinal Direction auxiliary sign**
21 **and a route sign. Where the Confirming or Reassurance assembly is for an alternative route, the**
22 **appropriate auxiliary sign for an alternative route (see Section 2D.16) shall also be included in the**
23 **assembly.**

24 Guidance:

25 A Confirming assembly should be installed just beyond intersections of numbered routes. It should be
26 placed 25 to 200 feet beyond the far shoulder or curb line of the intersected highway.

27 If used, Reassurance assemblies should be installed between intersections in urban ~~districts~~ areas as
28 needed, and beyond the built-up area of any incorporated city or town.

29 Route signs for either confirming or reassurance purposes should be spaced at such intervals as necessary
30 to keep road users informed of their routes.

31 ~~Support:~~

32 ~~Confirming and Reassurance assemblies are considered to be a type of Directional assembly.~~

33 ~~Section 2D.32~~ 2D.35 Trailblazer Assembly

34 Support:

35 Trailblazer assemblies provide directional guidance to a particular road facility from other highways in the
36 vicinity. This guidance is accomplished by installing Trailblazer assemblies at strategic locations to indicate
37 the direction to the nearest or most convenient point of access. The use of the word TO indicates that the road
38 or street where the sign is posted is not a part of the indicated route, and that a road user is merely being
39 directed progressively to the route.

40 Standard:

41 **A Trailblazer assembly shall consist of a TO auxiliary sign, a route sign ~~(or a special road facility~~**
42 **~~symbol)~~ for a numbered or named highway (see Section 2D.53) or an Auto Tour Route sign (see Section**
43 **2H.07), and a single-headed Directional Arrow auxiliary sign pointing in the direction leading to the**
44 **route. Where the Trailblazer assembly is for an alternative route, the appropriate auxiliary sign for an**
45 **alternative route (see Section 2D.16) shall also be included in the assembly.**

46 Option:

47 A Cardinal Direction auxiliary sign may be used with a Trailblazer assembly.

48 Guidance:

1 The TO auxiliary sign, Cardinal Direction auxiliary sign, and Directional Arrow auxiliary sign should be
2 of the standard size ~~specified~~ provided for auxiliary signs of their respective type. The route sign should be
3 the size ~~specified~~ provided in Section 2D.11.

4 Option:

5 Trailblazer assemblies may be installed with other Route Sign assemblies, or alone, in the immediate
6 vicinity of the designated facilities.

7 **Section ~~2D.33~~ 2D.36 Destination and Distance Signs**

8 Support:

9 In addition to guidance by route numbers, it is desirable to supply the road user information concerning
10 the destinations that can be reached by way of numbered or unnumbered routes. This is done by means of
11 Destination signs and Distance signs.

12 Option:

13 Route ~~and Cardinal Direction auxiliary signs~~ shields and cardinal directions may be included on the
14 Destination sign ~~panel~~ with the destinations and arrows.

15 Guidance:

16 If Route shields and cardinal directions are included on a Destination sign, the ~~size~~ height of the Route
17 signs ~~shields and Cardinal Direction auxiliary signs~~ should be at least ~~the minimum size specified for these~~
18 signs two times the height of the upper-case letters of the principal legend and not less than 18 inches, and the
19 cardinal directions should be in all upper-case letters that are at least the minimum height specified for these
20 signs.

21 **Section ~~2D.34~~ 2D.37 Destination Signs (D1 Series)**

22 Standard:

23 Except ~~where special~~ on approaches to interchanges ~~signing is prescribed~~ (see Section 2D.45), the
24 Destination (D1-1 through D1-3) sign (see Figure 2D-7), if used, shall be a horizontal rectangle ~~carrying~~
25 displaying the name of a city, town, village, or other traffic generator, and a directional arrow.

26 Option:

27 The distance (see Section 2D.41) to the place named may also be ~~shown~~ displayed on the Destination
28 (D1-1a through D1-3a) sign (see Figure 2D-7). If several destinations are to be ~~shown~~ displayed at a single
29 point, the several names may be placed on a single ~~panel~~ sign with an arrow (and the distance, if desired) for
30 each name. If more than one destination lies in the same direction, a single arrow may be used for such a
31 group of destinations.

32 Guidance:

33 Adequate separation should be made between any destinations or group of destinations in one direction
34 and those in other directions by suitable design of the arrow, spacing of lines of legend, heavy lines entirely
35 across the ~~panel~~ sign, or separate ~~panels~~ signs.

36 Support:

37 Separation of destinations by direction by the use of a horizontal separator line can enhance the
38 readability of a Destination sign by relating an arrow and its corresponding destination(s) and by eliminating
39 the need for multiple arrows that point in the same direction and excessive space between lines of legend.

40 Standard:

41 Except as otherwise provided in this Manual, an arrow pointing to the right shall be at the extreme
42 right of the sign, and an arrow pointing left or up shall be at the extreme left. The distance ~~figures~~
43 numerals, if used, shall be placed to the right of the destination names.

44 Option:

45 An arrow pointing up may be placed at the extreme right of the sign when the sign is mounted to the left
46 of the traffic to which it applies.

47 Guidance:

48 Unless a sloping arrow will convey a clearer indication of the direction to be followed, the directional
49 arrows should be horizontal or vertical.

1 If several individual name ~~panels~~ signs are assembled into a group, all ~~panels~~ signs in the assembly should
2 be of the same ~~length~~ horizontal width.

3 Destination signs should be used:

- 4 A. At the intersections of U.S. or State numbered routes with Interstate, U.S., or State numbered routes;
5 and
6 B. At points where they serve to direct traffic from U.S. or State numbered routes to the business section
7 of towns, or to other destinations reached by unnumbered routes.

8 **Standard:**

9 **Where a total of three or less destinations are provided on the Advance Guide (see Section 2E.33)
10 and Supplemental Guide (see Section 2E.35) signs, not more than three destination names shall be used
11 on a Destination sign. Where four destinations are provided by the Advance Guide and Supplemental
12 Guide signs, not more than four destination names shall be used on a Destination sign.**

13 **Guidance:**

14 If space permits, four destinations should be displayed as two separate signs ~~panels~~ at two separate
15 locations.

16 **Option:**

17 Where space does not permit, or where all four destinations are in one direction, a single sign ~~assembly~~
18 may be used. Where a single sign is used and all destinations are in the same direction, the arrow may be
19 placed below the destinations for the purpose of enhancing the conspicuity of the arrow.

20 **Standard:**

21 **Where a single four-name sign assembly is used, a heavy line entirely across the ~~panel~~ sign or
22 separated signs ~~panels~~ shall be used to separate destinations by direction.**

23 **Guidance:**

24 The ~~next~~ closest destination lying straight ahead should be at the top of the sign or assembly, and below it
25 the closest destinations to the left and to the right, in that order. The destination ~~shown~~ displayed for each
26 direction should ordinarily be the next county seat or the next principal city, rather than a more distant
27 destination. In the case of overlapping routes, ~~there only one destination~~ should be ~~shown~~ displayed ~~only one~~
28 ~~destination~~ in each direction for each route.

29 **Standard:**

30 **If ~~there is~~ more than one destination is ~~shown~~ displayed in the same direction, the name of ~~the~~
31 ~~nearest~~ a nearer destination shall ~~appear~~ be displayed above the names of ~~any~~ destinations that ~~are~~ is
32 further away.**

33 **Section 2D.38 Destination Signs at Circular Intersections**

34 **Standard:**

35 Destination signs that are used at circular intersections shall comply with the provisions of Section
36 2D.37, except as provided in this Section.

37 **Option:**

38 Exit destination (D1-1d, D1-1e) signs (see Figure 2D-8) with diagonal upward-pointing arrows or
39 Directional assemblies (see Section 2D.32) may be used to designate a particular exit from a circular
40 intersection.

41 Exit destination (D1-2d, D1-3d) signs (see Figure 2D-8) with curved-stem arrows may be used on
42 approaches to circular intersections to represent the left-turn movements.

43 Curved-stem arrows on circular intersection destination signs may point in diagonal directions to depict
44 the location of an exit relative to the approach roadway and entry into the intersection.

45 Exit destination (D1-5 or D1-5a) signs (see Figure 2D-8) with a diagram of the circular intersection may
46 be used on approaches to circular intersections.

47 **Guidance:**

48 If curved-stem arrows are used on destination signs, then this arrow type should also be used consistently
49 on any regulatory lane-use signs (see Chapter 2B), Directional assemblies (see Section 2D.32), and pavement
50 markings (see Part 3) for a particular destination or movement.

51 **Support:**

1 [Figure 2D-9 illustrates two examples of guide signing for circular intersections.](#)

2 [Diagrammatic guide signs might be preferable where space is available and where the geometry of the](#)
3 [circular intersection is non-typical, such as where more than four legs are present or where the legs are not at](#)
4 [approximately 90-degree angles to each other.](#)

5 **Standard:**

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

9 **Support:**

10 [Chapter 2B contains information regarding regulatory signs at circular intersections, Chapter 2C contains](#)
11 [information regarding warning signs at circular intersections, and Chapter 3C contains information regarding](#)
12 [pavement markings at circular intersections.](#)

13 **Section 2D.39 Destination Signs at Jughandles**

14 **Standard:**

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

17 **Option:**

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

21 **Support:**

22 [Section 2B.27 contains information regarding regulatory signs for jughandle turns. Figure 2B-9 shows](#)
23 [examples of regulatory and destination guide signing for various types of jughandle turns.](#)

24 **Section ~~2D.35~~ 2D.40 Location of Destination Signs**

25 **Guidance:**

26 When used in high-speed areas, Destination signs should be located 200 feet or more in advance of the
27 intersection, and following any Junction or Advance Route Turn assemblies that ~~may~~ [might](#) be required. [In](#)
28 [rural areas, the minimum distance between a Destination sign and either an Advance Route Turn assembly or](#)
29 [a Junction assembly should be 200 feet.](#)

30 **Option:**

31 In urban areas, shorter advance distances may be used.

32 Because the Destination sign is of lesser importance than the Junction, Advance Route Turn, or
33 Directional assemblies, the Destination sign may be eliminated when sign spacing is critical.

34 **Support:**

35 Figure 2D-6 shows typical placements of Destination signs.

36 **Section ~~2D.36~~ 2D.41 Distance Signs (D2 Series)**

37 **Standard:**

38 **If used, the Distance (D2-1 through D2-3) sign (see Figure 2D-7) shall be a horizontal rectangle of a**
39 **size appropriate for the required legend, carrying the names of no~~e~~ more than three cities, towns,**
40 **junctions, or other traffic generators, and the distance (to the nearest mile) to those places.**

41 **The distance numerals shall be placed to the right of the destination names as shown in Figure 2D-7.**

42 **Guidance:**

43 The distance ~~shown~~ [displayed](#) should be selected on a case-by-case basis by the jurisdiction that owns the
44 road or by statewide policy. A well-defined central area or central business district should be used where one
45 exists. In other cases, the layout of the community should be considered in relation to the highway being
46 signed and the decision based on where it appears that most drivers would feel that they are in the center of
47 the community in question.

48 The top name on the Distance sign should be that of the next place on the route having a post office or a
49 railroad station, a route number or name of an intersected highway, or any other significant geographical

1 identity. The bottom name on the sign should be that of the next major destination or control city. If three
2 destinations are ~~shown~~ displayed, the middle line should be used to indicate communities of general interest
3 along the route or important route junctions.

4 Option:

5 The choice of names for the middle line may be varied on successive Distance signs to give road users
6 additional information concerning communities served by the route.

7 Guidance:

8 The control city should remain the same on all successive Distance signs throughout the length of the
9 route until that city is reached.

10 Option:

11 If more than one distant point may properly be designated, such as where the route divides at some
12 distance ahead to serve two destinations of similar importance, and if these two destinations cannot appear on
13 the same sign, the two names may be alternated on successive signs.

14 On a route continuing into another State, destinations in the adjacent State may be ~~shown~~ displayed.

15 **Section ~~2D.37~~ 2D.42 Location of Distance Signs**

16 Guidance:

17 If used, Distance signs should be installed on important routes leaving municipalities and just beyond
18 intersections of numbered routes in rural areas. If used, they should be placed just outside the municipal
19 limits or at the edge of the built-up ~~district~~ area if it extends beyond the limits.

20 Where overlapping routes separate a short distance from the municipal limits, the Distance sign at the
21 municipal limits should be omitted. The Distance sign should be installed approximately 300 feet beyond the
22 separation of the two routes.

23 Where, just outside of an incorporated municipality, two routes are concurrent and continue concurrently
24 to the next incorporated municipality, the top name on the Distance sign should be that of the place where the
25 routes separate; the bottom name should be that of the city to which the greater part of the through traffic is
26 destined.

27 Support:

28 Figure 2D-6 shows typical placements of Distance signs.

29 **Section ~~2D.38~~ 2D.43 Street Name Signs (D3-1 or D3-1a)**

30 Guidance:

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

34 Option:

35 For streets that are part of a U.S., State, or county numbered route, a D3-1a Street Name sign (see Figure
36 2D-10) that incorporates a route shield may be used to assist road users who might not otherwise be able to
37 associate the name of the street with the route number.

38 Standard:

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

41 Guidance:

42 Lettering on ~~ground-~~ post-mounted Street Name signs should be ~~at least 6 inches high in capital letters, or~~
43 ~~6-inch~~ composed of initial upper-case letters at least 6 inches in height ~~with 4.5-inch~~ and lower-case letters at
44 least 4.5 inches in height.

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

48 Option:

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

4 Guidance:

5 If overhead Street Name signs are used, the lettering should be ~~at least 12 inches high in capital letters, or~~
6 ~~12-inch~~ composed of initial upper-case letters at least 12 inches in height ~~with 9-inch~~ and lower-case letters at
7 least 9 inches in height.

8 Support:

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

10 Option:

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

15 A ~~symbol or letter designation~~ pictograph (see definition in Section 1A.13) may be used on a ~~Street Name~~
16 ~~D3-1 sign to identify the governmental jurisdiction, area of jurisdiction, or other government approved~~
17 ~~institution~~.

18 **Standard:**

19 Pictographs shall not be displayed on D3-1a or Advance Street Name (D3-2) signs (see Section
20 2D.44).

21 If a ~~symbol or letter designation~~ pictograph is used on a D3-1 sign, the height and width of the
22 ~~symbol or letter designation~~ pictograph shall not exceed the upper-case letter height of the principal
23 legend of the sign.

24 Guidance:

25 The ~~symbol or letter designation~~ pictograph should be positioned to the left of the street name.

26 **Standard:**

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

30 ~~Guidance:~~

31 ~~Street Name signs should have a white legend on a green background. A border, if used, should be the~~
32 ~~same color as the legend.~~

33 Option:

34 The border may be omitted from a Street Name sign.

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

38 **Standard:**

39 Alternative background colors shall not be used for Advance Street Name (D3-2) signs (see Section
40 2D.44).

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

45 Guidance:

46 An alternative background color for Street Name signs, if used, should be applied to the Street Name (D3-
47 1 or D3-1a) signs on all roadways under the jurisdiction of a particular highway agency.

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

52 Option:

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

3 Guidance:

4 In urban or suburban areas, especially where Advance Street Name signs [for signalized and other major](#)
5 [intersections](#) are not used, the use of overhead ~~mounted~~ Street Name signs should be [strongly](#) considered.

6 [Option:](#)

7 At intersection crossroads where the same road has two different street names for each direction of travel,
8 both street names may be ~~shown~~ [displayed](#) on the same sign along with directional arrows.

9 Support:

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

12 **Section ~~2D.39~~ [2D.44](#) Advance Street Name Signs (D3-2)**

13 Support:

14 Advance Street Name (D3-2) signs (see Figure 2D-10) identify an upcoming intersection. Although this
15 is often the next intersection, it could also be several intersections away in cases where the next signalized
16 intersection is referenced.

17 **Standard:**

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

20 [Option:](#)

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

24 [Guidance:](#)

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

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

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

32 **Standard:**

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

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

38 [Pictographs shall not be displayed on Advance Street Name signs.](#)

39 [Option:](#)

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

43 For intersecting crossroads where the same road has a different street name for each direction of travel, the
44 different street names may be ~~shown~~ [displayed](#) on the same Advance Street Name sign along with directional
45 arrows.

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

50 [Guidance:](#)

1 [If two street names are used on the Advance Street Name sign, the street names should be displayed in the](#)
2 [following order:](#)

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

9 **Option:**

10 An Advance Street Name (W16-8P or W16-8aP) plaque (see Section 2C.58) with black legend on a
11 yellow background, installed supplemental to an Intersection (W2 series) or Advance Traffic Control (W3
12 series) ~~series~~ warning sign may be used instead of an Advance Street Name guide sign (~~see Section 2C.49~~).

13 **Section 2D.45 Signing on Conventional Roads on Approaches to Interchanges** text for this new
14 **Section was relocated from Section 2E.49**

15 **Support:**

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

21 **Standard:**

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

25 **Guidance:**

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

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

33 **Standard:**

34 **If used, the Entrance Direction sign shall consist of a white legend and border on a green**
35 **background. It shall contain the freeway or expressway route shield(s), cardinal direction, and**
36 **directional arrow(s).**

37 **Option:**

38 The Entrance Direction sign may contain a destination(s) and/or an action message such as NEXT
39 RIGHT.

40 At minor interchanges, the following sequence of signs may be used (see Figure 2D-12):

- 41 A. Junction Assembly
42 B. Directional Assembly for the first ramp
43 C. Directional Assembly for the second ramp

44 **Guidance:**

45 On multi-lane conventional roads approaching an interchange, the sign sequence should contain the
46 following signs (see Figures 2D-13 through 2D-15):

- 47 A. Junction Assembly
48 B. Advance Entrance Direction sign(s) for both directions (if applicable) of travel on the freeway or
49 expressway
50 C. Entrance Direction sign for first ramp
51 D. Advance Turn Assembly
52 E. Entrance Direction sign for the second ramp

1 Support:

2 Advance Entrance [Direction](#) signs are used to direct road users to the appropriate lane(s).

3 **Standard:**

4 **The Advance Entrance [Direction](#) sign shall consist of a white legend and border on a green**
5 **background. It shall contain the freeway or expressway route shield(s) and cardinal direction(s).**

6 Option:

7 The Advance Entrance [Direction](#) sign may have destinations, directional arrows, and/or an action message
8 such as [KEEP LEFT LANE](#), NEXT LEFT, or SECOND RIGHT. Signs in this sequence may be mounted
9 overhead to improve visibility [as shown in Figures 2D-13 through 2D-15](#).

10 [Support:](#)

11 [A post-mounted Advance Entrance Direction diagrammatic guide sign \(see Figure 2D-16\), within the](#)
12 [sequence of approach guide signing described in Paragraphs 3, 6, and 7, might be helpful in depicting the](#)
13 [location of a freeway or expressway entrance ramp that is in close proximity to an intervening intersection on](#)
14 [the same side of the approach roadway and where signing for only the ramp might cause confusion to road](#)
15 [users.](#)

16 **[Standard:](#)**

17 **[If used, the post-mounted Advance Entrance Direction diagrammatic guide sign shall display only](#)**
18 **[the two successive turns from the same side of the roadway, one of which shall be the entrance ramp.](#)**
19 **[The post-mounted Advance Entrance Direction sign shall depict only the successive turns and shall not](#)**
20 **[depict lane use with lane lines, multiple arrow shafts for the approach roadway, action messages, or](#)**
21 **[other representations.](#)**

22 [Support:](#)

23 [Section 2D.46 contains information regarding the use of a Directional assembly or a FREEWAY](#)
24 [ENTRANCE sign to mark the entrance to a freeway or expressway at the far corner of an intersection.](#)

25 **[Section 2D.46 Freeway Entrance Signs \(D13-3 and D13-3a\)](#)** text relocated from Section 2E.50

26 Option:

27 **[Guide](#)** [FREEWAY ENTRANCE \(D13-3\) signs or FREEWAY ENTRANCE with downward pointing](#)
28 [diagonal arrow \(D13-3a\) signs \(see Figure 2D-14\)](#) may be used on entrance ramps near the crossroad to
29 inform road users of the freeway or expressway entrance, as appropriate ~~(see Figure 2E-37)~~.

30 [The D13-3 and D13-3a signs may display an alternate legend in place of FREEWAY, such as](#)
31 [EXPRESSWAY or PARKWAY, as appropriate, or may display the name of an unnumbered highway.](#)

32 [A Directional assembly \(see Section 2D.32\) with a downward pointing diagonal arrow auxiliary \(M6-2a\)](#)
33 [sign \(see Section 2D.28\) may be used at the far left-hand corner of an intersection with a freeway or](#)
34 [expressway entrance ramp as an alternative to the D13-3a sign, facing left-turning traffic on the conventional](#)
35 [road approach to indicate the immediate point of entry to the freeway or expressway and distinguish the](#)
36 [entrance ramp from an adjoining exit ramp terminal at the same intersection with the conventional road \(see](#)
37 [Figure 2D-14\). A similar Directional assembly may be used at the far right-hand corner of an intersection](#)
38 [with a freeway or expressway entrance ramp where the entrance ramp and a crossroad or side road follow one](#)
39 [another in close succession on the conventional road approach and the point of entry to the freeway or](#)
40 [expressway might be difficult for the road user to distinguish from the crossroad or side road on the](#)
41 [conventional road approach \(see Figure 2D-14\).](#)

42 [Support:](#)

43 [Section 2B.41 contains information regarding the use of regulatory signs to deter wrong-way movements](#)
44 [at intersections of freeway or expressway ramps with conventional roads, and in the area where entrance](#)
45 [ramps intersect with the mainline lanes.](#)

46 **[Section ~~2D-40~~ 2D.47 Parking Area Guide Sign \(D4-1\)](#)**

47 Option:

48 The Parking Area (D4-1) [guide](#) sign (see Figure 2D-10) may be used to show the direction to a nearby
49 public parking area [or parking facility](#).

50 **Standard:**

1 If used, the [Parking Area \(D4-1\) guide](#) sign shall be a horizontal rectangle with a standard size of 30
2 x 24 inches, or with a smaller size of 18 x 15 inches for minor, low-speed streets. It shall carry the word
3 PARKING, with the letter P five times the height of the remaining letters, and a directional arrow. The
4 legend and border shall be green on a retroreflectorized white background.

5 Guidance:

6 If used, the Parking Area [guide](#) sign should be installed on major thoroughfares at the nearest point of
7 access to the parking facility and where it can advise drivers of a place to park. The sign should not be used
8 more than four blocks from the parking area.

9 ~~Section 2D.41~~ [2D.48](#) **PARK & - RIDE Sign (D4-2)**

10 Option:

11 PARK & - RIDE (D4-2) signs (see Figure 2D-10) may be used to direct road users to park ~~and~~ - ride
12 facilities.

13 **Standard:**

14 The signs shall contain the word message PARK & - RIDE and direction information (arrow or
15 word message).

16 Option:

17 PARK & - RIDE signs may contain the local transit ~~logo~~ [pictograph](#) and/or carpool symbol ~~within~~ [on](#) the
18 sign ~~border~~.

19 **Standard:**

20 If used, the local transit ~~logo~~ [pictograph](#) and/or carpool symbol shall be located in the top part of
21 the sign above the message PARK & - RIDE. In no case shall the vertical dimension of the local transit
22 ~~logo~~ [pictograph](#) and/or carpool symbol exceed 18 inches.

23 Guidance:

24 If the function of the parking facility is to provide parking for persons using public transportation, the
25 local transit ~~logo symbol~~ [pictograph](#) should be used on the guide sign. If the function of the parking facility is
26 to serve carpool riders, the carpool symbol should be used on the guide sign. If the parking facility serves
27 both functions, both the ~~logo~~ [pictograph](#) and carpool symbol should be used.

28 **Standard:**

29 These signs shall have a retroreflective white legend and border on a rectangular green
30 background. The carpool symbol shall be as shown for [the D4-2 sign](#) ~~D4-2~~. The color of the [local](#)
31 transit ~~logo~~ [pictograph](#) shall be selected by the local transit authority.

32 Option:

33 To increase the target value and contrast of the [local](#) transit ~~logo~~ [pictograph](#), and to allow the local transit
34 ~~logo~~ [pictograph](#) to retain its distinctive color and shape, the ~~logo~~ [pictograph](#) may be included within a white
35 border or placed on a white background.

36 ~~Section 2D.42 Rest Area Signs (D5 Series)~~ [relocated to Chapter 2I](#)

37 ~~Section 2D.43 Scenic Area Signs (D6 Series)~~ [relocated to Chapter 2I](#)

38 ~~Section 2D.44~~ [2D.49](#) **Weigh Station Signing (D8 Series)**

39 Support:

40 The general concept for Weigh Station signing is similar to Rest Area signing (see Section 2I.05) because
41 in both cases traffic using either area remains within the right-of-way.

42 **Standard:**

43 The standard installation for Weigh Station signing shall include three basic signs:

- 44 A. Advance sign (D8-1),
- 45 B. Exit Direction sign (D8-2), and
- 46 C. [Exit](#) Gore sign (D8-3).

47 Support:

48 Example locations of these signs are shown in Figure 2D-17.

1 Option:

2 Where State law requires a regulatory sign (R13-1) in advance of the Weigh Station, a fourth sign (see
3 Section 2B.60) may be located following the Advance sign.

4 Guidance:

5 The Exit Direction sign (D8-2) or the Advance sign (D8-1) should display, either within the sign border or
6 on a supplemental [plaque or sign](#) panel, the changeable message OPEN or CLOSED.

7 ~~Section 2D.45 General Service Signs (D9 Series)~~ relocated to Chapter 2I

8 ~~Section 2D.46 Reference Location Signs (D10-1 through D10-3) and Intermediate Reference~~
9 ~~Location Signs (D10-1a through D10-3a)~~ relocated to Chapter 2H

10 ~~Section 2D.47 Traffic Signal Speed Sign (I1-1)~~ relocated to Chapter 2H

11 ~~Section 2D.48 General Information Signs (I Series)~~ relocated to Chapter 2H

12 Section 2D.50 Community Wayfinding Signs

13 Support:

14 Community wayfinding guide signs are part of a coordinated and continuous system of signs that direct
15 tourists and other road users to key civic, cultural, visitor, and recreational attractions and other destinations
16 within a city or a local urbanized or downtown area.

17 Community wayfinding guide signs are a type of destination guide sign for conventional roads with a
18 common color and/or identification enhancement marker for destinations within an overall wayfinding guide
19 sign plan for an area.

20 Figures 2D-18 through 2D-20 illustrate various examples of the design and application of community
21 wayfinding guide signs.

22 Standard:

23 The use of community wayfinding guide signs shall be limited to conventional roads. Community
24 wayfinding guide signs shall not be installed on freeway or expressway mainlines or ramps. Direction
25 to community wayfinding destinations from a freeway or expressway shall be limited to the use of a
26 Supplemental Guide sign (see Section 2E.35) on the mainline and a Destination sign (see Section 2D.37)
27 on the ramp to direct road users to the area or areas within which community wayfinding guide signs
28 are used. The individual wayfinding destinations shall not be displayed on the Supplemental Guide and
29 Destination signs except where the destinations are in accordance with the State or agency policy on
30 Supplemental Guide signs.

31 Community wayfinding guide signs shall not be used to provide direction to primary destinations or
32 highway routes or streets. Destination or other guide signs shall be used for this purpose as described
33 elsewhere in this Chapter and shall have priority over any community wayfinding sign in placement,
34 prominence, and conspicuity.

35 Because regulatory, warning, and other guide signs have a higher priority, community wayfinding
36 guide signs shall not be installed where adequate spacing cannot be provided between the community
37 wayfinding guide sign and other higher priority signs. Community wayfinding guide signs shall not be
38 installed in a position where they would obscure the road users' view of other traffic control devices.

39 Community wayfinding guide signs shall not be mounted overhead.

40 Guidance:

41 If used, a community wayfinding guide sign system should be established on a local municipal or
42 equivalent jurisdictional level or for an urbanized area of adjoining municipalities or equivalent that form an
43 identifiable geographic entity that is conducive to a cohesive and continuous system of signs. Community
44 wayfinding guide signs should not be used on a regional or statewide basis where infrequent or sparse
45 placement does not contribute to a continuous or coordinated system of signing that is readily identifiable as
46 such to the road user. In such cases, Destination or other guide signs detailed in this Chapter should be used
47 to direct road users to an identifiable area in which the type of eligible destination described in Paragraph 1 is
48 located.

49 Support:

1 The specific provisions of this Section regarding the design of community wayfinding sign legends apply
2 to vehicular community wayfinding signs and do not apply to those signs that are intended only to provide
3 information or direction to pedestrians or other users of a sidewalk or roadside area.

4 Guidance:

5 Because pedestrian wayfinding signs typically use smaller legends that are inadequately sized for viewing
6 by vehicular traffic and because they can provide direction to pedestrians that might conflict with that
7 appropriate for vehicular traffic, wayfinding signs designed for and intended to provide direction to
8 pedestrians or other users of a sidewalk or other roadside area should be located to minimize their conspicuity
9 to vehicular traffic. Such signs should be located as far as practical from the street, such as at the far edge of
10 the sidewalk. Where locating such signs farther from the roadway is not practical, the pedestrian wayfinding
11 signs should have their conspicuity to vehicular traffic minimized by employing one or a combination of the
12 following methods:

- 13 A. Locating signs away from intersections where high-priority traffic control devices are present.
- 14 B. Facing the pedestrian message toward the sidewalk and away from the street.
- 15 C. Cantilevering the sign over the sidewalk if the pedestrian wayfinding sign is mounted at a height
16 consistent with vehicular traffic signs, removing the pedestrian wayfinding signs from the line of sight
17 in a sequence of vehicular signs.

18 To further minimize their conspicuity to vehicular traffic during nighttime conditions, pedestrian
19 wayfinding signs should not be retroreflective.

20 Support:

21 Color coding is sometimes used on community wayfinding guide signs to help road users distinguish
22 between multiple potentially confusing traffic generator destinations located in different neighborhoods or
23 subareas within a community or area.

24 Option:

25 At the boundaries of the geographical area within which community wayfinding guide signing is used, an
26 informational guide sign (see Figures 2D-18 and 2D-20) may be posted to inform road users about the
27 presence of wayfinding signing and to identify the meanings of the various color codes or pictographs that are
28 being used.

29 Standard:

30 These informational guide signs shall have a white legend and border on a green background and
31 shall have a design similar to that illustrated in Figures 2D-1 and 2D-18 and shall be consistent with the
32 basic design principles for guide signs. These informational guide signs shall not be installed on
33 freeway or expressway mainlines or ramps.

34 The color coding or a pictograph of the identification enhancement markers of the community
35 wayfinding guide signing system shall be included on the informational guide sign posted at the
36 boundary of the community wayfinding guide signing area. The color coding or pictographs shall apply
37 to a specific, identifiable neighborhood or geographical subarea within the overall area covered by the
38 community wayfinding guide signing. Color coding or pictographs shall not be used to distinguish
39 between different types of destinations that are within the same designated neighborhood or subarea.
40 The color coding shall be accomplished by the use of different colored square or rectangular panels on
41 the face of the informational guide sign, each positioned to the left of the neighborhood or named
42 geographic area to which the color-coding panel applies. The height of the colored square or
43 rectangular panels shall not exceed two times the height of the upper-case letters of the principal legend
44 on the sign.

45 Option:

46 The different colored square or rectangular panels may include either a black or a white (whichever
47 provides the better contrast with the color of the panel) letter, numeral, or other appropriate designation to
48 identify the destination.

49 Except for the informational guide sign posted at the boundary of the wayfinding guide sign area,
50 community wayfinding guide signs may use background colors other than green in order to provide a color
51 identification for the wayfinding destinations by geographical area within the overall wayfinding guide
52 signing system. Color-coded community wayfinding guide signs may be used with or without the boundary
53 informational guide sign displaying corresponding color-coding panels described in Paragraphs 13 through
54 16. Except as provided in Paragraphs 18 and 19, in addition to the colors that are approved in this Manual for

1 use on official traffic control signs (see Section 2A.10), other background colors may also be used for the
2 color coding of community wayfinding guide signs.

3 **Standard:**

4 **The standard colors of red, orange, yellow, purple, or the fluorescent versions thereof, fluorescent**
5 **yellow-green, and fluorescent pink shall not be used as background colors for community wayfinding**
6 **guide signs, in order to minimize possible confusion with critical, higher-priority regulatory and**
7 **warning sign color meanings readily understood by road users.**

8 **The minimum contrast value of legend color to background color for community wayfinding guide**
9 **signs shall be at least 0.70 (or 70%).**

10 **All messages, borders, legends, and backgrounds of community wayfinding guide signs and any**
11 **identification enhancement markers shall be retroreflective (see Sections 2A.07 and 2A.08).**

12 **Guidance:**

13 Community wayfinding guide signs, exclusive of any identification enhancement marker used, should be
14 rectangular in shape. Simplicity and uniformity in design, position, and application as described in Section
15 2A.06 are important and should be incorporated into the community wayfinding guide sign design and
16 location plans for the area.

17 Community wayfinding guide signs should be limited to three destinations per sign (see Section 2D.07).

18 Abbreviations (see Section 1A.15) should be kept to a minimum, and should include only those that are
19 commonly recognized and understood.

20 Horizontal lines of a color that contrasts with the sign background color should be used to separate groups
21 of destinations by direction from each other.

22 **Support:**

23 The basic requirement for all highway signs, including community wayfinding signs, is that they be
24 legible to those for whom they are intended and that they be understandable in time to permit a proper
25 response. Section 2A.06 contains additional information on the design of signs, including desirable attributes
26 of effective designs.

27 **Guidance:**

28 Word messages should be as brief as practical and the lettering should be large enough to provide the
29 necessary legibility distance.

30 **Standard:**

31 **The minimum specific ratio of letter height to legibility distance shall comply with the provisions of**
32 **Section 2A.13. The size of lettering used for destination and directional legends on community**
33 **wayfinding signs shall comply with the provisions of minimum letter heights as provided in Section**
34 **2D.06.**

35 **Interline and edge spacing shall comply with the provisions of Section 2D.06.**

36 **Except as provided in Paragraph 31, the lettering style used for destination and directional legends**
37 **on community wayfinding guide signs shall comply with the provisions of Section 2D.05.**

38 **The lettering for destinations on community wayfinding guide signs shall be a combination of lower-**
39 **case letters with initial upper-case letters (see Section 2D.05). All other word messages on community**
40 **wayfinding guide signs shall be in all upper-case letters.**

41 **Option:**

42 A lettering style other than the Standard Alphabets provided in the “Standard Highway Signs and
43 Markings” book may be used on community wayfinding guide signs if an engineering study determines that
44 the legibility and recognition values for the chosen lettering style meet or exceed the values for the Standard
45 Alphabets for the same legend height and stroke width.

46 **Standard:**

47 **Except for signs that are intended to be viewed only by pedestrians, bicyclists stopped out of the**
48 **flow of traffic, or occupants of parked vehicles, Internet and e-mail addresses, including domain names**
49 **and uniform resource locators (URL), shall not be displayed on any community wayfinding guide sign**
50 **or sign assembly.**

1 The arrow location and priority order of destinations shall follow the provisions described in
2 Sections 2D.08 and 2D.37. Arrows shall be of the designs provided in Section 2D.08.

3 Option:

4 Pictographs (see definition in Section 1A.13) may be used on community wayfinding guide signs.

5 Standard:

6 If a pictograph is used, its height shall not exceed two times the height of the upper-case letters of
7 the principal legend on the sign.

8 Except for pictographs, symbols that are not approved in this Manual for use on guide signs shall
9 not be used on community wayfinding guide signs.

10 Business logos, commercial graphics, or other forms of advertising (see Section 1A.01) shall not be
11 used on community wayfinding guide signs or sign assemblies.

12 Option:

13 Other graphics that specifically identify the wayfinding system, including identification enhancement
14 markers, may be used on the overall sign assembly and sign supports.

15 Support:

16 An enhancement marker consists of a shape, color, and/or pictograph that is used as a visual identifier for
17 the community wayfinding guide signing system for an area. Figure 2D-18 shows examples of identification
18 enhancement marker designs that can be used with community wayfinding guide signs.

19 Option:

20 An identification enhancement marker may be used in a community wayfinding guide sign assembly, or
21 may be incorporated into the overall design of a community wayfinding guide sign, as a means of visually
22 identifying the sign as part of an overall system of community wayfinding signs and destinations.

23 Standard:

24 The sizes and shapes of identification enhancement markers shall be smaller than the community
25 wayfinding guide signs themselves. Identification enhancement markers shall not be designed to have
26 an appearance that could be mistaken by road users as being a traffic control device.

27 Guidance:

28 The area of the identification enhancement marker should not exceed 1/5 of the area of the community
29 wayfinding guide sign with which it is mounted in the same sign assembly.

30 Section 2D.51 Truck, Passing, or Climbing Lane Signs (D17-1 and D17-2)

31 Guidance:

32 If an extra lane has been provided for trucks and other slow-moving traffic, a NEXT TRUCK LANE XX
33 MILES (D17-1) sign and/or a TRUCK LANE XX MILES (D17-2) sign (see Figure 2D-21) should be
34 installed in advance of the lane.

35 Option:

36 Alternative legends such as PASSING LANE or CLIMBING LANE may be used instead of TRUCK
37 LANE.

38 Section 2B.31 contains information regarding regulatory signs for these types of lanes.

39 Section 2D.52 Slow Vehicle Turn-Out Sign (D17-7)

40 Guidance:

41 If a slow vehicle turn-out area has been provided for slow-moving traffic, a SLOW VEHICLE TURN-
42 OUT XX MILES (D17-7) sign (see Figure 2D-21) should be installed in advance of the turn-out area.

43 Option:

44 Section 2B.35 contains information regarding regulatory signs for slow vehicle turn-out areas.

45 **Section ~~2D.49~~ 2D.53 Signing of Named Highways the first four paragraphs have been relocated to**
46 **Section 2M.10**

47 Option:

1 Guide signs may contain street or highway names if the purpose is to enhance driver communication and
2 guidance; however, they are to be considered as supplemental information to route numbers.

3 **Standard:**

4 **Highway names shall not replace official numeral designations.**

5 **Memorial names (see Section 2M.10) shall not appear on supplemental signs or on any other**
6 **information sign ~~either~~ on or along the highway or its intersecting routes.**

7 **The use of route signs shall be restricted to signs officially used for guidance of traffic in accordance**
8 **with this Manual and the “Purpose and Policy” statement of the American Association of State**
9 **Highway and Transportation Officials that applies to Interstate and U.S. numbered routes (see Page i**
10 **for AASHTO’s address).**

11 **Option:**

12 Unnumbered routes having major importance to proper guidance of traffic may be signed if carried out in
13 accordance with the aforementioned policies. For unnumbered highways, a name to enhance route guidance
14 may be used where the name is applied consistently throughout its length.

15 **Guidance:**

16 Only one name should be used to identify any highway, whether numbered or unnumbered.

17 ~~Section 2D.50 Trail Signs~~ relocated to Section 2H.07

18 **Section ~~2D.51~~ 2D.54 Crossover Signs (D13-1 Series and D13-2)**

19 **Option:**

20 Crossover signs may be installed on divided highways to identify median openings not otherwise
21 identified by warning or other guide signs.

22 **Standard:**

23 **A CROSSOVER (D13-1) sign (see Figure 2D-21) shall not be used to identify a median opening that**
24 **is permitted to be used only by official or authorized vehicles. If used, the sign shall be a horizontal**
25 **rectangle of appropriate size to carry the word CROSSOVER and a horizontal directional arrow. The**
26 **CROSSOVER sign shall have a white legend and border on a green background.**

27 **Guidance:**

28 If used, the CROSSOVER sign should be installed immediately beyond the median opening, either on the
29 right-hand side of the roadway or in the median.

30 **Option:**

31 The Advance Crossover (D13-2) sign (see Figure 2D-21) may be installed in advance of the
32 CROSSOVER sign to provide advance notice of the crossover.

33 **Standard:**

34 **If used, the Advance Crossover sign shall be a horizontal rectangle of appropriate size to carry the**
35 **word CROSSOVER and the distance to the median opening. The sign shall have white legend and**
36 **border on a green background.**

37 **Guidance:**

38 The distance ~~shown~~ displayed on the Advance Crossover sign should be 1 MILE, 1/2 MILE, or 1/4 MILE,
39 unless unusual conditions require some other distance. If used, the sign should be installed either on the right-
40 hand side of the roadway or in the median at approximately the distance ~~shown~~ displayed on the sign.

41 **Section ~~2D.52~~ 2D.55 National Scenic Byways Signs (D6-4, D6-4a)**

42 **Support:**

43 Certain roads have been designated by the U.S. Secretary of Transportation as National Scenic Byways or
44 All-American Roads based on their archeological, cultural, historic, natural, recreational, or scenic qualities.

45 **Option:**

46 State and local highway agencies may install the National Scenic Byways (D6-4 or D6-4a) signs at
47 entrance points to a route that has been recognized by the U.S. Secretary of Transportation as a National
48 Scenic Byway or an All-American Road. The D6-4 or D6-4a sign may be installed on route sign assemblies
49 (see Figure 2D-22) or as part of larger roadside structures. National Scenic Byways signs may also be

1 installed at periodic intervals along the designated route and at intersections where the designated route turns
2 or follows a different numbered highway. At locations where roadside features have been developed to
3 enhance the traveler's experience such as rest areas, historic sites, interpretive facilities, or scenic overlooks,
4 the National Scenic Byways sign may be placed on the associated sign assembly to inform travelers that the
5 site contributes to the byway travel experience.

6 **Standard:**

7 **When a National Scenic Byways sign is installed on a National Scenic Byway or an All-American**
8 **Road, the design shown for the D6-4 or D6-4a sign in Figure 2D-22 shall be used. Use of this design**
9 **shall be limited to routes that have been designated as a National Scenic Byway or All-American Road**
10 **by the U.S. Secretary of Transportation.**

11 **If used, the D6-4 or D6-4a sign shall be placed such that the roadway route signs have primary**
12 **visibility for the road user.**

1 **CHAPTER 2E. GUIDE SIGNS—FREEWAYS AND EXPRESSWAYS**

2 **Section 2E.01 Scope of Freeway and Expressway Guide Sign Standards**

3 Support:

4 ~~These standards~~ The provisions of this Chapter provide a uniform and effective system of ~~highway~~
5 signing for high-volume, high-speed motor vehicle traffic on freeways and expressways. The requirements
6 and specifications for expressway signing exceed those for conventional roads (see Chapter 2D), but are less
7 than those for freeway signing. Since there are many geometric design variables to be found in existing roads,
8 a signing concept commensurate with prevailing conditions is the primary consideration. Section 1A.13
9 includes definitions of freeway and expressway.

10 Guide signs for freeways and expressways are primarily identified by the name of the sign rather than by
11 an assigned sign ~~code~~ designation. Guidelines for the design of guide signs for freeways and expressways are
12 provided in ~~Chapter 8 (Design Guidelines)~~ of the “Standard Highway Signs and Markings” book (see Section
13 1A.11).

14 **Standard:**

15 The ~~standards prescribed herein for freeway or expressway guide signing~~ provisions of this Chapter
16 shall apply to any highway that meets the definition of ~~such~~ freeway or expressway facilities.

17 **Section 2E.02 Freeway and Expressway Signing Principles**

18 Support:

19 The development of a signing system for freeways and expressways is approached on the premise that the
20 signing is primarily for the benefit and direction of road users who are not familiar with the route or area. The
21 signing furnishes road users with clear instructions for orderly progress to their destinations. Sign
22 installations are an integral part of the facility and, as such, are best planned concurrently with the
23 development of highway location and geometric design. For optimal results, plans for signing are analyzed
24 during the earliest stages of preliminary design, and details are correlated as final design is developed. The
25 excessive signing found on many major highways usually is the result of using a multitude of signs that are
26 too small and that are poorly designed and placed to accomplish the intended purpose.

27 Freeway and expressway signing is to be considered and developed as a planned system of installations.
28 An engineering study is sometimes necessary for proper solution of the problems of many individual
29 locations, but, in addition, consideration of an entire route is necessary.

30 Guidance:

31 Road users should be guided with consistent signing on the approaches to interchanges, when they drive
32 from one State to another, and when driving through rural or urban areas. Because geographical, geometric,
33 and operating factors regularly create significant differences between urban and rural conditions, the signing
34 should take these conditions into account.

35 Guide signs on freeways and expressways should serve distinct functions as follows:

- 36 A. Give directions to destinations, or to streets or highway routes, at intersections or interchanges;
- 37 B. Furnish advance notice of the approach to intersections or interchanges;
- 38 C. Direct road users into appropriate lanes in advance of diverging or merging movements;
- 39 D. Identify routes and directions on those routes;
- 40 E. Show distances to destinations;
- 41 F. Indicate access to general motorist services, rest, scenic, and recreational areas; and
- 42 G. Provide other information of value to the road user.

43 **Section ~~2E.24~~ 2E.03 Guide Sign Classification**

44 Support:

45 Freeway and expressway guide signs are classified and treated in the following categories:

- 46 A. Route signs and Trailblazer Assemblies (see Section 2E.27),
- 47 B. At-Grade Intersection signs (see Section 2E.29),
- 48 C. Interchange signs (see Sections 2E.30 through 2E.39),
- 49 D. Interchange Sequence signs (see Section 2E.40),
- 50 E. Community Interchanges Identification signs (see Section 2E.41),
- 51 F. NEXT ~~XX~~ EXITS signs (see Section 2E.42),

- 1 G. Weigh Station signing (see Section 2E.54),
- 2 H. Miscellaneous ~~guide~~ information signs (see Section 2H.04),
- 3 I. Reference Location signs (see Section 2H.05),
- 4 J. General Service signs (see ~~Section 2E.51~~ Chapter 2I),
- 5 K. Rest and Scenic Area signs (see Section 2I.05),
- 6 L. Tourist Information and Welcome Center signs (see Section 2I.08),
- 7 M. Radio Information signing (see Section 2I.09),
- 8 N. Carpool and Ridesharing signing (see Section 2I.11),
- 9 O. Specific Service signs (see Chapter 2J), and
- 10 P. Recreational and Cultural Interest Area signs (see Chapter 2M).

11 **Section ~~2E.03~~ 2E.04 General**

12 Support:

13 Signs are designed so that they are legible to road users approaching them and readable in time to permit
14 proper responses. Desired design characteristics include: (a) long visibility distances, (b) large lettering, ~~and~~
15 symbols, and arrows, and (c) short legends for quick comprehension.

16 **Standard:**

17 **Standard shapes and colors shall be used so that traffic signs can be promptly recognized by road**
18 **users.**

19 **Section ~~2E.04~~ 2E.05 Color of Guide Signs**

20 **Standard:**

21 **Guide signs on freeways and expressways, except as otherwise noted provided herein in this**
22 **Manual, shall have white letters, symbols, arrows, and borders on a green background.**

23 Support:

24 Color requirements for route signs and trailblazers, signs with blank-out or changeable messages, signs for
25 services, rest areas, park and recreational areas, and for certain miscellaneous signs are ~~specified~~ provided
26 in the individual Sections dealing with the particular sign or sign group.

27 **Section ~~2E.05~~ 2E.06 Retroreflection or Illumination**

28 **Standard:**

29 **Letters, numerals, symbols, arrows, and borders of all guide signs shall be retroreflectORIZED. The**
30 **background of all guide signs that are not independently illuminated shall be retroreflective.**

31 Support:

32 Where there is no serious interference from extraneous light sources, retroreflectORIZED ~~ground-~~ post-
33 mounted signs usually provide adequate nighttime visibility.

34 On freeways and expressways where much driving at night is done with low-beam headlights, the amount
35 of headlight illumination incident to an overhead sign display is relatively small.

36 Guidance:

37 Overhead sign installations should be illuminated unless an engineering study shows that
38 retroreflectORIZATION alone will perform effectively. The type of illumination chosen should provide effective
39 and reasonably uniform illumination of the sign face and message.

40 **Section ~~2E.06~~ 2E.07 Characteristics of Urban Signing**

41 Support:

42 Urban conditions are characterized not so much by city limits or other arbitrary boundaries, as by the
43 following features:

- 44 A. Mainline roadways with more than two lanes in each direction;
- 45 B. High traffic volumes on the through roadways;
- 46 C. High volumes of traffic entering and leaving interchanges;
- 47 D. Interchanges closely spaced;
- 48 E. Roadway and interchange lighting;
- 49 F. Three or more interchanges serving the major city;
- 50 G. A loop, circumferential, or spur serving a sizable portion of the urban population; and

- 1 H. Visual clutter from roadside development.
- 2 Operating conditions and road geometrics on urban freeways and expressways usually make special sign
- 3 treatments desirable, including:
 - 4 A. Use of Interchange Sequence signs (see Section 2E.40);
 - 5 B. Use of sign spreading to the maximum extent possible (see Section 2E.11);
 - 6 C. Elimination of [General or Specific](#) Service signing (see ~~Section 2E.51~~ [Chapters 2I and 2J](#));
 - 7 D. Reduction to a minimum of post-interchange signs (see Section 2E.38);
 - 8 E. Display of advance signs at distances closer to the interchange, with appropriate adjustments in the
 - 9 legend (see Section 2E.33);
 - 10 F. Use of overhead signs on roadway structures and independent sign supports (see Section 2E.25);
 - 11 G. Use of [Overhead Arrow-per-Lane or Diagrammatic](#) [guide](#) signs in advance of intersections and
 - 12 interchanges (see Sections [2E.21](#) and [2E.22](#)); and
 - 13 H. Frequent use of street names as the principal message in guide signs.
- 14 Lower speeds which are often characteristic of urban operations do not justify lower signing standards.
- 15 Typical traffic patterns are more complex for the road user to negotiate, and large, easy-to-read legends are,
- 16 therefore, just as necessary as on rural highways.

17 **Section ~~2E.07~~ [2E.08](#) Characteristics of Rural Signing**

18 Support:

19 Rural areas ordinarily have greater distances between interchanges, which permits adequate spacing for

20 the sequences of signs on the approach to and departure from each interchange. However, the absence of

21 traffic in adjoining lanes and on entering or exiting ramps often adds monotony or inattention to rural driving.

22 This increases the importance of signs that call for decisions or actions.

23 Guidance:

24 Where there are long distances between interchanges and the alignment is relatively unchanging, signs

25 should be positioned for their best effect on road users. The tendency to group all signing in the immediate

26 vicinity of rural interchanges should be avoided by considering the entire route in the development of signing

27 plans. Extra effort should be given to the placement of signs at natural target locations to command the

28 attention of the road user, particularly when the message requires an action by the road user.

29 **Section ~~2E.08~~ [2E.09](#) Memorial Highway Signing of Named Highways** the previous text in this

30 section is now contained in Section 2M.10

31 Support:

32 [Section 2D.53 contains information, which is also applicable to freeways and expressways, regarding the](#)

33 [use of highway names on the signing for unnumbered highways to enhance route guidance and facilitate](#)

34 [travel.](#)

35 [Section 2M.10 contains information regarding memorial signing of routes, bridges, or highway](#)

36 [components.](#)

37 ~~Guidance:~~

38 ~~Freeways and expressways should not be signed as memorial highways. If a route, bridge, or highway~~

39 ~~component is officially designated as a memorial, and if notification of the memorial is to be made on the~~

40 ~~highway right-of-way, such notification should consist of installing a memorial plaque in a rest area, scenic~~

41 ~~overlook, recreational area, or other appropriate location where parking is provided with the signing~~

42 ~~inconspicuously located relative to vehicle operations along the highway.~~

43 ~~Option:~~

44 ~~If the installation of a memorial plaque off the main roadway is not practical, a memorial sign may be~~

45 ~~installed on the mainline.~~

46 ~~Standard:~~

47 ~~Where such memorial signs are installed on the mainline, (1) memorial names shall not appear on~~

48 ~~directional guide signs, (2) memorial signs shall not interfere with the placement of any other necessary~~

49 ~~highway signing, and (3) memorial signs shall not compromise the safety or efficiency of traffic flow.~~

50 ~~The memorial signing shall be limited to one sign at an appropriate location in each route direction.~~

51 **Section ~~2E.09~~ [2E.10](#) Amount of Legend on Guide Signs**

1 Guidance:

2 No more than two destination names or street names should be ~~shown~~ [displayed](#) on any Advance Guide
3 sign or Exit Direction sign. A city name and street name on the same sign should be avoided. Where two or
4 three signs are placed on the same supports, destinations or names should be limited to one per sign, or to a
5 total of three in the display. Sign legends should not exceed three lines of copy, [exclusive of the exit number](#)
6 [and action or distance information](#).

7 ~~Option:~~

8 ~~Sign legends may include symbols, route numbers, arrows, cardinal directions, and exit instructions.~~

9 **Section ~~2E.10~~ [2E.11](#) Number of Signs at an Overhead Installation and Sign Spreading**

10 Guidance:

11 If overhead signs are warranted, as set forth in Section 2A.17, the number of signs at these locations
12 should be limited to only those essential in communicating pertinent destination information to the road user.
13 Exit Direction signs for a single exit and the Advance Guide signs should have only one ~~panel~~ [sign](#) with one
14 or two destinations. Regulatory signs, such as speed limits, should not be used in conjunction with overhead
15 guide sign installations. Because road users have limited time to read and comprehend sign messages, there
16 should not be more than three guide signs displayed at any one location either on the overhead structure or its
17 support.

18 Option:

19 At overhead locations, more than one sign may be installed to advise of a multiple exit condition at an
20 interchange. If the roadway ramp or crossing roadway has complex or unusual geometrics, additional signs
21 with confirming messages may be provided to properly guide the road user.

22 Support:

23 Sign spreading is a concept where major overhead signs are spaced so that road users are not overloaded
24 with a group of signs at a single location. Figure 2E-1 illustrates an example of sign spreading.

25 Guidance:

26 Where overhead signing is used, sign spreading should be used at all single exit interchanges and to the
27 extent possible at multi-exit interchanges. Sign spreading should be accomplished by use of the following:

- 28 A. The Exit Direction sign should be the only sign used in the vicinity of the gore (other than the [Exit](#)
29 Gore sign). It should be located overhead near the theoretical gore and generally on an overhead sign
30 support structure.
- 31 B. The Advance Guide sign to indicate the next interchange exit should be placed near the crossroad
32 location. If the crossroad goes over the mainline, the Advance Guide sign should be placed on the
33 overcrossing structure [or on a separate structure immediately in front of the overcrossing structure](#).

34 **Section ~~2E.11~~ [2E.12](#) Pull-Through Signs (E6-2, E6-2a)**

35 Support:

36 Pull-Through ([E6-2, E6-2a](#)) signs (see Figure 2E-2) are overhead ~~lane-use~~ [guide](#) signs intended for
37 through traffic.

38 Guidance:

39 Pull-Through signs should be used where the geometrics of a given interchange are such that it is not clear
40 to the road user as to which is the through roadway, or where additional route guidance is desired. Pull-
41 Through signs with down arrows should be used where the alignment of the through lanes is curved and the
42 exit direction is straight ahead, where the number of through lanes is not readily evident, and at multi-lane
43 exits where there is a reduction in the number of through lanes.

44 [Support:](#)

45 [Sections 2E.20 through 2E.24 contain information regarding the use of Overhead Arrow-per-Lane or](#)
46 [Diagrammatic guide signs at multi-lane exits where there is a reduction in the number of through lanes and a](#)
47 [through lane becomes an interior option lane for through or exiting traffic.](#)

48 **Section ~~2E.12~~ [2E.13](#) Designation of Destinations**

49 **Standard:**

1 The direction of a freeway and the major destinations or control cities (~~see Section 2D.34~~) along it
2 shall be clearly identified through the use of appropriate destination legends (see Section 2D.37).
3 Successive freeway guide signs shall provide continuity in destination names and consistency with
4 available map information. At any decision point, a given destination shall be indicated by way of only
5 one route.

6 Guidance:

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

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

13 Support:

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

15 The determination of major destinations or control cities is important to the quality of service provided by
16 the freeway. Control cities on freeway guide signs are selected by the States and are contained in the
17 “Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to Freeways, 4th
18 Edition/Guide Signs, Part II: Guidelines for Airport Guide Signing/Guide Signs, Part III: List of Control
19 Cities for Use in Guide Signs on Interstate Highways,” published by and available from the American
20 Association of State and Highway Transportation Officials (see ~~Page i for AASHTO’s address~~ Section
21 1A.11).

22 **Section ~~2E.13~~ 2E.14 Size and Style of Letters and Signs**

23 **Standard:**

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

26 **Support:**

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

28 **Option:**

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

30 **Standard:**

31 ~~With~~ For all freeway and expressway signs that do not have a standardized design, the message
32 dimensions shall be determined first, and the outside sign dimensions secondarily. Word messages in
33 the legend of expressway guide signs shall be in letters at least 8 inches high. Larger lettering shall be
34 used for major guide signs at or in advance of interchanges and for all overhead signs. Minimum
35 numeral and letter sizes for expressway guide signs according to interchange classification, type of sign,
36 and component of sign legend ~~are~~ shall be as shown in Tables 2E-2 and 2E-3. Minimum numeral and
37 letter sizes for freeway guide signs according to interchange classification, type of sign, and component
38 of sign legend ~~appear~~ shall be as shown in Tables 2E-4 and 2E-5. All names of places, streets, and
39 highways on freeway and expressway guide signs shall be composed of lower-case letters with initial
40 upper-case letters. The letters and the numerals used shall be Series E(M) of the “Standard Highway
41 Signs and Markings” book (see Section 1A.11). The nominal loop height of the lower-case letters shall
42 be 3/4 of the height of the initial upper-case letter (see Paragraph 2 of Section 2D.05 for additional
43 information on the specification of letter heights). Other word legends shall be ~~in~~ composed of capital
44 upper-case letters. Interline and edge spacing shall be as ~~specified~~ provided in Section 2E.15.

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

47 **Support:**

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

51 Designs for upper-case, and lower-case, ~~and capital~~ alphabets together with tables of recommended letter
52 spacing, are shown in the “Standard Highway Signs and Markings” book (see Section 1A.11).

1 Guidance:

2 ~~Where upper and lower case lettering is used, the initial upper case letters should be approximately 1.33~~
3 ~~times the “loop” height of the lower case letters.~~ Freeway lettering sizes (see Tables 2E-4 and 2E-5) should
4 be used when expressway geometric design is comparable to freeway standards.

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

7 Support:

8 A sign mounted over a particular roadway lane to which it applies might have to be limited in horizontal
9 dimension to the width of the lane, so that another sign can be placed over an adjacent lane. The necessity to
10 maintain proper vertical clearance might also place a further limitation on the size of the overhead sign and the
11 legend that can be accommodated.

12 ~~Section 2E.14~~ [2E.15](#) Interline and Edge Spacing

13 Guidance:

14 Interline spacing of upper-case letters should be approximately three-fourths the average of upper-case
15 letter heights in adjacent lines of letters.

16 The spacings to the top and bottom borders should be equal to the average of the letter height of the
17 adjacent line of letters. The lateral spacing to the vertical borders should be essentially the same as the height
18 of the largest letter.

19 ~~Section 2E.15~~ [2E.16](#) Sign Borders

20 Standard:

21 **Signs shall have a border of the same color as the legend in order to outline their distinctive shape**
22 **and thereby give them easy recognition and a finished appearance.**

23 Guidance:

24 For guide signs larger than 120 x 72 inches, the border should have a width of 2 inches. For smaller guide
25 signs, a border width of 1.25 inches should be used, but the width should not exceed the stroke width of the
26 ~~major~~ lettering [of the principal legend](#) on the sign.

27 Corner radii of sign borders should be 1/8 of the minimum sign dimension on guide signs, except that the
28 radii should not exceed 12 inches on any sign.

29 Option:

30 The sign material in the area outside of the corner radius may be trimmed.

31 ~~Section 2E.16~~ [2E.17](#) Abbreviations

32 Guidance:

33 Abbreviations should be kept to a minimum; however, they are useful when complete destination
34 messages produce excessively long signs. If used, abbreviations should be unmistakably recognized by road
35 users (see Section 1A.15). [Longer commonly used words that are not part of a proper name and are readily](#)
36 [recognizable, such as Street, Boulevard, and Avenue, should be abbreviated to expedite recognition of the](#)
37 [sign legend by reducing the amount and complexity of the legend.](#)

38 [Periods, apostrophes, question marks, ampersands, or other punctuation or characters that are not letters,](#)
39 [numerals, or hyphens](#) should not be used [in abbreviations](#), unless ~~a cardinal direction is abbreviated as part of~~
40 ~~a destination name~~ [necessary to avoid confusion.](#)

41 [The solidus \(slanted line or forward slash\) is intended to be used for fractions only and should not be used](#)
42 [to separate words on the same line of legend. Instead, a hyphen should be used for this purpose, such as](#)
43 [“CARS – TRUCKS.”](#)

44 Standard:

45 **The words NORTH, SOUTH, EAST, and WEST shall not be abbreviated when used with route**
46 **signs to indicate cardinal directions on guide signs.**

47 ~~Section 2E.17~~ [2E.18](#) Symbols

48 Standard:

1 Symbol designs shall be ~~essentially~~ **unmistakably** like those shown in this Manual and in the
2 “Standard Highway Signs and Markings” book (see Section 1A.11).

3 Guidance:

4 A special effort should be made to balance legend components for maximum legibility of the symbol with
5 the rest of the sign.

6 Option:

7 Educational plaques may be used below symbol signs where needed.

8 **Section ~~2E.18~~ 2E.19 Arrows for Interchange Guide Signs**

9 **Standard:**

10 Arrows used on interchange guide signs shall be of the types shown in Figure 2D-2 and shall comply
11 with the provisions of this Section and Section 2D.08.

12 ~~On all~~ Except on Exit Direction Overhead Arrow-per-Lane guide signs (see Section 2E.21) and on
13 Exit Direction signs for lane drops (see Section 2E.24), and except as provided in Paragraphs 3 and 4,
14 directional arrows on both all overhead and ground- post-mounted, arrows Exit Direction signs shall be
15 point diagonally upward slanting and shall be located on the side of the sign consistent with the
16 direction of the exiting movement.

17 Option:

18 On post-mounted Exit Direction signs that are located where a directional arrow to the side of the legend
19 farthest from the roadway might create an unusually wide sign that limits the road user’s view of the arrow,
20 the directional arrow may be placed at the bottom portion of the sign, centered under the legend.

21 Standard:

22 ~~Downward pointing arrows shall be used only for overhead guide signs to prescribe lane assignment~~
23 ~~for traffic bound for a destination or route that can be reached only by being in the designated lane(s).~~

24 Directional arrows on guide signs for multi-lane exits shall be positioned below the legend
25 approximately over the center of each lane to which the arrow applies (see Figures 2E-4 and 2E-8).

26 On overhead signs where down arrows are used to indicate a lane to be followed, a down arrow
27 shall be positioned approximately over the center of each lane and shall point vertically downward
28 toward the approximate center of that lane. Down arrows shall be used only on overhead guide signs
29 that restrict the use of specific lanes to traffic bound for the destination(s) and/or route(s) indicated by
30 these arrows. Down arrows shall not be used unless an arrow can be located over and pointed to the
31 approximate center of each lane that can be used to reach the destination displayed on the sign.

32 If down arrows are used, having more than one down arrow pointing to the same lane on a single
33 overhead sign (or on multiple signs on the same overhead sign structure) shall not be permitted.

34 ~~Option:~~

35 ~~Downward pointing arrows may be tilted where it is desired to emphasize the separation of roadways.~~

36 Support:

37 ~~Examples of Directional and down~~ arrows for use on guide signs are shown in Figure 2D-2. Detailed
38 ~~dimensions of~~ drawings and standardized sizes based on ranges of letter heights for these arrows are provided
39 in the “Standard Highway Signs and Markings” book (see Section 1A.11). Information on the dimensions for
40 arrows used in Overhead Arrow-per-Lane and Diagrammatic guide signing is also provided in the “Standard
41 Highway Signs and Markings” book.

42 **Section 2E.20 Signing for Option Lanes at Splits and Multi-Lane Exits**

43 Support:

44 Some freeway and expressway splits or multi-lane exit interchanges contain an interior option lane
45 servicing both movements in which traffic can either leave the route or remain on the route, or choose either
46 destination at a split, from the same lane.

47 Standard:

48 On freeways and expressways, either the Overhead Arrow-per-Lane or Diagrammatic guide sign
49 designs as provided in Sections 2E.21 and 2E.22 shall be used for all multi-lane exits at major
50 interchanges (see Section 2E.32) that have an optional exit lane that also carries the through route (see

1 Figures 2E-4, 2E-5, 2E-8, and 2E-9) and for all splits that include an option lane (see Figures 2E-6 and
2 2E-10). Overhead Arrow-per-Lane or Diagrammatic guide signs shall not be used on freeways and
3 expressways for any other types of exits or splits, including single-lane exits and splits that do not have
4 an option lane.

5 Guidance:

6 The Overhead Arrow-per-Lane guide sign design (see Section 2E.21) should also be considered for multi-
7 lane exits with an option lane at intermediate interchanges (see Section 2E.32) based on such factors as the
8 extent of the need to optimize the mainline operation by maximizing the usage of the option lane, the extent of
9 the period(s) of the day during which the exiting volumes warrant the multi-lane exit arrangement, and the
10 nature of the traffic that primarily uses the option lane during the high-volume periods.

11 Signing for multi-lane exits at minor interchanges (see Section 2E.32) that have an optional exit lane or at
12 intermediate interchanges that have an optional exit lane at which it has been determined that the Overhead
13 Arrow-per-Lane guide sign design is not warranted should use a combination of conventional guide signing
14 and regulatory lane-use signing, in accordance with the provisions of Section 2E.23.

15 **Section 2E.21 Design of Overhead Arrow-per-Lane Guide Signs for Option Lanes**

16 Support:

17 Overhead Arrow-per-Lane guide signs (see Figure 2E-3) are used where an option lane is present at
18 freeway and expressway multi-lane exit interchanges and splits. They display an upward-pointing arrow
19 above each lane that conveys the direction(s) of travel that the lane serves at the point of departure. At
20 locations where an option lane is present at a multi-lane exit or split, Overhead Arrow-per-Lane guide signs
21 have been shown to be superior to either conventional guide signs or Diagrammatic guide signs because they
22 convey positive direction about which destination and direction each approach lane serves, particularly for the
23 option lane, which is otherwise difficult to clearly sign.

24 Standard:

25 Overhead Arrow-per-Lane guide signs shall be used on all new or reconstructed freeways and
26 expressways as described in Section 2E.20.

27 Where used, the Overhead Arrow-per-Lane guide sign at the exit or split shall be located at or in
28 the immediate vicinity of the point where the exiting lanes begin to diverge from the through lanes or,
29 for a split, at the point where the approach lanes begin to diverge from one another, preserving the
30 relation of the arrows displayed on the sign to their respective lanes. The Overhead Arrow-per-Lane
31 guide sign at the exit shall not be located at or near the theoretical gore.

32 Option:

33 At existing or non-reconstructed locations where Exit Direction and Pull-Through signs exist at the
34 theoretical gore, the existing sign support structure may remain in place, continuing to use Exit Direction and
35 Pull-Through signs, in conjunction with a replacement of the advance signs using the Overhead Arrow-per-
36 Lane guide sign design.

37 Standard:

38 If existing Exit Direction and Pull-Through signs are being retained at an interchange as provided
39 in Paragraph 4, an Overhead Arrow-per-Lane guide sign shall not be used at the location of the Exit
40 Direction and Pull-Through signs at or in the vicinity of the theoretical gore. New installations of Exit
41 Direction and Pull-Through signs shall not be permitted in conjunction with Overhead Arrow-per-Lane
42 guide signs on new or reconstructed facilities.

43 Guidance:

44 Overhead Arrow-per-Lane guide signs should be located at approximately 1/2 mile and 1 mile in advance
45 of the exit or split, and at approximately 2 miles in advance of the exit or split where space is available and
46 conditions allow.

47 Standard:

48 Overhead Arrow-per-Lane guide signs used on freeways and expressways shall include one arrow
49 above each lane and shall be designed in accordance with the following criteria:

- 50 A. The sign shall include an upward-pointing arrow for each lane of the approach to the split or
51 exit, and the shaft of each arrow shall be located approximately over the center of the lane to
52 which it applies.

- 1 B. Arrows for continuing through lanes shall be vertically upward pointing (see Figure 2E-4)
2 unless those lanes are on a significantly curved alignment beyond the theoretical gore, in which
3 case the arrows for the continuing through lanes shall indicate the approximate degree of
4 curvature (see Figure 2E-5).
- 5 C. The arrow for a lane that must exit shall be curved in the direction of the exit and shall be
6 accompanied by black-on-yellow EXIT (E11-1a) and ONLY (E11-1b) sign panels adjacent to
7 the lower end of the arrow shaft. The E11-1a and E11-1b sign panels shall not be used for a
8 split of two overlapping routes where neither of the diverging routes is designated as an exit.
9 Where the through lanes curve and the exit continues on a straight alignment, upward-pointing
10 vertical arrows shall be used for the exiting movement and curved arrows for the through
11 movement.
- 12 D. The arrow for an optional exit lane that also carries the through route shall have a single shaft
13 that bifurcates into a vertically upward-pointing arrow and a curving arrow corresponding to
14 the configuration of the through and exit lanes.
- 15 E. For splits with an option lane, the arrow for the lane from which either direction of the split can
16 be accessed shall have a single shaft that bifurcates into two upward-pointing curving arrows
17 showing the approximate degrees of curvature of the two roadways beyond the theoretical gore
18 (see Figure 2E-6).
- 19 F. A vertical white line shall be used to separate the route shields and destinations for the two
20 diverging movements from each other.
- 21 G. The distance to the exit or split shall be displayed below the off-movement destination on the
22 advance signs at the 1-mile and 2-mile locations.
- 23 H. The number of lanes displayed on a sign shall correspond to the number of lanes at the location
24 of that sign. An advance sign shall not depict lanes that are added downstream of a sign
25 location.
- 26 I. For numbered exits, the Exit Number (E1-5P) or Left Exit Number (E1-5bP) plaque shall be
27 used at the top of the sign in accordance with Section 2E.31. For unnumbered left exits, the
28 LEFT (E1-5aP) plaque shall be used at the top left edge of the sign.

29 Guidance:

30 Overhead Arrow-per-Lane guide signs used on freeways and expressways should be designed in
31 accordance with the following additional criteria:

- 32 A. No more than one destination should be displayed for each movement, and no more than two
33 destinations should be displayed per sign.
- 34 B. The arrowhead(s) for the diverging movement should be positioned lower on the sign than the
35 arrowhead(s) for the movement that continues straight ahead, independent of which movement carries
36 the through route. Where the movements are freeway or expressway splits rather than exits, the
37 arrowheads should be positioned at approximately the same height on the sign.
- 38 C. Route shields, cardinal directions, and destinations should be positioned on the sign such that they are
39 clearly related to the arrowhead(s) for the movement to which they apply.
- 40 D. The cardinal direction should be placed adjacent to the route shield for exits or splits leading in a
41 single cardinal direction.
- 42 E. The vertical white line that is used to separate the route shields and destinations for the two diverging
43 movements from each other should not descend below the top of the arrowheads for the through lanes,
44 and should be positioned approximately halfway between the diverging arrowheads for the optional
45 movement lane (see Figure 2E-3).

46 Standard:

47 Overhead Arrow-per-Lane guide signs shall not be used to depict a downstream split of an exit
48 ramp on a sign located on the mainline.

49 Support:

50 Specific guidelines for more detailed design of Overhead Arrow-per-Lane guide signs are contained in the
51 “Standard Highway Signs and Markings” book (see Section 1A.11).

52 Option:

53 Where extra emphasis of an especially low advisory ramp speed is needed, an EXIT XX MPH (E13-2)
54 sign panel (see Figure 2E-27) may be placed below the applicable destination legend to supplement, but not to
55 replace, the exit or ramp advisory speed warning signs.

1 **Section ~~2E.19~~ 2E.22 Design of Freeway and Expressway Diagrammatic Guide Signs for**
2 **Option Lanes**

3 Support:

4 Diagrammatic guide signs (see Figure 2E-7) are guide signs that show a simplified graphic view of the
5 exit arrangement in relationship to the main highway. ~~While the use of such guide signs has been shown to be~~
6 ~~superior to conventional guide signs for some interchanges~~ might be helpful for the purpose of conveying
7 relative direction of each movement, Diagrammatic guide signs have been shown to be less effective than
8 conventional or Overhead Arrow-per-Lane guide signs at conveying the destination or direction(s) that each
9 approach lane serves, regardless of whether dedicated or option lanes are present.

10 **Standard:**

11 **Diagrammatic guide signs used where an option lane is present at a freeway or expressway split or**
12 **multi-lane exit shall be designed in accordance with the following criteria:**

- 13 **A. The graphic legend shall be of a plan view showing the off-ramp arrangement (~~see Figure 2E-3~~).**
- 14 **B. No other symbols or route shields shall be used as a substitute for arrowheads.**
- 15 **C. They shall not be installed at the Exit Direction sign location (see Section 2E.36).**
- 16 **D. The EXIT ONLY sign panel shall not be used on diagrammatic guide signs ~~at any major split in~~**
17 **advance of the interchange.**
- 18 **E. For numbered exits, the Exit Number (E1-5P) or Left Exit Number (E1-5bP) plaque shall be**
19 **used at the top of the sign in accordance with Section 2E.31. For unnumbered left exits, the**
20 **LEFT (E1-5aP) plaque shall be used at the top left edge of the sign.**
- 21 **F. The EXIT ONLY (E11-1e or E11-1f) sign panels shall be used on the Exit Direction sign at the**
22 **theoretical gore, except at splits of two overlapping routes where neither of the routes is**
23 **designated as an exit.**

24 Guidance:

25 Diagrammatic guide signs used on freeways and expressways should be designed in accordance with the
26 following additional criteria:

- 27 A. The graphic should not depict deceleration lanes.
- 28 B. No more than one destination should be ~~shown~~ displayed for each arrowhead movement, and no more
29 than two destinations should be ~~shown~~ displayed per sign.
- 30 ~~C. A black on yellow EXIT ONLY panel should be used to supplement a lane drop graphic.~~
- 31 C. The shaft arrowhead for the exit ramp diverging movement should be ~~shorter than, but not separated~~
32 ~~from, the through movement graphic~~ positioned lower on the sign than the arrowhead for the
33 movement that continues straight ahead, independent of which movement carries the through route
34 (see Figures 2E-8 and 2E-9). Where the movements are freeway or expressway splits rather than
35 exits, the shafts arrowheads should be equal in length positioned at approximately the same height on
36 the sign (see Figure 2E-10).
- 37 D. Arrow shafts should contain lane lines ~~where appropriate.~~
- 38 E. Route shields, cardinal directions, and destinations should be positioned on the sign such that they are
39 clearly related to the arrowhead(s), and the arrowhead for the off movement should point toward the
40 route shield for the off movement ~~to which they apply.~~
- 41 F. For exits or splits leading in a single direction, the cardinal direction should be placed adjacent to the
42 route shield, and the destination should be placed below ~~and justified with~~ the route shield and
43 cardinal direction.

44 ~~Diagrammatic signs should be used at the Advance Guide sign location(s) for the following:~~

- 45 ~~A. Left exits (see Figure 2E-3).~~
- 46 ~~B. Splits where the off-route movement is to the left (see Figure 2E-4).~~
- 47 ~~C. Optional lane splits for non-overlapping routes (see Figure 2E-5).~~
- 48 ~~D. Where a two-lane exit has an optional lane that carries the through route (see Figures 2E-6 and 2E-7).~~
49 ~~These interchanges create serious expectancy problems for drivers who are unfamiliar with the~~
50 ~~interchange.~~
- 51 ~~E. Left exit interchange lane drop situations. In this situation, an EXIT ONLY (E11-1e) panel should be~~
52 ~~used without a down arrow for Advance Guide signs (see Figure 2E-8).~~

53 **Standard:**

1 ~~Diagrammatic guide signs have been shown to be inferior to conventional signs~~ shall not be used at
2 cloverleaf interchanges ~~and shall not be used at these locations,~~ for the purpose of depicting successive
3 departures from the mainline or separate downstream departures from a collector-distributor roadway.
4 The use of Diagrammatic guide signs at cloverleaf interchanges shall be limited to the following cases:

- 5 A. Where the outer (non-loop) exit ramp of the cloverleaf is a multi-lane exit having an optional
6 exit lane that also carries the through route; and
7 B. At cloverleaf interchanges that include collector-distributor roadways, such as those illustrated
8 in Figure 2E-36, that are accessed from the mainline by a multi-lane exit having an optional exit
9 lane that also carries the through route. In this case, the Diagrammatic guide sign shall only
10 show the configuration of the lanes at the exit point to the collector-distributor roadway and not
11 the entire interchange configuration.

12 Support:

13 Specific guidelines for more detailed design of Diagrammatic guide signs are contained in the “Standard
14 Highway Signs and Markings” book (see Section 1A.11).

15 Option:

16 Where extra emphasis of an especially low advisory ramp speed is needed, an EXIT XX MPH (E13-2)
17 sign panel (see Figure 2E-27) may be placed below the applicable destination legend to supplement, but not to
18 replace, the exit or ramp advisory speed warning signs.

19 Section 2E.23 Signing for Intermediate and Minor Interchange Multi-Lane Exits with an 20 Option Lane

21 Support:

22 Intermediate and minor multi-lane exits might have an operational need for the presence of an option lane
23 for only the peak period during which excessive queues might otherwise develop if the option lane were not
24 available. In such cases, the Overhead Arrow-per-Lane or Diagrammatic guide signing described for option
25 lanes in Sections 2E.21 and 2E.22 might not be practical, depending on the level of use of the option lane and
26 the spacing of nearby interchanges, particularly in non-rural areas.

27 Guidance:

28 Signing for an intermediate or minor interchange that has a multi-lane exit with an option lane that also
29 carries the through route should use the same basic principles as those for a conventional exit. In such cases,
30 the option lane is not signed on the Advance Guide signs. For such exits that involve the addition of an
31 auxiliary lane that is not present at the Advance Guide sign locations, but do not involve a lane drop (see
32 Figure 2E-12), a sequence of post-mounted or overhead-mounted Advance Guide signs should be used,
33 located in accordance with the interchange classification (see Section 2E.32). The Exit Direction sign should
34 be located at the theoretical gore and display a diagonally upward-pointing directional arrow above each lane
35 that departs from the mainline alignment. The Exit Direction sign should not contain the EXIT ONLY legend.

36 For such interchanges that also have a lane drop (see Figure 2E-11), the Advance Guide and Exit
37 Direction signs should follow the provisions of Section 2E.24. The Exit Direction sign should be located at
38 the theoretical gore and should contain the EXIT ONLY (E11-1e) sign panel.

39 The presence of the option lane should be conveyed by the use of post-mounted lane-use (R3-8 Series)
40 signs (see Section 2B.22). When used, the R3-8 signs should be of an appropriate size for their application to
41 optimize their conspicuity. The signs should be located in succession with the Advance Guide signs, where
42 the option and exit lanes have developed (see Figure 2E-11). In cases where the exiting lane or lanes have not
43 developed and the option lane is created by the addition of an auxiliary lane that exits, the R3-8 signs should
44 be located only adjacent to where the lanes have been fully developed and not in advance of the lane or along
45 its transition (see Figure 2E-12).

46 Support:

47 The use of a down arrow on overhead freeway or expressway guide signs has been shown to be
48 misinterpreted by road users as an indication of a dedicated lane.

49 Standard:

50 Advance Guide signs that are mounted overhead shall not display a down arrow over an option
51 lane.

52 Section ~~2E.20~~ 2E.24 Signing for Interchange Lane Drops

1 **Standard:**

2 The provisions of this Section shall only apply to lane drops at exits that do not have an optional
3 exit lane. At exits that have an optional exit lane in addition to the dropped lane, the provisions of
4 Sections 2E.20 through 2E.23 shall apply.

5 Major guide signs for all lane drops at interchanges shall be mounted overhead. An EXIT ONLY
6 sign panel shall be used for all interchange lane drops at which the through route is carried on the
7 mainline.

8 ~~Guidance:~~

9 Except on Overhead Arrow-per-Lane and Diagrammatic guide signs (See Sections 2E.20 through
10 2E.22), the EXIT ONLY (down arrow) (E11-1 or E11-1f) sign panel (see Figure 2E-13) should shall be
11 used on all signing of lane drops on all overhead Advance Guide signs for right exits (see Figures 2E-14
12 through 2E-16). For lane drops on the left side, diagrammatic signing with the EXIT ONLY (E11-1e)
13 panel (see Figure 2E-9) should be used without a down arrow for Advance Guide signs (see Figure 2E-
14 8). The number of arrows on each sign shall correspond to the number of dropped lanes at the location
15 of each sign. Placement of the down arrow shall comply with the provisions of Section 2E.19.

16 ~~Standard:~~

17 For lane drops, the Exit Direction sign (see Section 2E.36 and Figure 2E-26) and E11-1a panel (see
18 Figure 2E-9) shall be of the format shown in Figures 2E-15 and 2E-16 for all lane drops. The standard
19 slanted up arrow (left or right side) shall be included on the Exit Direction sign. The bottom portion of
20 the Exit Direction sign shall be yellow with a black border and shall include a diagonally upward-
21 pointing black directional arrow (left or right) for each lane dropped at the exit, with the sign designed
22 and placed so that each arrow is located over the approximate center of each lane being dropped. The
23 words EXIT and ONLY shall be positioned to the left and right, respectively, of the arrow on the E11-
24 1d sign panel for a single-lane drop. For a two-lane drop, the words EXIT ONLY shall be located
25 between the two arrows on the E11-1e sign panel. The number of arrows on the sign shall correspond
26 to the number of dropped lanes at the location of the sign.

27 Option:

28 EXIT ONLY messages of either the combination of E11-1a and E11-1b, or E11-1c formats may be used
29 to retrofit existing signing to warn of a lane drop situation ahead.

30 **Standard:**

31 If used ~~on~~ to retrofit an existing Advance Guide sign, the E11-1a and E11-1b sign panels (see Figure
32 2E-13) shall be placed on either side of a white down arrow. The E11-1c sign panel, if used ~~on~~ to
33 retrofit an existing ~~non~~diagrammatic sign, shall be placed between the lower destination message and
34 the white down arrow.

35 Guidance:

36 Except as provided in Paragraph 8 for an auxiliary lane, Advance Guide signs for lane drops within 1 mile
37 of the interchange should not contain the distance message.

38 Where the dropped lane is an auxiliary lane that is provided between successive entrance and exit ramps
39 of two separate interchanges and the distance between the two ramps is less than 1 mile, the first Advance
40 Guide sign in the sequence downstream from the entrance ramp should contain the distance message.

41 Wherever the dropped lane carries the through route, ~~diagrammatic~~ signs should be used without the
42 EXIT ONLY sign panel.

43 Support:

44 Sections 2E.20 through 2E.23 contain information on the signing of lane drops at exits that also have an
45 option lane.

46 Section 2B.23 contains information regarding regulatory signs that can also be used for freeway lane drop
47 situations and Section 2C.42 contains information regarding warning signs that can also be used for freeway
48 lane drop situations.

49 ~~Section 2E.21—Changeable Message Signs~~ the text from this Section has been relocated to Chapter 2L

50 **Section ~~2E.22~~ 2E.25 Overhead Sign Installations**

51 Support:

1 Specifications for the design and construction of structural supports for ~~highway~~ signs have been
2 standardized by the American Association of State Highway and Transportation Officials (AASHTO).
3 Overcrossing structures can often serve for the support of overhead signs, and might in some cases be the only
4 practical location that will provide adequate viewing distance. Use of these structures as sign supports will
5 eliminate the need for additional sign supports along the roadside. Factors justifying the installation of
6 overhead signs are given in Section 2A.17. Vertical clearance of overhead signs is discussed in Section
7 2A.18.

8 **Section ~~2E.23~~ 2E.26 Lateral Offset**

9 **Standard:**

10 The minimum lateral ~~clearance~~ offset outside the usable roadway shoulder for ~~ground-~~ post-
11 mounted freeway and expressway signs or for overhead sign supports, either to the right-hand or left-
12 hand side of the roadway, shall be 6 feet. This minimum clearance shall also apply outside of a ~~barrier~~
13 ~~curb~~. If located within the clear zone, the signs shall be mounted on crashworthy supports or shielded
14 by appropriate crashworthy barriers.

15 **Guidance:**

16 Where practical, a sign should not be less than 10 feet from the edge of the nearest traffic lane. Large
17 guide signs especially should be farther removed, preferably 30 feet or more from the nearest traffic lane.

18 Where an expressway median is 12 feet or less in width, consideration should be given to spanning both
19 roadways without a center support.

20 Where overhead sign supports cannot be placed ~~a reasonably safe distance~~ sufficiently far away from the
21 line of traffic or in an otherwise protected site, they should either be designed to minimize the impact forces,
22 or be adequately shielded by a ~~physical~~ traffic barrier ~~or guardrail~~ of suitable design.

23 **Standard:**

24 **Butterfly-type sign supports and other overhead non-crashworthy sign supports shall not be**
25 **installed in gores or other ~~unprotected~~ unshielded locations within the clear zone.**

26 **Option:**

27 Lesser clearances, but not generally less than 6 feet, may be used on connecting roadways or ramps at
28 interchanges.

29 ~~Section 2E.24 Guide Sign Classification~~ relocated to Section 2E.03

30 **Section ~~2E.25~~ 2E.27 Route Signs and Trailblazer Assemblies**

31 **Standard:**

32 **The official Route sign for the Interstate Highway System shall be the red, white, and blue**
33 **retroreflective distinctive shield adopted by the American Association of State Highway and**
34 **Transportation Officials (see Section 2D.11).**

35 **Guidance:**

36 Route signs (see Figure 2E-17) should be incorporated as cut-out shields or other distinctive shapes on
37 large directional guide signs. Where the Interstate shield is displayed in an assembly or on the face of a guide
38 sign with U.S. or State Route signs, the Interstate numeral should be at least equal in size to the numerals on
39 the other Route signs. The use of independent Route signs should be limited primarily to route confirmation
40 assemblies.

41 Route signs and auxiliary signs showing junctions and turns should be used for guidance on approach
42 roads, for route confirmation just beyond entrances and exits, and for reassurance along the freeway or
43 expressway. When used along the freeway or expressway, the Route signs should be enlarged to a 36 x 36-
44 inch minimum size for routes with one or two digits and to a 45 x 36-inch minimum size for routes with three
45 digits as shown in the “Standard Highway Signs and Markings” book (see Section 1A.11). When
46 independently mounted Route signs are used in place of Pull-Through signs, they should be located just
47 beyond the exit.

48 **Option:**

49 The standard Trailblazer Assembly (see Section 2D.35) may be used on roads leading to the freeway or
50 expressway. Component ~~parts~~ messages of the Trailblazer Assembly may be included on a single sign ~~panel~~

1 [in accordance with the provisions of Section 2D.12](#). Independently mounted Route signs may be used instead
2 of Pull-Through signs ([see Section 2E.12](#)) as confirmation information (~~[see Section 2E.11](#)~~).

3 **Support:**

4 [Section 2H.07 contains information regarding the design of signs for Auto Tour Routes.](#)

5 **Option:**

6 The commonly used name or trailblazer ~~symbol~~ [route sign](#) for a toll ~~facility~~ [highway](#) (see Chapter 2F)
7 may be displayed on non-toll sections of the Interstate Highway System at:

- 8 A. The last exit before entering a toll section of the Interstate Highway System;
9 B. The interchange or connection with a toll ~~facility~~ [highway](#), whether or not the toll ~~facility~~ [highway](#) is
10 a part of the Interstate Highway System; and
11 C. Other locations within a reasonable approach distance of toll ~~facilities~~ [highways](#) when the name or
12 trailblazer symbol for the toll ~~facility~~ [highway](#) would provide better guidance to road users unfamiliar
13 with the area than would place names and route numbers.

14 The toll ~~facility~~ [highway](#) name or ~~symbol~~ [route sign](#) may be included as a part of the guide sign
15 installations on intersecting highways and approach roads to indicate the interchange with a toll section of an
16 Interstate route. Where needed for the proper direction of traffic, a trailblazer for a toll ~~facility~~ [highway](#) that is
17 part of the Interstate Highway System may be displayed with the Interstate Trailblazer Assembly.

18 **Support:**

19 [Chapter 2F contains additional information regarding signing for toll highways.](#)

20 **Section 2E.28 Eisenhower Interstate System Signs (M1-10, M1-10a)**

21 **Option:**

22 [The Eisenhower Interstate System \(M1-10 and M1-10a\) signs \(see Figure 2E-18\) may be used on](#)
23 [Interstate highways at periodic intervals and in rest areas, scenic overlooks, or other similar roadside facilities](#)
24 [on the Interstate Highway System.](#)

25 **Guidance:**

26 [If used, the M1-10a sign should be used only in rest areas or other similar facilities where the sign can be](#)
27 [viewed by occupants of parked vehicles or by pedestrians. The M1-10a sign should not be installed on](#)
28 [Interstate highway mainlines, ramps, or other roadways where it can be viewed by vehicular traffic.](#)

29 **Standard:**

30 **The M1-10 and M1-10a signs shall not be used as part of a Junction, Advance Route Turn,**
31 **Directional, or Trailblazer Assembly or as part of a guide sign or similar assembly providing direction**
32 **to a route or destination.**

33 **Section ~~2E.26~~ 2E.29 Signs for Intersections at Grade**

34 **Guidance:**

35 If there are intersections at grade within the limits of an expressway, guide sign types ~~specified~~ [provided](#)
36 in Chapter 2D should be used. However, such signs should be of a size compatible with the size of other
37 signing on the expressway.

38 **Option:**

39 Advance Guide signs for intersections at grade may take the form of diagrammatic layouts depicting the
40 geometrics of the intersection along with essential directional information.

41 **Section ~~2E.27~~ 2E.30 Interchange Guide Signs**

42 **Standard:**

43 **The signs at interchanges and on their approaches shall include Advance Guide signs and Exit**
44 **Direction signs. Consistent destination messages shall be displayed on these signs.**

45 **Guidance:**

46 New destination information should not be introduced into the major sign sequence for one interchange,
47 nor should destination information be dropped.

1 Reference should be made to Section 2E.11 and Sections 2E.33 through 2E.42 for a detailed description
2 of the signs in the order that they should appear at the approach to and beyond each interchange. Guide signs
3 placed in advance of an interchange deceleration lane should be spaced at least 800 feet apart.

4 Supplemental guide signing should be used sparingly as provided in Section 2E.35.

5 **Section ~~2E.28~~ 2E.31 Interchange Exit Numbering**

6 Support:

7 Interchange exit numbering provides valuable orientation for the road user on a freeway or expressway.
8 The feasibility of numbering interchanges or exits on an expressway will depend largely on the extent to
9 which grade separations are provided. Where there is appreciable continuity of interchange facilities,
10 interrupted only by an occasional intersection at grade, the numbering will be helpful to the expressway user.

11 **Standard:**

12 **Interchange numbering shall be used in signing each freeway interchange exit. Interchange exit**
13 **numbers shall be displayed with each Advance Guide sign, Exit Direction sign, and Exit Gore sign. The**
14 **exit number shall be displayed on a separate plaque at the top of the Advance Guide or Exit Direction**
15 **sign. The ~~standard~~ exit number (E1-5P) plaque (see Figure 2E-22) shall be 30 inches in height and shall**
16 **~~include the word EXIT, and the appropriate exit number, and the suffix letter (on multi-exit~~**
17 **~~interchanges) separated from the exit number by a space in a single-line format on a plaque 30 inches in~~**
18 **~~height. Suffix letters shall be used for exit numbering at a multi-exit interchange. The suffix letter shall~~**
19 **also be included on the exit number plaque and shall be separated from the exit number by a space**
20 **having a width of between 1/2 and 3/4 of the height of the suffix letter. Exit numbers shall not include**
21 **the cardinal initials corresponding to the directions of the cross route. Minimum numeral and letter**
22 **sizes are given in Tables 2E-2 through 2E-5. If used, the interchange numbering system for**
23 **expressways shall ~~conform to~~ comply with the provisions prescribed for freeways.**

24 **At a multi-exit interchange where suffix letters are used for exit numbering, an exit of the same**
25 **number without a suffix letter shall not be used on the same route in the same direction. For example,**
26 **if an exit is designated as EXIT 256 A, then there shall not be an exit designated as EXIT 256 on the**
27 **same route in the same direction.**

28 **Option:**

29 **~~There are two approaches to~~ Interchange exit numbering ~~that the State and local highway agencies~~**
30 **~~may shall use: (1) the reference location sign exit numbering method, or (2) The consecutive exit~~**
31 **~~numbering method shall not be used.~~**

32 Support:

33 Reference location sign exit numbering ~~is preferred over consecutive exit numbering for two reasons: (1)~~
34 ~~if new interchanges are added to a route, the highway agencies do not have to change the numbering~~
35 ~~sequence; and (2) reference location sign numbering assists road users in determining their destination~~
36 ~~distances and travel mileage, and assists highway agencies because the exit numbering sequence does not have~~
37 ~~to be changed if new interchanges are added to a route.~~

38 **Option:**

39 Exit numbers may also be used with Supplemental Guide signs and ~~Road User~~ Motorist Service signs.

40 Guidance:

41 Exit number (E1-5P) plaques should be ~~located~~ added ~~to ward~~ the top ~~left edge of the sign for a left exit~~
42 ~~and toward the top~~ right-hand edge ~~of the sign~~ for ~~right exits~~ an exit to the right.

43 **Standard:**

44 **Because road users might not expect a left an exit to the left and might have difficulty in**
45 **maneuvering to the left, ~~the word LEFT should be added to the~~ a left exit number (E1-5bP) plaque (see**
46 **Figure 2E-22) shall be added to the top left-hand edge of the sign for all left-hand exits (see Figures 2E-**
47 **14 and 2E-15). ~~Where a left exit is not numbered (no exit number plaque), a plaque with the word~~**
48 **~~LEFT should be added to the top left edge of the sign. The portion of the exit number plaque~~**
49 **~~containing the word LEFT on the E1-5bP plaque may shall have be~~ a black legend ~~and border~~ on a**
50 **yellow rectangular background sign panel and shall be centered above the word EXIT.** the last sentence
51 was formerly an Option paragraph

52 Support:

1 Example exit number plaque designs are shown in Figures ~~2E-3 and~~ 2E-22. Figures ~~2E-1, 2E-20, 2E-23,~~
2 ~~2E-27 through 2E-32, and 2E-42~~ 2E-3, 2E-7, 2E-22, 2E-26, and 2E-27 illustrate the incorporation of exit
3 number plaques on guide signs.

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

11 Standard:

12 ~~Where~~ Regardless of whether a mainline route originates within a State or crosses into a State from
13 another State, the southernmost or westernmost terminus within that State shall be the beginning point
14 for interchange numbering. ~~If a loop, spur, or circumferential route crosses State boundaries, the~~
15 ~~sequence of numbering shall be coordinated by the States to provide continuous numbering.~~ relocated to
16 three paragraphs below to increase continuity

17 For circumferential routes, ~~the~~ interchange numbering ~~of interchanges~~ shall be in a clockwise
18 direction. The numbering shall begin with the first interchange west of the south end of an imaginary
19 north-south line bisecting the circumferential route, at a radial freeway or other Interstate route, or
20 some other conspicuous landmark in the circumferential route near a south polar location (see Figure
21 2E-19).

22 The interchange numbers on loop routes shall begin at the loop interchange nearest the south or
23 west mainline junction and increase in magnitude toward the north or east mainline junction (see
24 Figure 2E-20).

25 Spur route interchanges shall be numbered in ascending order starting at the interchange where the
26 spur leaves the mainline ~~of the principal~~ route (see Figure 2E-20).

27 If a circumferential, loop, or spur route crosses State boundaries, the numbering sequence shall be
28 coordinated by the States to provide continuous interchange numbering. relocated from three paragraphs
29 above to increase continuity

30 Where numbered routes overlap, continuity of interchange numbering shall be established for only
31 one of the routes (see Figure 2E-21). If one of the routes is an Interstate and the other route is not an
32 Interstate, the Interstate route shall maintain continuity of interchange numbering.

33 Guidance:

34 The route chosen for continuity of interchange numbering should also have reference location sign
35 continuity (see Figure 2E-21).

36 Section ~~2E.29~~ 2E.32 Interchange Classification

37 Support:

38 For signing purposes, interchanges are classified as major, intermediate, and minor. The minimum
39 alphabet sizes contained in Tables 2E-2 and 2E-4 are based on this classification. Descriptions of these
40 classifications are as follows:

- 41 A. Major interchanges are subdivided into two categories: (a) interchanges with other expressways or
42 freeways, or (b) interchanges with high-volume multi-lane highways, principal urban arterials, or
43 major rural routes where the volume of interchanging traffic is heavy or includes many road users
44 unfamiliar with the area.
- 45 B. Intermediate interchanges are those with urban and rural routes not in the category of major or minor
46 interchanges.
- 47 C. Minor interchanges include those where traffic is local and very light, such as interchanges with land
48 service access roads. Where the sum of exit volumes is estimated to be lower than 100 vehicles per
49 day in the design year, the interchange is classified as minor.

50 Section ~~2E.30~~ 2E.33 Advance Guide Signs

51 Support:

1 ~~The~~ An Advance Guide sign (see Figure 2E-22) gives notice well in advance of the exit point of the
2 principal destinations served by the next interchange and the distance to that interchange (~~see Figure 2E-15~~).

3 Guidance:

4 For major and intermediate interchanges (see Section 2E.32), Advance Guide signs should be placed at
5 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
6 the exit if spacing permits. At minor interchanges, only one Advance Guide sign should be used. It should be
7 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
8 ~~shown~~ displayed should be to the nearest 1/4 mile. ~~Fractions of kilometers or decimals of kilometers should~~
9 ~~not be used.~~ Fractions of a mile, rather than decimals, should be ~~shown~~ displayed in all cases.

10 Standard:

11 For numbered exits to the left, a left exit number (E1-5bP) plaque (see Figure 2E-22) shall be added
12 to the top left-hand edge of the sign.

13 For non-numbered exits to the left, a LEFT (E1-5aP) plaque (see Figure 2E-22) shall be added to
14 the top left-hand edge of the sign.

15 Support:

16 Section 2E.31 contains additional information regarding exit numbering.

17 Standard:

18 ~~Where~~ Advance Guide signs ~~are provided for a left exit,~~ for multi-lane exits having an optional exit
19 lane that also carries the through route (see Figures 2E-4, 2E-5, 2E-8, and 2E-9) and for splits with an
20 option lane (see Figures 2E-6 and 2E-10) shall be Overhead Arrow-per-Lane or diagrammatic signs
21 ~~should be used (see Figure 2E-3)~~ designed in accordance with Sections 2E.20 through 2E.22.

22 ~~Standard:~~

23 ~~When used~~ Except as provided in Section 2E.24, Advance Guide signs, if used, shall contain the
24 distance message. Except as provided in Paragraph 8 of this Section, the legend on the Advance Guide
25 signs shall be the same as the legend on the Exit Direction sign, except that the last line shall read EXIT
26 XX MILES. If the interchange has two or more exit roadways, the bottom line shall read EXITS XX
27 MILES.

28 Guidance:

29 Where interchange exit numbers are used, the word EXIT(S) ~~may~~ should be omitted from the bottom line.

30 Option:

31 Where the distance between interchanges is more than 1 mile, but less than 2 miles, the first Advance
32 Guide sign may be closer than 2 miles, but not placed so as to overlap the signing for the previous exit.
33 Duplicate Advance Guide signs or Interchange Sequence Series signs may be placed in the median on the
34 opposite side of the roadway and are not included in the minimum requirements of interchange signing.

35 Guidance:

36 Where there is less than 800 feet between interchanges, Interchange Sequence Series signs (see Section
37 2E.40) should be used instead of Advance Guide signs for the affected interchanges.

38 The Advance Guide signs for the last exit from a highway before it becomes a facility on which toll
39 payments are required should include the LAST EXIT BEFORE TOLL (W16-16P) plaque (see Section 2F.10
40 and Figure 2F-3). The plaque should be installed above the Advance Guide signs.

41 Option:

42 If there is insufficient space above the Advance Guide sign because of the presence of an exit number
43 plaque, the W16-16P plaque may be installed below the Advance Guide sign.

44 **Section ~~2E.31~~ 2E.34 Next Exit ~~Supplemental Signs~~ Plaques**

45 Option:

46 Where the distance to the next interchange is unusually long, a Next Exit ~~supplemental signs~~ plaque (see
47 Figure 2E-23) may be installed to inform road users of the distance to the next interchange (~~see Figure 2E-16~~).

48 Guidance:

49 The Next Exit ~~supplemental sign~~ plaque should not be used unless the distance between successive
50 interchanges is more than 5 miles.

1 **Standard:**

2 The Next Exit ~~supplemental sign~~ plaque shall carry the legend NEXT EXIT XX MILES. If the Next
3 Exit ~~supplemental sign~~ plaque is used, it shall be placed below the Advance Guide sign nearest the
4 interchange. It shall be mounted so as to not adversely affect the breakaway feature of the sign support
5 structure.

6 **Option:**

7 The legend for the Next Exit ~~supplemental sign~~ plaque may be displayed in either one or two lines as
8 shown in Figure 2E-23.

9 **Support:**

10 The one-line message on the Next Exit plaque is the more desirable choice unless the message causes the
11 sign to have a horizontal dimension greater than that of the Advance Guide sign.

12 **Section ~~2E.32~~ 2E.35 Other Supplemental Guide Signs**

13 **Support:**

14 Supplemental Guide signs can be used to provide information regarding destinations accessible from an
15 interchange, other than places ~~shown~~ displayed on the standard interchange signing. However, such
16 Supplemental Guide signing can reduce the effectiveness of other more important guide signing because of
17 the possibility of overloading the road user's capacity to receive visual messages and make appropriate
18 decisions. "The AASHTO Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators
19 Adjacent to Freeways" is incorporated by reference in this section (see Page i for AASHTO's address).

20 **Guidance:**

21 No more than one Supplemental Guide sign should be used on each interchange approach.

22 A Supplemental Guide sign (see Figure 2E-24) should not list more than two destinations. Destination
23 names should be followed by the interchange number (and suffix), or if interchanges are not numbered, by the
24 legend NEXT RIGHT or SECOND RIGHT or both, as appropriate. The Supplemental Guide sign should be
25 installed as an independent guide sign assembly.

26 Where two or more Advance Guide signs are used, the Supplemental Guide sign should be installed
27 approximately midway between two of the Advance Guide signs. If only one Advance Guide sign is used, the
28 Supplemental Guide sign should follow it by at least 800 feet. If the interchanges are numbered, the
29 interchange number should be used for the action message.

30 States and other agencies should adopt an appropriate policy for installing supplemental signs using "The
31 AASHTO Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to
32 Freeways." In developing policies for such signing, such items as population, amount of traffic generated,
33 distance from the route, and the significance of the destination should be taken into account.

34 **Standard:**

35 **Guide signs directing drivers to park ~~and~~ - ride facilities shall be considered as Supplemental Guide**
36 **signs (see Figures 2E-25 ~~and 2E-19~~).**

37 **Option:**

38 A pictograph (see definition in Section 1A.13) may be used on a Supplemental Guide sign in conjunction
39 with a destination that is associated with governmental agencies, military bases, universities, or other
40 government-approved institutions.

41 **Standard:**

42 The maximum dimension (height or width) of a pictograph shall not exceed two times the upper-case
43 letter height of the destination legend and shall not exceed the size of a route shield on the guide sign. If
44 used, the pictograph shall be located to the left of the destination legend it represents, except as
45 provided in Paragraph 9 for the park-ride Supplemental Guide sign.

46 When a transit pictograph is displayed on the park-ride Supplemental Guide sign, it shall be located
47 on the same line as the carpool symbol, if used, above the word legend.

48 A pictograph representing a State, county, or municipal corporation or other incorporated or
49 unincorporated community shall not be displayed on a Supplemental Guide sign.

50 Pictographs shall otherwise comply with the provisions of Section 2A.06.

1 **Section ~~2E.33~~ 2E.36 Exit Direction Signs**

2 Support:

3 The Exit Direction sign (see Figure 2E-26) repeats the route and destination information that was ~~shown~~
4 displayed on the Advance Guide sign(s) for the next exit, and thereby assures road users of the destination
5 served and indicates whether they exit to the right or ~~the~~ left for that destination.

6 **Standard:**

7 **Exit Direction signs (~~see Figure 2E-20~~) shall be used at major and intermediate interchanges.**
8 **Populations ~~figures~~ or other similar information shall not be ~~used~~ displayed on Exit Direction signs.**

9 Guidance:

10 Exit Direction signs should be used at minor interchanges.

11 ~~Ground- Post-~~mounted Exit Direction signs should be installed at the beginning of the deceleration lane. If
12 there is less than 300 feet from the ~~beginning~~ upstream end of the deceleration lane to the theoretical gore (see
13 Figure 3B-8), the Exit Direction sign should be installed overhead over the exiting lane in the vicinity of the
14 theoretical gore.

15 **Standard:**

16 Except where Overhead Arrow-per-Lane guide signs are used (see Section 2E.21 and Paragraph 6
17 of this Section), where a through lane is being terminated (dropped) at an exit, the Exit Direction sign
18 shall be placed overhead at the theoretical gore (see Figures 2E-8 through 2E-11, and 2E-14 through
19 2E-16).

20 Except as provided in Paragraph 4 in Section 2E.21, where Overhead Arrow-per-Lane guide signs
21 are used for the Advance Guide sign(s) for a multi-lane exit having an optional exit lane that also
22 carries the through route or for a split with an option lane (see Section 2E.21), an Overhead Arrow-per-
23 Lane guide sign shall also be used instead of the Exit Direction sign. This Overhead Arrow-per-Lane
24 guide sign shall include the appropriate exit number (E1-5P or E1-5bP) plaque (if a numbered exit) and
25 it shall be located near, but not downstream from, the point where the outside edge of the dropped lane
26 begins to diverge from the mainline (see Figures 2E-4 through 2E-6).

27 The following provisions shall govern the design and application of ~~the~~ overhead Exit Direction
28 signs:

- 29 A. The sign shall carry the exit number (if exit numbering is used), the route number, cardinal
30 direction, and destination, as applicable, with an ~~appropriate~~ diagonally upward-pointing
31 ~~slanting~~ directional arrow (see Figure 2E-26).
- 32 B. The message EXIT ONLY in black on a yellow sign panel (E11-1d or E11-1e) shall be used on
33 the overhead Exit Direction sign to advise road users of a lane drop situation (see Figures 2E-8
34 through 2E-11). The sign shall ~~conform to~~ comply with the provisions of Section 2E.24.
- 35 ~~C. Diagrammatic signs shall not be employed at the exit direction location.~~

36 Guidance:

37 For numbered exits to the right, an exit number (E1-5P) plaque (see Figure 2E-22) should be ~~located~~
38 added to ~~ward the left edge of the sign for a left exit and toward the top~~ right-hand edge of the sign ~~for right~~
39 ~~exits.~~

40 **Standard:**

41 For numbered exits to the left, a left exit number (E1-5bP) plaque (see Figure 2E-22) shall be added
42 to the top left-hand edge of the sign.

43 For non-numbered exits to the left, a LEFT (E1-5aP) plaque (see Figure 2E-22) shall be added to
44 the top left-hand edge of the sign.

45 **Support:**

46 Section 2E.31 contains additional information regarding exit numbering.

47 **Option:**

48 In some cases, principally in urban areas, where restricted sight distance because of structures or unusual
49 alignment make it impossible to locate the Exit Direction sign without violating the required minimum
50 spacing (see Section 2E.33) between major guide signs, Interchange Sequence signs (see Section 2E.40) may
51 be substituted for an Advance Guide sign.

52 **Guidance:**

1 At multi-exit interchanges, the Exit Direction sign should be located directly over the exiting lane for the
2 first exit. At the same location, and normally over the right-hand through lane, an Advance Guide sign for the
3 second exit should be located. Only for those conditions where the through movement is not evident should a
4 confirmatory message (Pull-Through sign as shown in Figure 2E-2) be used over the left lane(s) to guide road
5 users traveling through an interchange. In the interest of sign spreading, three signs on one structure should
6 not be used. When the freeway or expressway is on an overpass, the Exit Direction sign should be installed
7 on an overhead support over the exit lane in advance of the gore point.

8 Option:

9 If the second exit is beyond an underpass, the Exit Direction sign may be mounted on the face of the
10 overhead structure.

11 Where extra emphasis of an especially low advisory ramp speed is needed, an EXIT XX MPH (E13-2)
12 sign panel (see Figure 2E-27) may be placed at the bottom of the Exit Direction sign to supplement, but not to
13 replace, the exit or ramp advisory speed warning signs.

14 Guidance:

15 At the last exit from a highway before it becomes a facility on which toll payments are required, the
16 LAST EXIT BEFORE TOLL (W16-16P) plaque (see Section 2F.10 and Figure 2F-3) should be installed
17 above the Exit Direction sign.

18 Option:

19 If there is insufficient space above the Exit Direction sign because of the presence of an Exit Number (E1-
20 5P) plaque, the W16-16P plaque may be mounted below the Exit Direction sign.

21 **Section ~~2E.34~~ 2E.37 Exit Gore Signs (E5-1 Series)**

22 Support:

23 The Exit Gore (E5-1 or E5-1a) sign (see Figure 2E-28) in the gore indicates the exiting point or the place
24 of departure from the main roadway. Consistent application of this sign at each exit is important.

25 **Standard:**

26 **The gore shall be defined as the area located between the main roadway and the ramp just beyond**
27 **where the ramp branches from the main roadway. The Exit Gore sign shall be located in the gore and**
28 **shall carry the word EXIT or EXIT XX (if interchange numbering is used) and an appropriate upward**
29 **slanting arrow (see Figure 2E-21). If suffix letters are used for exit numbering at a multi-exit**
30 **interchange, the suffix letter shall also be included on the Exit Gore sign and shall be separated from**
31 **the exit number by a space having a width of between 1/2 and 3/4 of the height of the suffix letter.**
32 **Breakaway or yielding supports shall be used.**

33 Guidance:

34 The arrow should be aligned to approximate the angle of departure. Each gore should be treated similarly,
35 whether the interchange has one exit roadway or multiple exits.

36 Option:

37 Where extra emphasis of an especially low advisory ramp speed is needed, an E13-1P ~~panel~~ plaque
38 indicating the advisory speed may be mounted below the Exit Gore sign (see Figure 2E-28) to supplement, but
39 not to replace, the exit or ramp advisory speed warning signs.

40 To improve the visibility of the gore for exiting drivers, a Type 1 object marker (see Chapter 2C) may be
41 installed on each sign support below the Exit Gore sign.

42 An Exit Number (E5-1bP) plaque (see Figure 2E-22) may be installed above an existing Exit Gore (E5-1)
43 sign when a non-numbered exit is converted to a numbered exit.

44 **Standard:**

45 **An Exit Gore (E5-1a) sign shall be used when the replacement of an existing assembly of an E5-1**
46 **sign and an E5-1bP plaque becomes necessary.**

47 Option:

48 The Narrow Exit Gore (E5-1c) sign may be used in gore areas of limited width where the width of the
49 Exit Gore (E5-1a) sign would not permit sufficient lateral offset (see Section 2A.19), such as for ramp
50 departures that are nearly parallel to the mainline roadway where the Exit Gore sign would be mounted on a

1 [narrow island or barrier. Where the E5-1c sign is mounted at a height of 14 feet or more from the roadway,](#)
2 [the directional arrow may point diagonally downward.](#)

3 Guidance:

4 [The E5-1c should not be used in gore areas where an E5-1a sign could be installed with sufficient lateral](#)
5 [offset.](#)

6 **Section ~~2E.35~~ 2E.38 Post-Interchange Signs**

7 Guidance:

8 If space between interchanges permits, as in rural areas, and where undue repetition of messages will not
9 occur, a fixed sequence of signs should be displayed beginning 500 feet beyond the [downstream](#) end of the
10 acceleration lane. At this point a Route sign assembly should be installed followed by a Speed Limit sign and
11 a Distance sign, each at a spacing of 1,000 feet.

12 If space between interchanges does not permit placement of these three post-interchange signs without
13 encroaching on or overlapping the Advance Guide signs necessary for the next interchange, or in rural areas
14 where the interchanging traffic is primarily local, one or more of the post-interchange signs should be omitted.

15 Option:

16 Usually the Distance sign will be of less importance than the other two signs and may be omitted,
17 especially if Interchange Sequence signs are used. If the sign for through traffic on an overhead assembly
18 already contains the route sign, the post-interchange route sign assembly may also be omitted.

19 **Section ~~2E.36~~ 2E.39 Post-Interchange Distance Signs**

20 Standard:

21 **If used, the Post-Interchange Distance sign shall consist of a two- or three-line sign carrying the**
22 **names of significant destination points and the distances to those points. The top line of the sign shall**
23 **identify the next meaningful interchange with the name of the community near or through which the**
24 **route passes, or if there is no community, the route number or name of the intersected highway (see**
25 **Figure 2E-29).**

26 Support:

27 The minimum sizes of the route shields identifying a significant destination point are prescribed in Tables
28 [2E-1 through 2E-3](#) and 2E-5.

29 Option:

30 The text identification of a route may be ~~shown~~ [displayed](#) instead of a route shield, such as “US XX,”
31 “State Route XX,” or “County Route XX.”

32 Guidance:

33 If a second line is used, it should be reserved for communities of general interest that are located on or
34 immediately adjacent to the route or for major traffic generators along the route.

35 Option:

36 The choice of names for the second line, if it is used, may be varied on successive Distance signs to give
37 road users maximum information concerning communities served by the route.

38 Standard:

39 **The third, or bottom line, shall contain the name and distance to a control city (if any) that has**
40 **national significance for travelers using the route.**

41 Guidance:

42 Distances to the same destinations should not be shown more frequently than at 5-mile intervals. The
43 distances displayed on these signs should be the actual distance to the destination points and not to the exit
44 from the freeway or expressway. [The distance displayed for each community should comply with the](#)
45 [provisions of Section 2D.41.](#)

46 **Section ~~2E.37~~ 2E.40 Interchange Sequence Signs**

47 Option:

48 If interchanges are closely spaced, particularly through large urban areas, so that guide signs cannot be
49 adequately spaced, Interchange Sequence signs identifying the next two or three interchanges may be used.

1 Guidance:

2 If used, Interchange Sequence signs should be used over the entire length of a route in an urban area.
3 [Except as provided in Paragraph 3](#), they should not be used on a single interchange basis.

4 If there is less than 800 feet between interchanges, Interchange Sequence signs should be used instead of
5 the Advance Guide signs for the affected interchanges.

6 Support:

7 Interchange Sequence signs are generally supplemental to Advance Guide signs. Signing of this type is
8 illustrated in Figures 2E-30 and 2E-31, and is compatible with the sign spreading concept [described in](#)
9 [Paragraph 3 of Section 2E.11](#).

10 These signs are installed in a series and display the next two or three interchanges by name or route
11 number with distances to the nearest 1/4 mile.

12 **Standard:**

13 **If used, the first sign in the series shall be located in advance of the first Advance Guide sign for the**
14 **first interchange.**

15 **Where the exit direction is to the left, a LEFT (E11-2) sign panel (see Figure 2E-13) shall be**
16 **displayed on the same line immediately to the right of the interchange names or route numbers** ~~shown~~
17 ~~on such signs shall be followed by the legend LEFT or LEFT EXIT in black letters on a yellow~~
18 ~~rectangular background.~~

19 **Interchange Sequence signs shall not be substituted for Exit Direction signs.**

20 Guidance:

21 Interchange Sequence signs should be located in the median. After the first of the series, Interchange
22 Sequence signs should be placed approximately midway between interchanges.

23 **Standard:**

24 **Interchange Sequence signs located in the median shall be installed at overhead sign height (see**
25 **[Section 2A.18](#)).**

26 Option:

27 Interchange numbers may be ~~shown~~ [displayed](#) to the left of the interchange name or route number.

28 **Section ~~2E.38~~ [2E.41](#) Community Interchanges Identification Signs**

29 Support:

30 For suburban or rural communities served by two or three interchanges, Community Interchanges
31 Identification signs are useful (see Figure 2E-32).

32 Guidance:

33 In these cases, the name of the community followed by the word EXITS should be ~~shown~~ [displayed](#) on
34 the top line; the lines below should display the destination, road name or route number, and the corresponding
35 distances to the nearest 1/4 mile.

36 The sign should be located in advance of the first Advance Guide sign for the first interchange within the
37 community.

38 Option:

39 If interchanges are not conveniently identifiable or if there are more than three interchanges to be
40 identified, the NEXT [XX](#) EXITS sign (see Section 2E.42) may be used.

41 **Section ~~2E.39~~ [2E.42](#) NEXT [XX](#) EXITS Sign**

42 Support:

43 Many freeways or expressways pass through historical or recreational regions, or urban areas served by a
44 succession of several interchanges.

45 Option:

46 Such regions or areas may be indicated by a NEXT [XX](#) EXITS sign (see Figure 2E-33) located in advance
47 of the Advance Guide sign or signs for the first interchange.

48 Guidance:

49 The sign legend should identify the region or area followed by the words NEXT [XX](#) EXITS.

1 **Section ~~2E.40~~ 2E.43 Signing by Type of Interchange**

2 Support:

3 Road users need signs to help identify the location of the exit, as well as to obtain route, direction, and
4 destination information for specific exit ramps. Figures 2E-34 through 2E-40 show examples of guide signs
5 for common types of interchanges. The interchange layouts shown in most of the figures illustrate only the
6 major guide signs for one direction of traffic on the ~~through road~~ freeway and on the ~~crossroad~~ exit ramps.
7 Section 2D.45 contains information regarding the signing of the crossroad approaches and connecting
8 roadways to freeways and expressways.

9 **Standard:**

10 **Interchange guide signing shall be consistent for each type of interchange along a route.**

11 Guidance:

12 The signing layout for all interchanges having only one exit ramp in the direction of travel should be
13 similar, regardless of the interchange type (~~see Figures 2E-8, 2E-10, and Figures 2E-27 through 2E-32~~). For
14 the sake of uniform application, the significant features of the signing plan for each of the more frequent kinds
15 of interchanges (illustrated in Figures 2E-34 through 2E-40) should be followed as closely as possible. Even
16 when unusual geometric features exist, variations in signing layout should be held to a minimum.

17 **Section ~~2E.41~~ 2E.44 Freeway-to-Freeway Interchange**

18 Support:

19 Freeway-to-freeway interchanges are major decision points where the effect of taking a wrong ramp
20 cannot be easily corrected. Reversing direction on the connecting freeway or reentering to continue on the
21 intended course is usually not possible. Figure 2E-34 shows examples of guide signs at a freeway-to-freeway
22 interchange.

23 Guidance:

24 The sign messages should contain only the route shield, cardinal direction, and the name of the next
25 control city on the route. Arrows should point as indicated in Section 2D.08, ~~unless~~ except where Overhead
26 Arrow-per-Lane or a Diagrammatic representation of the interchange layout requires otherwise signs are used
27 in accordance with the provisions of Sections 2E.20 through 2E.22.

28 Support:

29 At splits where the off-route movement is to the left or where there is an optional lane split, expectancy
30 problems usually result, ~~and diagrammatic signs should be used at the Advance Guide sign location.~~

31 **Standard:**

32 At splits where the off-route movement is to the left, the Left Exit Number (E1-5bP) plaque shall be
33 added at the top left-hand edge of the guide sign (see Section 2E.31). Overhead Arrow-per-Lane or
34 Diagrammatic guide signs (see Sections 2E.21 and 2E.22) also should shall be used at the Advance-
35 Guide sign locations for interchanges where two-lane exits with an optional lane carry the through-
36 route on the exiting lanes freeway splits with an option lane and for multi-lane freeway-to-freeway exits
37 having an option lane.

38 ~~Standard:~~

39 **Overhead signs shall be used at a distance of 1 mile and at the theoretical gore of each connecting**
40 **ramp. When Overhead Arrow-per-Lane or Diagrammatic guide signs are used, they shall ~~conform to~~**
41 **comply with the provisions of Sections 2E.21 and 2E.22.**

42 Option:

43 Overhead signs may also be used at the 1/2-mile and 2-mile ~~points~~ locations.

44 The arrow and/or the name of the control city may be omitted on signs that indicate the straight-ahead
45 continuation of a route on a Pull-Through sign (see Section 2E.12).

46 An Advisory Exit Speed sign may be used where an engineering study shows that it is necessary to
47 display a speed reduction message for ramp signing (see Section 2C.14).

48 Where extra emphasis of an especially low advisory ramp speed is needed, an EXIT XX MPH (E13-2)
49 sign panel (see Figure 2E-27) may be placed at the bottom of the Exit Direction sign to supplement, but not to
50 replace, the exit or ramp advisory speed warning signs.

1 **Section ~~2E.42~~ 2E.45 Cloverleaf Interchange**

2 Support:

3 A cloverleaf interchange has two exits for each direction of travel. The exits are closely spaced and have
4 common Advance Guide signs. Examples of guide signs for cloverleaf interchanges are shown in Figure 2E-
5 35.

6 Guidance:

7 The Advance Guide signs should include two place names, one corresponding to each exit ramp, with the
8 name of the place served by the first exit on the upper line.

9 **Standard:**

10 An overhead guide sign shall be placed at the theoretical gore ~~point~~ of the first exit ramp, with an
11 diagonally upward-pointing ~~slanting~~ directional arrow on the Exit Direction sign for that exit and the
12 message XX MILES, or EXIT XX MILES if interchange numbering is not used, on the Advance Guide
13 sign for the second exit, as shown in Figure 2E-35. The second exit shall be indicated by an overhead
14 Exit Direction sign over the auxiliary lane. An Exit Gore sign shall also be used at each gore (see
15 Section 2E.37).

16 Interchanges with more than one exit from the main line shall be numbered as described in Section
17 2E.31 with an appropriate suffix.

18 Diagrammatic signs shall not be used for cloverleaf interchanges except as otherwise provided in
19 Section 2E.22.

20 Guidance:

21 ~~As shown in Figure 2E-28~~ Where the mainline passes under the crossroad and the exit roadway is located
22 beyond the overcrossing structure, the overhead Exit Direction sign for the second exit should be ~~mounted~~
23 placed either on the overcrossing structure ~~if the mainline passes under the crossroad and the exit roadway is~~
24 ~~located beyond the structure~~ (see Figure 2E-35) or on a separate structure located immediately in front of the
25 overcrossing structure.

26 **Section ~~2E.43~~ 2E.46 Cloverleaf Interchange with Collector-Distributor Roadways**

27 Support:

28 Examples of guide signs for full cloverleaf interchanges with collector-distributor roadways are shown in
29 Figure 2E-36.

30 Guidance:

31 Signing on the collector-distributor roadways should be the same as the signing on the mainline of a
32 cloverleaf interchange.

33 **Standard:**

34 **Guide signs at exits from the collector-distributor roadways shall be overhead and located at the**
35 **theoretical gore of the collector-distributor roadway and the exit ramp.**

36 Option:

37 Exits from the collector-distributor roadways may be numbered with an appropriate suffix. If the exits
38 from a collector-distributor roadway are numbered with suffixes, the Advance Guide signs on the mainline
39 may include two place names and their corresponding exit numbers with the plural EXITS. If only the exit
40 from the mainline is numbered or if interchange numbering is not used, the Advance Guide signs on the
41 mainline ~~or~~ may use the singular EXIT.

42 **Section ~~2E.44~~ 2E.47 Partial Cloverleaf Interchange**

43 Support:

44 Examples of guide signs for partial cloverleaf interchanges are shown in Figure 2E-37.

45 Guidance:

46 ~~As shown in Figure 2E-30~~ Where the mainline passes under the crossroad and the exit roadway is located
47 beyond the overcrossing structure, the overhead Exit Direction sign should be placed either on the
48 overcrossing structure ~~if the mainline passes under the crossroad and the exit roadway is located beyond the~~
49 ~~structure~~ (see Figure 2E-37) or on a separate structure located immediately in front of the overcrossing
50 structure.

1 **Standard:**

2 A ~~ground-~~ post-mounted Exit Gore sign shall also be installed in the ramp gore.

3 Support:

4 Partial cloverleaf interchanges with successive exit ramps from the same direction of travel are signed the
5 same as cloverleaf interchanges for that direction of travel (see Section 2E.45).

6 **Section ~~2E.45~~ 2E.48 Diamond Interchange**

7 Support:

8 Examples of guide signs for diamond interchanges are shown in Figure 2E-38.

9 **Standard:**

10 For numbered exits, the singular message EXIT shall be used on the Exit Number plaques (see
11 Section 2E.31) with the Advance Guide and Exit Direction signs. For non-numbered exits, the singular
12 message EXIT shall be used as part of the distance message on the Advance Guide signs. ~~Exit numbers~~
13 ~~shall not include the cardinal initials corresponding to the direction of the cross route.~~

14 Support:

15 The typical diamond interchange ramp departs from the mainline roadway such that a speed reduction
16 generally is not necessary in order for a driver to ~~reasonably safely~~ negotiate an exit maneuver from the
17 mainline onto the ramp roadway.

18 Guidance:

19 When a speed reduction is not necessary, an exit speed sign should not be used.

20 Option:

21 An Advisory Exit Speed sign may be used where an engineering study shows that it is necessary to
22 display a speed reduction message for ramp signing (see Section 2C.14).

23 Guidance:

24 The Advisory Exit Speed sign should be located along the deceleration lane or along the ramp such that it
25 is visible to the driver far enough in advance ~~so that a reasonably safe slowing and~~ to allow the driver to
26 decelerate before reaching the curve associated with the exiting maneuver ~~can be made.~~

27 Option:

28 A Stop Ahead or Signal Ahead warning sign may be placed, where engineering judgment indicates a
29 need, along the ramp in advance of the cross street, to give notice to the driver (see Section 2C.36).

30 Guidance:

31 When used on two-lane ramps, Stop Ahead or Signal Ahead signs should be used in pairs with one sign
32 on each side of the ramp.

33 **Section ~~2E.46~~ 2E.49 Diamond Interchange in Urban Area**

34 Support:

35 Examples of guide signs for diamond interchanges in an urban area are shown in Figure 2E-39. This
36 example includes the use of the Community Interchanges Identification sign (see Section 2E.41), which might
37 be useful if two or more interchanges serve the same community.

38 In urban areas, street names are often ~~shown~~ displayed as the principal message in destination signs.

39 Option:

40 If interchanges are too closely spaced to properly locate the Advance Guide signs, they may be placed
41 closer to the exit, ~~and~~ with the distances ~~figures~~ displayed adjusted accordingly.

42 **Section ~~2E.47~~ 2E.50 Closely-Spaced Interchanges**

43 ~~Option:~~

44 ~~When a series of interchanges is closely spaced, the advance guide sign for the next interchange may be~~
45 ~~mounted on an overhead structure located downstream from the gore of the preceding interchange.~~

46 Support:

47 Section 2E.11 contains information regarding sign spreading where the Exit Direction sign and the
48 Advance Guide sign for the next interchange are mounted overhead. Sign spreading is particularly beneficial

1 [where interchanges are closely spaced and overhead signing is used in conjunction with Interchange Sequence](#)
2 [signs as provided in Paragraph 2.](#)

3 Guidance:

4 Interchange Sequence signs ([see Section 2E.40](#)) should be used at closely-spaced interchanges. When
5 used, they should identify and show street names and distances for the next two or three exits as shown in
6 Figure 2E-30.

7 **Standard:**

8 Advance Guide signs for closely-spaced interchanges shall show information for only one
9 interchange.

10 **Section ~~2E.48~~ 2E.51 Minor Interchange**

11 Option:

12 Less signing may be used for minor interchanges because such interchanges customarily serve low
13 volumes of local traffic.

14 Support:

15 Examples of guide signs for minor interchanges are shown in Figure 2E-40.

16 **Standard:**

17 At least one Advance Guide sign and an Exit Gore sign shall be ~~placed~~ [used](#) at a minor interchange.

18 Guidance:

19 An Exit Direction sign should also be used.

20 **Section ~~2E.49~~ 2E.52 Signing ~~of~~ on Conventional Road Approaches and Connecting Roadways**

21 [text of this Section was relocated to Section 2D.45](#)

22 [Support:](#)

23 [Section 2D.45 contains information regarding the signing on conventional roads on the approaches to](#)
24 [interchanges and the signing on connecting roadways.](#)

25 **Section ~~2E.50~~ 2E.53 Wrong-Way Traffic Control at Interchange Ramps** [text of this Section was](#)

26 [relocated to Section 2B.41](#)

27 [Support:](#)

28 [Section 2B.41 contains information regarding the use of regulatory signs to deter wrong-way movements](#)
29 [at intersections of freeway or expressway ramps with conventional roads, and in the area where entrance](#)
30 [ramps intersect with the mainline lanes.](#)

31 [Section 2D.46 contains information regarding the use of a Directional assembly or a guide sign to mark](#)
32 [the entrance to a freeway or expressway from a conventional road.](#)

33 ~~Section 2E.51 General Service Signs~~ [relocated to Chapter 2I](#)

34 ~~Section 2E.52 Rest and Scenic Area Signs~~ [relocated to Chapter 2I](#)

35 ~~Section 2E.53 Tourist Information and Welcome Center Signs~~ [relocated to Chapter 2I](#)

36 ~~Section 2E.54 Reference Location Signs and Enhanced Reference Location Signs (D10-4, D10-~~
37 ~~5)~~ [relocated to Chapter 2H](#)

38 ~~Section 2E.55 Miscellaneous Guide Signs~~ [relocated to Section 2H.04](#)

39 ~~Section 2E.56 Radio Information Signing~~ [relocated to Chapter 2I](#)

40 ~~Section 2E.57 Carpool and Ridesharing Signing~~ [relocated to Chapter 2I](#)

41 **Section ~~2E.58~~ 2E.54 Weigh Station Signing**

42 **Standard:**

1 **Weigh Station signing on freeways and expressways shall be the same as that ~~specified~~ provided in**
2 **Section 2D.49, except for lettering size and the advance posting distance for the Exit Direction sign,**
3 **which shall be located a minimum of 1,500 feet in advance of the gore.**
4 Support:
5 Weigh Station sign layouts for freeway and expressway applications are shown in the “Standard Highway
6 Signs and Markings” book (see Section 1A.11).

CHAPTER 2F. TOLL ROAD SIGNS

Section 2F.01 Scope

Support:

Toll highways are typically limited-access freeway or expressway facilities. A portion of or an entire route might be a toll highway, or a bridge, tunnel, or other crossing point might be the only toll portion of a highway. A toll highway might be a conventional road. The general signing requirements for toll roads will depend on the type of facility and access (freeway, expressway, or conventional road). The provisions of Chapters 2D and 2E will generally apply for guide signs along the toll facility that direct road users within and off the facility where exit points and geometric configurations are not dependent specifically on the collection of tolls. The aspect of tolling and the presence of toll plazas or collection points necessitate additional considerations in the typical signing needs. The notification of the collection of tolls in advance of and at entry points to the toll highway also necessitate additional modifications to the typical signing.

The scope of this Section applies to a route or facility on which all lanes are tolled. Chapter 2G contains provisions for the signing of managed lanes within an otherwise non-toll facility that employ tolling or pricing as an operational strategy to manage congestion levels.

Standard:

Except where specifically provided in this Chapter, the provisions of other Chapters in Part 2 shall apply to toll roads.

Section 2F.02 Sizes of Toll Road Signs

Standard:

Except as provided in Section 2A.11, the sizes of toll road signs that have standardized designs shall be as shown in Table 2F-1.

Support:

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

Option:

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

Section 2F.03 Use of Purple Backgrounds and Underlay Panels with ETC Account

Pictographs

Standard:

Use of the color purple on any sign shall comply with the provisions of Sections 1A.12 and 2A.10. Except as provided in Sections 2F.12 and 2F.16, purple as a background color shall be used only when the information associated with the appropriate ETC account is displayed on that portion of the sign. The background color of the remaining portion of such signs shall comply with the provisions of Sections 1A.12 and 2A.10 as appropriate for a regulatory, warning, or guide sign. Purple shall not be used as a background color to display a destination, action message, or other legend that is not a display of the requirement for all vehicles to have a registered ETC account.

If only vehicles with registered ETC accounts are allowed to use a highway lane, a toll plaza lane, an open-road tolling lane, or all lanes of a toll highway or connection, the signs for such lanes or highways shall incorporate the pictograph (see Chapter 2A) adopted by the toll facility's ETC payment system and the regulatory message ONLY. Except for ETC pictographs whose predominant background color is purple, if incorporated within the green background of a guide sign, the ETC pictograph shall be on a white rectangular or square panel set on a purple underlay panel with a white border. For rectangular ETC pictographs whose predominant background color is purple, a white border shall be used at the outer edges of the purple rectangle to provide contrast between the pictograph and the sign background color.

If an ETC pictograph is used on a separate plaque with a guide sign or on a header panel within a guide sign, the plaque or the header panel shall have a purple background with a white border and the ETC pictograph shall have a white border to provide contrast between the pictograph and the background of the plaque or header panel.

1 Purple underlay panels for ETC pictographs or purple backgrounds for plaques and header panels
2 shall only be used in the manner described in Paragraphs 1 through 3 to convey the requirement of a
3 registered ETC account on signs for lanes reserved exclusively for vehicles with such an account and on
4 directional signs to an ETC account-only facility from a non-toll facility or from a toll facility that
5 accepts multiple payment forms.

6 Support:

7 Figure 2F-1 shows examples of ETC account pictographs, their use with various background colors, and
8 modifications involving underlay panels.

9 Section 2F.04 contains provisions regarding the size of pictographs for ETC accounts.

10 Section 2F.04 Size of ETC Pictographs

11 Standard:

12 The ETC pictograph (see Chapter 2A) shall be of a size that makes it a prominent feature of the
13 sign legend as necessary for conspicuity for those road users with registered ETC accounts seeking such
14 direction, as well as for those road users who do not have ETC accounts so that it is clear to them to
15 avoid such direction when applicable.

16 Guidance:

17 An ETC pictograph that is in the shape of a horizontal rectangle should have a minimum height between
18 approximately 1.5 and 2 times the upper-case letter height of the principal legend on the sign. The width of an
19 ETC pictograph in the shape of a horizontal rectangle should be between approximately two and three times
20 the height of the pictograph. When the pictograph is the principal legend on the sign, such as for advance
21 guide signs for open-road tolling lanes (see Section 2F.15), the minimum height of a horizontal rectangular
22 ETC pictograph should be consistent with that of a route shield prescribed for the particular application and
23 type of sign.

24 For ETC pictographs whose shape is square, circular, or otherwise similar in height and width, or is a
25 vertical rectangle, the same basic principles for conspicuity and placement should be followed. ETC
26 pictographs whose shape is not in that of a horizontal rectangle should be suitably sized to facilitate
27 conspicuity as described in Paragraph 1 and should be of a similar approximate area as the horizontal
28 rectangular pictographs designed in accordance with the height and width as provided in Paragraph 2.

29 Section 2F.05 Regulatory Signs for Toll Plazas

30 Support:

31 Toll plaza operations often include lane-specific restrictions on vehicle type, forms of payment accepted,
32 and speed limits or required stops. Vehicles are typically required to come to a stop to pay the toll or receive a
33 toll ticket in the attended and exact change or automatic lanes. Electronic toll collection (ETC) lanes with
34 favorable geometrics typically allow vehicles to move through the toll plaza without stopping, but usually
35 within a set regulatory speed limit or advisory speed. In some ETC lanes and in most lanes that accommodate
36 non-ETC vehicles, a stop might be required while the ETC payment is processed because of geometric or
37 other conditions.

38 Guidance:

39 Regulatory signs applicable only to a particular lane or lanes should be located in a position that makes
40 their applicability clear to road users approaching the toll plaza.

41 Regulatory signs, or regulatory panels within guide signs, indicating restrictions on vehicle type and
42 forms of toll payment accepted at a specific toll plaza lane should be installed over the applicable lane either
43 on the toll plaza canopy or on a separate structure immediately in advance of the canopy located in a manner
44 such that each sign is clearly related to an individual toll lane.

45 Support:

46 Section 2F.13 contains information regarding the incorporation of regulatory messages into guide signs
47 for toll plazas.

48 Section 2F.16 contains information regarding the design and use of toll plaza canopy signs.

49 Guidance:

50 One or more Speed Limit (R2-1) signs (see Section 2B.13) should be installed in the locations provided in
51 Paragraph 8 for an ETC-Only lane at a toll plaza in which an enforceable regulatory speed limit is established

1 for a lane in which it is intended that vehicles move through the toll plaza without stopping while toll
2 payments requiring stops occur in other lanes at the toll plaza. The speed limit displayed on the signs should
3 be based on an engineering study taking into account the geometry of the plaza and the lanes and other
4 appropriate safety and operational factors.

5 A Speed Limit (R2-1) sign should not be installed for a toll plaza lane that is controlled by a STOP (R1-1)
6 sign or where a stop is required.

7 Option:

8 Speed limit signs may be installed over the applicable lane on the toll plaza canopy, on the approach end
9 of the toll booth island, on the toll booth itself, or on a vertical element of the canopy structure. Down arrows
10 or diagonally downward-pointing directional arrows may be used to supplement the speed limit signs if an
11 engineering study or engineering judgment indicates that the arrow is needed to clarify the applicability of a
12 sign to a specific lane or to improve compliance.

13 **Standard:**

14 **A STOP (R1-1) sign shall not be installed for a toll plaza lane that is operated as an ETC-Only lane**
15 **and that is designed for tolls to be collected while vehicles continue moving.**

16 Option:

17 A STOP (R1-1) sign may be installed to require vehicles to come to a complete stop to pay a toll in an
18 attended or exact change lane, even if that lane is also available for optional use by vehicles with registered
19 ETC accounts. A PAY TOLL (R3-29P) or TAKE TICKET (R3-30P) plaque (see Figure 2F-2), as appropriate
20 to the operation, may be installed directly under the STOP (R1-1) sign for a toll plaza lane, if needed.

21 The mounting height of the STOP sign and any supplemental plaque may be less than the normal
22 mounting height requirements if constrained by the physical features of the toll island or toll plaza.

23 The lateral offset of a STOP or other regulatory sign located within a toll plaza island may be reduced to a
24 minimum of 1 foot from the face of the toll island or raised barrier to the nearest edge of the sign.

25 Guidance:

26 If used, a STOP (R1-1) sign for a toll plaza cash payment lane should be located in a longitudinal position
27 as near as practical to the point where a vehicle is expected to stop to pay the toll or take a ticket.

28 Option:

29 A Toll Rate (R3-28) sign (see Figure 2F-2) may be installed in advance of the toll plaza to indicate the toll
30 applicable to the various vehicle types.

31 Guidance:

32 If used, the Toll Rate (R3-28) sign should be located between the toll plaza and the first advance sign
33 informing road users of the toll plaza.

34 The R3-28 sign should not contain more than three lines of legend. Each lines that shows a toll amount
35 should display only a single toll amount.

36 Option:

37 Additional toll rate information exceeding three lines of legend may be displayed on the toll booth
38 adjacent to the payment window of an attended lane or the payment receptacle of an exact change or
39 automatic lane where it is visible to a road user who has stopped to pay the toll, but is not visible to
40 approaching road users who have not yet entered the toll lane.

41 **Section 2F.06 Pay Toll Advance Warning Sign (W9-6)**

42 **Standard:**

43 **The Pay Toll Advance Warning (W9-6) sign shall be a horizontal rectangle with a black legend and**
44 **border on a yellow background. The legend shall include the distance to the toll plaza and, except for**
45 **toll-ticket facilities, the toll for passenger or 2-axle vehicles (see Figure 2F-3). Where the toll for**
46 **passenger or 2-axle vehicles is variable by time of day, a changeable message element shall be**
47 **incorporated into the W9-6 sign to display the toll in effect. For toll plazas where road users entering a**
48 **toll-ticket facility are issued a toll ticket, the legend PAY TOLL shall be replaced with a suitable legend**
49 **such as TAKE TICKET.**

50 Guidance:

1 The Pay Toll Advance Warning sign should be installed overhead at approximately 1 mile and 1/2 mile in
2 advance of mainline toll plazas at which some or all lanes are required to come to a stop to pay a toll (see
3 Sections 2F.14 and 2F.15).

4 Option:

5 If there is insufficient space for the W9-6 sign at the 1-mile or 1/2-mile advance locations, the Pay Toll
6 Advance Warning (W9-6P) plaque (see Section 2F.07) may be installed at those advance locations above the
7 appropriate guide sign(s) that relate to toll payment types.

8 An additional W9-6 sign may be installed approximately 2 miles in advance of a mainline toll plaza. This
9 sign may be either overhead or post-mounted.

10 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
11 is limited, the W9-6 sign may also be installed in advance of the ramp toll plaza.

12 **Section 2F.07 Pay Toll Advance Warning Plaque (W9-6P)**

13 Option:

14 The Pay Toll Advance Warning (W9-6P) plaque (see Figure 2F-3) may be installed above the appropriate
15 guide sign(s) relating to toll payment types at the 1-mile and/or 1/2-mile advance locations on the approach to
16 a toll plaza if there is insufficient space for the W9-6 sign (see Section 2F.06) at those advance locations.

17 **Standard:**

18 **The W9-6P plaque shall be a horizontal rectangle with black legend and border on a yellow**
19 **background. The legend shall include the distance to the toll plaza and, except for toll-ticket facilities,**
20 **the toll for passenger or 2-axle vehicles. Where the toll for passenger or 2-axle vehicles is variable by**
21 **time of day, a changeable message element shall be incorporated into the W9-6P plaque to display the**
22 **toll in effect. For toll plazas where road users entering a toll-ticket facility are issued a toll ticket, the**
23 **legend PAY TOLL shall be replaced with a suitable legend such as TAKE TICKET.**

24 Option:

25 The distance to the toll plaza may be omitted from the W9-6P plaque if the distance is displayed on the
26 guide sign that the plaque accompanies.

27 The toll for passenger or 2-axle vehicles may be omitted from the W9-6P plaque if the toll information is
28 displayed on the guide sign that the plaque accompanies.

29 **Section 2F.08 Stop Ahead Pay Toll Warning Sign (W9-6a)**

30 **Standard:**

31 **The Stop Ahead Pay Toll (W9-6a) sign shall be a horizontal rectangle with a black legend and**
32 **border on a yellow background. The legend shall include STOP AHEAD PAY TOLL and, except for**
33 **toll-ticket facilities, the toll for passenger or 2-axle vehicles (see Figure 2F-3). Where the toll for**
34 **passenger or 2-axle vehicles is variable by time of day, a changeable message element shall be**
35 **incorporated into the W9-6a sign to display the toll in effect. For toll plazas where road users entering**
36 **a toll-ticket facility are issued a toll ticket, the legend PAY TOLL shall be replaced with a suitable**
37 **legend such as TAKE TICKET.**

38 Guidance:

39 The Stop Ahead Pay Toll sign should be installed overhead downstream from the W9-6 sign that is 1/2
40 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
41 toll (see Sections 2F.14 and 2F.15). The location of the overhead sign should coincide with the approximate
42 location where the mainline lanes begin to widen on the approach to the toll plaza lanes.

43 Where open-road tolling is used in addition to a toll plaza at a particular location, the W9-6a sign should
44 be located such that the message is clearly related to the lanes that access the toll plaza and not to the open-
45 road tolling lanes.

46 Option:

47 If there is insufficient space for the W9-6a sign at the recommended location, the Stop Ahead Pay Toll
48 (W9-6aP) plaque (see Section 2F.09) may be installed at that location above the appropriate guide sign that
49 relates to toll payment types.

50 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
51 is limited, the W9-6a sign may also be installed in advance of the ramp toll plaza.

1 **Section 2F.09 Stop Ahead Pay Toll Warning Plaque (W9-6aP)**

2 **Option:**

3 The Stop Ahead Pay Toll (W9-6aP) plaque (see Figure 2F-3) may be installed above the appropriate
4 guide sign at the location specified for the Stop Ahead Pay Toll (W9-6a) sign (see Section 2F.08) if there is
5 insufficient space for the W9-6a sign at that location.

6 **Standard:**

7 The W9-6aP plaque shall be a horizontal rectangle with black legend and border on a yellow
8 background. The legend shall include STOP AHEAD PAY TOLL and, except for toll-ticket facilities,
9 the toll for passenger or 2-axle vehicles. Where the toll for passenger or 2-axle vehicles is variable by
10 time of day, a changeable message element shall be incorporated into the W9-6aP plaque to display the
11 toll in effect. For toll plazas where road users entering a toll-ticket facility are issued a toll ticket, the
12 legend PAY TOLL shall be replaced with a suitable legend such as TAKE TICKET.

13 **Option:**

14 The toll for passenger or 2-axle vehicles may be omitted from the W9-6aP plaque if the toll information is
15 displayed on the guide sign that the plaque accompanies.

16 **Section 2F.10 LAST EXIT BEFORE TOLL Warning Plaque (W16-16P)**

17 **Guidance:**

18 The LAST EXIT BEFORE TOLL (W16-16P) plaque (see Figure 2F-3) should be used to notify road
19 users of the last exit from a highway before it becomes a facility on which toll payments are required. The
20 plaque should be installed above or below the appropriate guide signs for the exit (see Sections 2E.30 and
21 2E.33).

22 **Standard:**

23 The W16-16P plaque shall have a black legend and border on a yellow background.

24 **Section 2F.11 TOLL Auxiliary Sign (M4-15)**

25 **Standard:**

26 The TOLL (M4-15) auxiliary sign (see Figure 2F-4) shall have a black legend and border on a
27 yellow background and shall be mounted directly above the route sign of a numbered toll highway or, if
28 used, above the cardinal direction and alternative route auxiliary signs, in any route sign assembly
29 providing directions from a non-toll highway to the toll highway or to a segment of a highway on which
30 the payment of a toll is required.

31 **Section 2F.12 Electronic Toll Collection (ETC) Account-Only Auxiliary Signs (M4-16 and M4-**
32 **20)**

33 **Standard:**

34 In any route sign assembly providing directions from a non-toll highway to a toll facility, or to a
35 tolled segment of a highway, where electronic toll collection (ETC) is the only payment method accepted
36 and all vehicles are required to have a registered ETC account, the ETC Account-Only (M4-20)
37 auxiliary sign (see Figure 2F-4) shall be mounted directly below the route sign of the numbered or
38 named toll facility. The M4-20 auxiliary sign shall have a white border and purple background and
39 incorporate the pictograph adopted by the toll facility's ETC payment system and the word ONLY in
40 black letters on a white panel set on the purple background of the sign.

41 **Option:**

42 The NO CASH (M4-16) auxiliary sign (see Figure 2F-4) with a black legend and border on a white
43 background may be used in a route sign assembly directly below the M4-20 auxiliary sign.

44 **Section 2F.13 Toll Facility and Toll Plaza Guide Signs – General**

45 **Support:**

46 Toll plazas are used on many toll highways, bridges, and tunnels for collection of tolls from road users.
47 Electronic toll collection and/or open-road tolling might also be used on such facilities, either in addition to or
48 in place of collecting toll payments at toll plazas.

1 Chapter 2G contains information regarding signs for preferential and managed lanes that are applicable to
2 toll roads.

3 Chapter 3E contains information regarding pavement markings for certain toll plaza applications.

4 **Standard:**

5 **Directional assemblies for entrances to a toll highway or to a road leading directly to a toll highway**
6 **with no opportunity to exit before paying or being charged a toll, shall clearly indicate that the facility**
7 **is a toll facility. The TOLL (M4-15) auxiliary sign (see Section 2F.11) shall be used above the route sign**
8 **of a numbered toll facility in any route sign assembly that provides directions to the toll route from**
9 **another highway.**

10 **A rectangular panel with the black legend TOLL on a yellow background shall be incorporated into**
11 **the guide signs leading road users to a toll highway (see Figure 2F-5).**

12 **Guide signs for toll highways, toll plazas, and tolled or priced managed lanes (see Chapter 2G) shall**
13 **have white legends and borders on green backgrounds, except as specifically provided by Sections 2F.13**
14 **through 2F.16.**

15 **Option:**

16 Where conditions do not permit separate signs, or where it is important to associate a particular regulatory
17 or warning message with specific guidance information, regulatory and/or warning messages may be
18 combined with guide signs for toll plazas using plaques, header panels, or rectangular regulatory or warning
19 panels incorporated within the guide signs, as long as the proper legend and background colors are preserved.

20 **Standard:**

21 **When regulatory messages are incorporated within a guide sign, they shall be on a rectangular**
22 **panel with black legend on a white background. When warning messages are incorporated within a**
23 **guide sign, they shall be on a rectangular panel with black legend on a yellow background.**

24 **Support:**

25 Figure 2F-5 shows examples of guide signs for entrances to various types of toll highways and for ETC
26 account-only entrances to non-toll highways.

27 **Standard:**

28 **Signing for entrances to toll highways where ETC is employed only through license plate character**
29 **recognition such that road users are not required to establish a toll account or register their vehicle**
30 **equipment shall comply with the provisions of Paragraphs 4 and 5 (see Figure 2F-6).**

31 **If only vehicles with registered ETC accounts are allowed to use a toll highway, the guide signs for**
32 **entrances to such facilities shall incorporate the pictograph adopted by the toll facility's ETC payment**
33 **system and the regulatory message ONLY (see Figures 2F-1, 2F-5, and 2F-6). The use, size, and**
34 **placement of the ETC pictograph shall comply with the provisions of Sections 2F.03 and 2F.04.**

35 **Support:**

36 Sections 2F.11, 2F.12, and 2F.17 contain additional provisions regarding signs for toll highways that only
37 accept ETC payments.

38 Sections 2G.16 through 2G.18 contain additional provisions regarding signs for priced managed lanes that
39 only accept ETC payments.

40 **Option:**

41 Where a toll highway on which tolls are collected only electronically also accepts payments from
42 registered toll account users and those road users not registered in a toll account program are assessed a
43 nominal surcharge in addition to the toll, or registered toll account users are assessed a discounted toll, such
44 information may be displayed on a separate information sign near the entrance to such a facility (see Figure
45 2F-6).

46 **Support:**

47 Figure 2F-7 shows an example of guide signs for alternative toll and non-toll ramp connections to a non-
48 toll highway.

49 Many different ETC payment systems are used by the various toll facility operators. Some of these
50 systems accept payment from other systems' accounts.

51 **Option:**

1 Where a facility will accept payments from other systems' accounts in addition to its primary ETC-
2 account payment system, such information may be displayed on a separate information sign near the entrances
3 to such a facility or in advance of a toll plaza or open-road tolling lanes, as space allows between primary
4 signs.

5 Guidance:

6 Guide signs for toll plazas should be designed in accordance with the general principles of guide signs
7 and the specific provisions of Chapter 2E.

8 Signs for toll plazas should systematically provide road users with advance and toll plaza lane-specific
9 information regarding:

- 10 A. The amount of the toll, the types of payment accepted, and the type(s) of registered ETC accounts
11 accepted for payment;
12 B. Which lane or lanes are required or allowed to be used for each available payment type; and
13 C. Restrictions on the use of a toll plaza lane or lanes by certain types of vehicles (such as cars only or
14 no trucks).

15 Standard:

16 Signs for attended lanes at toll plazas shall include word messages such as FULL SERVICE, CASH,
17 CHANGE, or RECEIPTS (see Figures 2F-8 through 2F-11).

18 Option:

19 Signs for Attended lanes at toll plazas may incorporate the Toll Taker (M4-17) symbol (see Figures 2F-8
20 and 2F-9), in a size that makes the symbol the predominant feature of the sign, to supplement the required
21 word message.

22 Standard:

23 Signs for Exact Change lanes at toll plazas shall incorporate an appropriate word message, such as
24 EXACT CHANGE and the amount of the toll for passenger vehicles (see Figures 2F-8 through 2F-11).

25 Option:

26 Signs for Exact Change lanes at toll plazas may include the Exact Change (M4-18) symbol (see Figures
27 2F-8 and 2F-9), in a size that makes the symbol the predominant feature of the sign, to supplement the
28 required word message.

29 Standard:

30 If used, the M4-17 and M4-18 symbols shall be used only as panels within guide signs that
31 accompany the required word messages. The M4-17 and M4-18 symbols shall not be used as an
32 independent sign or within a sign assembly.

33 If only vehicles with registered ETC accounts are allowed to use a toll plaza lane, the signs for such
34 lanes shall incorporate the pictograph adopted by the toll facility's ETC payment system and the
35 regulatory message ONLY (see Figures 2F-1, 2F-8, 2F-9, and 2F-11). The use, size, and placement of
36 the ETC pictograph shall comply with the provisions of Sections 2F.03 and 2F.04.

37 Option:

38 The ETC payment system's pictograph, without a purple underlay or purple header panel, may be used on
39 signs for Exact Change or attended lanes at toll plazas to indicate that vehicles with registered ETC accounts
40 may also use those lanes (see Figure 2F-9).

41 Section 2F.14 Advance Signs for Conventional Toll Plazas

42 Guidance:

43 For conventional toll plazas (those without a divergence onto a separate alignment from mainline-aligned
44 open-road tolling or ETC-Only lanes), one or more sets of overhead advance guide signs complying with the
45 provisions of this Section should be provided. The advance guide signs for multi-lane toll plazas should
46 provide information regarding which lanes to use for all of the toll payment methods accepted at the toll plaza.
47 These signs should include toll plaza lane numbers (if used), or action messages or lane-use information such
48 as LEFT LANE(S), CENTER LANE(S), RIGHT LANE(S), or down arrows over the approximate center of
49 each applicable lane. These signs should also incorporate regulatory messages indicating any restrictions or
50 prohibitions on the use of the lanes associated with the various types of payment methods by certain types of
51 vehicles. For mainline toll plazas, these signs should be at least 1/2 mile in advance of the toll plaza, and
52 farther if practical.

1 Additional guide signs with lane information for the toll payment types should be provided between
2 approximately 1/4 mile and 800 feet in advance of the toll plaza at a location that avoids or minimizes
3 obstruction of toll plaza canopy signs (see Section 2F.16) and lane-use control signals.

4 The number, mounting, and/or spacing of sets of advance signs for approaches to toll plazas on ramps, toll
5 bridges, or tunnels, to accommodate a limited distance to the plaza from an intersection or from the start of the
6 approach road to the bridge or tunnel, should be based on an engineering study or engineering judgment.

7 Support:

8 Figure 2F-10 shows examples of advance signs for a conventional toll plaza.

9 **Section 2F.15 Advance Signs for Toll Plazas on Diverging Alignments from Open-Road ETC** 10 **Account-Only Lanes**

11 Support:

12 Open-Road ETC lanes are sometimes located on the normal mainline alignment while the lanes for other
13 toll payment methods are located at a toll plaza on a separate alignment (see Figure 2F-11). Since road users
14 paying cash tolls must diverge from the mainline alignment, similar to a movement for an exit, it is important
15 that the guide signs in advance of and at the point of divergence clearly indicate the required lane use and/or
16 movements.

17 Guidance:

18 For toll plazas located on a separate alignment that diverges from mainline-aligned Open-Road ETC lanes
19 where vehicles are required to have a registered ETC account to use the Open-Road Tolling lanes, overhead
20 advance signs should be provided at approximately 1 mile and 1/2 mile in advance of the divergence point.

21 Both the 1-mile and 1/2-mile advance signs should include:

- 22 A. The ETC (pictograph) Account-Only guide sign (see Figures 2F-8 and 2F-11) with a down arrow over
23 the center of each lane that will become an Open-Road ETC lane;
- 24 B. For the lane or lanes which will diverge to a toll plaza, guide signs conforming to the provisions of
25 Section 2F.13, indicating which lane or lanes will diverge to the toll plaza for the various cash toll
26 payment methods; and
- 27 C. Regulatory signs, plaques, or panels within the guide signs, indicating any restrictions or prohibitions
28 of certain types of vehicles from toll plaza lanes associated with the various types of payment
29 methods.

30 At or near the theoretical gore of the divergence point, an additional set of overhead guide signs should be
31 provided and should include:

- 32 A. The ETC (pictograph) Account-Only guide sign (see Figures 2F-8 and 2F-11) with a down arrow over
33 the center of each Open-Road ETC lane;
- 34 B. Guide signs conforming to the provisions of Section 2F.13, with diagonally upward-pointing
35 directional arrow(s) over the approximate center of each lane indicating the direction of the
36 divergence, and providing lane information for all types of payment methods accepted at the toll
37 plaza; and
- 38 C. Regulatory signs, plaques, or panels within the guide signs, indicating any restrictions or prohibitions
39 on the use of the toll plaza lanes associated with the various types of payment methods by certain
40 types of vehicles.

41 Approximately 800 feet in advance of the toll plaza at a location that avoids or minimizes any obstruction
42 of the toll plaza canopy signs (see Section 2F.16) and lane-use control signals, an additional set of overhead
43 advance signs with lane information for the toll payment types should be provided.

44 Standard:

45 **The use of down and directional arrows on the signs at the locations described in Paragraphs 2**
46 **through 4 shall comply with the provisions of Section 2D.08.**

47 Support:

48 Figure 2F-11 shows an example of advance signs for toll plazas on a diverging alignment from Open-
49 Road ETC Account-Only Lanes.

50 Section 4K.02 contains information regarding the use of lane-use control signals for Open-Road ETC
51 lanes for temporary lane closure purposes.

52 **Section 2F.16 Toll Plaza Canopy Signs**

1 **Standard:**

2 A sign complying with the provisions of Section 2F.13 shall be provided above the center of each
3 lane that is not an Open-Road ETC lane, mounted on or suspended from the toll plaza canopy, or on a
4 separate structure immediately in advance of the plaza located such that each sign is clearly related to
5 an individual toll lane, indicating the payment type(s) accepted in the lane and any restrictions or
6 prohibitions of certain types of vehicles that apply to the lane. Except for toll-ticket systems, the toll for
7 passenger or 2-axle vehicles shall be included on the canopy sign or on a separate sign mounted on the
8 upstream side of the tollbooth.

9 The background color of a canopy sign for an ETC Account-Only toll plaza lane shall be purple (see
10 Figure 2F-9).

11 **Option:**

12 Where vehicles are required to have a registered ETC account to use the lane, one or two flashing yellow
13 beacons (see Section 4K.04) may supplement a canopy sign over an ETC Account-Only lane to call special
14 attention to the location of the ETC Account-Only lane within the plaza.

15 The canopy sign for an ETC-Only toll plaza lane in which a regulatory speed limit is not posted and in
16 which vehicles are not required to stop may display an advisory speed within a horizontal rectangular panel
17 with a black legend and yellow background within the bottom portion of the canopy sign.

18 **Standard:**

19 Flashing beacons supplementing a canopy sign over an ETC Account-Only lane shall be mounted
20 directly above or alongside the sign in a manner that is separated from any lane-use control signals for
21 that lane (see Figure 2F-9).

22 For multi-lane toll plazas, lane-use control signals (see Section 4K.02) shall be provided above the
23 center of each toll plaza lane that is not an Open-Road ETC lane to indicate the open or closed status of
24 each lane. Lane-use control signals shall not be used to call attention to a lane for a specific toll
25 payment type such as ETC Account-Only lanes.

26 **Support:**

27 Part 6 contains information regarding the closing of a lane for temporary traffic control purposes.

28 Figure 2F-9 shows examples of toll plaza canopy signs.

29 **Section 2F.17 Guide Signs for Entrances to ETC Account-Only Facilities**

30 **Support:**

31 Some toll highways, bridges, and tunnels are restricted to use only by vehicles with a specific registered
32 ETC account.

33 **Standard:**

34 Where vehicles are required to have a registered ETC account to use an ETC Account-Only facility,
35 guide signs for the facility shall comply with the applicable provisions of Chapter 2E and specifically
36 with the applicable provisions of Section 2F.13.

37 Guide signs for the entrance ramps to such ETC Account-Only facilities shall incorporate the
38 pictograph of the toll facility's ETC payment system and the word ONLY in a header panel or plaque
39 designed in accordance with the provisions of Section 2F.13 (see Figure 2F-5).

40 **Support:**

41 Section 2F.12 contains information regarding ETC-Only auxiliary signs for use with route signs in route
42 sign assemblies.

43 **Section 2F.18 ETC Program Information Signs**

44 **Standard:**

45 Except as provided in Paragraph 2, signs that inform road users of telephone numbers, Internet
46 addresses, including domain names and uniform resource locators (URLs), or e-mail addresses for
47 enrolling in an ETC program of a toll facility or managed lane, obtaining an ETC transponder, and/or
48 obtaining ETC program information shall only be installed in rest areas, parking areas, or similar
49 roadside facilities where the signs are viewed only by pedestrians or occupants of parked vehicles.

50 **Option:**

1 ETC program information signs displaying telephone numbers that have no more than four characters may
2 be installed on roadways in locations where they will not obscure the road user's view of higher priority
3 traffic control devices and that are removed from key decision points where the road user's view is more
4 appropriately focused on other traffic control devices, roadway geometry, or traffic conditions, including exit
5 and entrance ramps, intersections, toll plazas, temporary traffic control zones, and areas of limited sight
6 distance.

1 **CHAPTER 2G. PREFERENTIAL AND MANAGED LANE SIGNS** new Chapter with relocated
2 text from Chapters 2B, 2C, and 2E

3 **Section 2G.01 Scope**

4 Support:

5 Preferential ~~only~~ lanes are lanes designated for special traffic uses such as high-occupancy vehicles
6 (HOVs), light rail, buses, taxis, or bicycles. Preferential ~~only~~ lane treatments might be as simple as restricting
7 a turning lane to a certain class of vehicles during peak periods, or as sophisticated as providing a separate
8 roadway system within a highway corridor for certain vehicles. ~~this paragraph was relocated from Section~~
9 ~~2B.26~~

10 ~~HOV Preferential~~ lanes ~~may take many forms depending on the level of usage and the design of the~~
11 ~~facility. They may~~ ~~might~~ be ~~barrier-separated (on a separate alignment or~~ physically separated from the other
12 travel lanes by a barrier or median), ~~or they may be concurrent with other travel lanes and be~~ ~~buffer-separated~~
13 ~~(separated from the adjacent general-purpose lanes only by a narrow buffer area created with~~ longitudinal
14 pavement markings), ~~or contiguous (separated from the adjacent general-purpose lanes only by a lane line).~~
15 ~~Preferential lanes might allow continuous access with the adjacent general-purpose lanes or restrict access~~
16 ~~only to designated locations. Physically-separated HOV Preferential~~ lanes ~~may~~ ~~might~~ be operated in a
17 constant direction or ~~may be~~ operated as reversible lanes. ~~Some reversible preferential lanes on a divided~~
18 ~~highway might be operated counter-flow to the direction of traffic on the immediately adjacent general-~~
19 ~~purpose lanes. this paragraph was relocated from Section 2B.27~~

20 ~~HOV Preferential~~ lanes ~~may~~ ~~might~~ be operated on a 24-hour basis, for extended periods of the day, during
21 peak travel periods only, during special events, or during other activities. ~~this paragraph was relocated from~~
22 ~~Section 2B.27~~

23 ~~Open-road tolling lanes and toll plaza lanes that segregate traffic based on payment method are not~~
24 ~~considered preferential lanes. Chapter 2F contains information regarding signing of open-road tolling lanes~~
25 ~~and toll plaza lanes.~~

26 ~~Managed lanes typically restrict access with the adjacent general-purpose lanes to designated locations~~
27 ~~only.~~

28 ~~Under certain operational strategies, such as the occupancy requirement of an HOV lane changing in~~
29 ~~response to actual congestion levels, a managed lane is a special type of preferential lane (see Sections 2G.03~~
30 ~~through 2G.07).~~

31 ~~A managed lane operated on a real-time basis in response to changing conditions might be operated as an~~
32 ~~HOV lane for a period of time as needed to manage congestion levels.~~

33 ~~Sections 2G.16 through 2G.18 contain additional information regarding signs for managed lanes that use~~
34 ~~tolling or pricing as a management strategy.~~

35 ~~Section 9B.04 contains~~ information regarding Preferential ~~Only~~ Lane signs for ~~bicycle bike~~ lanes ~~is~~
36 ~~contained in Section 9B.04. this paragraph was relocated from Section 2B.26~~

37 **Section 2G.02 Sizes of Preferential and Managed Lane Signs**

38 **Standard:**

39 ~~Except as provided in Section 2A.11, the sizes of preferential and managed lane signs that have~~
40 ~~standardized designs shall be as shown in Table 2G-1.~~

41 Support:

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

43 Option:

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

45 **Section ~~2B.26~~ 2G.03 Regulatory Signs for Preferential ~~Only~~ Lanes – General ~~Signs (R3-10~~
46 ~~through R3-15)~~ existing Sections 2B.26 through 2B.28 have been edited; paragraphs have been
47 ~~relocated within and between these Sections and the text has been reorganized into five Sections~~**

48 ~~Option:~~

49 ~~Preferential only lane assignments may be made on a full-time or part-time basis.~~

50 **Standard:**

1 When a preferential ~~only~~ lane is established, the Preferential ~~Only~~ Lane regulatory signs (see Figure
2 2G-1) and pavement markings (see ~~Sections 3B.22 and 3B.23~~ Chapter 3D) for these lanes shall be used
3 to advise road users.

4 Support:

5 Preferential Lane (R3-10 series through R3-15 series) regulatory signs consist of several different general
6 types of regulatory signs as follows (see Figure 2G-1):

7 A. Vehicle Occupancy Definition signs define the vehicle occupancy requirements applicable to an HOV
8 lane (such as “2 OR MORE PERSONS PER VEHICLE”) or types of vehicles not meeting the
9 minimum occupancy requirement (such as motorcycles or ILEVs) that are allowed to use an HOV
10 lane (see Section 2G.04).

11 B. Periods of Operation signs notify road users of the days and hours during which the preferential
12 restrictions are in effect (see Section 2G.05).

13 C. Preferential Lane Advance signs notify road users that a preferential lane restriction begins ahead (see
14 Section 2G.06).

15 D. Preferential Lane Ends signs notify users of the termination point of the preferential lane restrictions
16 (see Section 2G.07).

17 Standard:

18 Regulatory signs applicable only to a preferential lane shall be distinguished from regulatory signs
19 applicable to general-purpose lanes by the inclusion of the applicable symbol(s) and/or word(s) (see
20 Figure 2G-1).

21 Support:

22 The symbol and word message ~~that appears~~ displayed on a particular Preferential ~~Only~~ Lane regulatory
23 sign will vary based on the specific type of allowed traffic and on other related operational constraints that
24 have been established for a particular lane, such as an HOV lane, a bus lane, or a taxi lane. ~~Section 2B.27~~
25 ~~contains information regarding the restriction of the use of the diamond symbol to HOV lanes only. The~~
26 ~~requirements for guide and regulatory signs in advance of all preferential only lanes on freeways are provided~~
27 ~~in Section 2E.59.~~

28 ~~Standard:~~

29 ~~At the end of a preferential only lane, a Lane Ends (R3-12a or R3-15a) sign shall be used.~~

30 Option:

31 Changeable message signs may ~~be used to~~ supplement, substitute for, or be incorporated into static
32 Preferential Lane regulatory signs where travel conditions change or where multiple types of operational
33 strategies (such as variable occupancy requirements, or vehicle types, ~~or pricing policies~~) are used and varied
34 throughout the day or week, or on a real-time basis, to manage the use of, control of, or access to preferential
35 ~~only~~ lanes.

36 Support:

37 Figure 2G-1 illustrates examples of changeable messages incorporated into static Preferential Lane
38 regulatory signs.

39 Standard:

40 When changeable message signs (see ~~Section 2A.07~~ Chapter 2L) are used as regulatory signs for
41 preferential ~~only~~ lanes, they shall be the required sign size and shall display the required letter height
42 and legend format that corresponds to the type of roadway facility and design speed.

43 Guidance:

44 When Preferential ~~Only~~ Lane regulatory signs are used on conventional roads, the decision regarding
45 whether to use a ~~specific ground-~~ post-mounted or overhead version of a particular type of sign should be
46 based on an engineering study that considers the available space, the existing signs for the ~~adjoining~~ adjacent
47 general-purpose traffic lanes, roadway and traffic characteristics, the proximity to existing overhead signing
48 signs, the ability to install overhead signs, and any other unique local factors. this paragraph was relocated
49 from Section 2B.28

50 ~~The decision to use a specific ground-mounted or overhead sign for a preferential only lane should be~~
51 ~~based on an engineering study that considers the available space, the existing signs for adjoining general-~~
52 ~~purpose lanes, roadway and traffic characteristics, the proximity of other overhead signing, the ability to~~
53 ~~install overhead signs, and any other unique local factors.~~

1 ~~Ground-mounted Preferential Only Lane (R3-10, R3-11, and R3-12 series) signs should be installed~~
2 ~~where preferential only lanes are implemented on freeways, expressways, and conventional roads.~~

3 If overhead regulatory signs applicable only to a preferential lane are located in approximately the same
4 longitudinal position along the highway as overhead signs applicable only to the general-purpose lanes, the
5 signs for the preferential lane should be separated laterally from the signs for the general-purpose lanes to the
6 maximum extent practical to minimize conflicting information, while maintaining their visual relationship to
7 the lanes below necessitated by specific legend or arrows indicating lane assignment.

8 **Standard:**

9 If used, overhead Preferential ~~Only~~ Lane (R3-13 series, R3-14 series, and R3-15 series) regulatory
10 signs shall ~~only be installed along preferential only lanes on freeways and expressways. These overhead~~
11 signs shall be installed on the side of the roadway where the entrance to the preferential ~~only~~ lane is
12 located and any appropriate adjustments shall be made to the sign message. ~~The sign sizes shall differ~~
13 between freeways and expressways as provided in Table 2B-1 to reflect the different design speeds for
14 each type of roadway. this paragraph was relocated from Section 2B.28

15 **Option:**

16 Where a median of sufficient width is available, the R3-13 series and R3-15 series signs may be post-
17 mounted.

18 **Support:**

19 The sizes for Preferential ~~Only~~ Lane regulatory signs will differ to reflect the design speeds for each type
20 of roadway facility. Table 2G-1 provides sizes for each type of roadway facility.

21 **Guidance:**

22 The edges of Preferential Lane regulatory signs that are post-mounted on a median barrier should not
23 project beyond the outer edges of the barrier, including in areas where lateral clearance is limited.

24 **Option:**

25 Where lateral clearance is limited, Preferential Lane regulatory signs that are post-mounted on a median
26 barrier and that are 72 inches or less in width may be skewed up to 45 degrees in order to fit within the barrier
27 width or may be mounted higher, such that the vertical clearance to the bottom of the sign, light fixture, or
28 structural support, whichever is lowest, is not less than 14 feet above any portion of the pavement and
29 shoulders.

30 **Standard:**

31 Where lateral clearance is limited, Preferential Lane regulatory signs that are post-mounted on a
32 median barrier and that are wider than 72 inches shall be mounted with a vertical clearance that
33 complies with the provisions of Section 2A.18 for overhead mounting.

34 **Guidance:**

35 On conventional roadways, Preferential ~~Only~~ Lane regulatory sign spacing should be determined by
36 engineering judgment based on ~~prevailing~~ speed, block length, distances from adjacent intersections, and
37 other site-specific considerations.

38 **Support:**

39 Sections 2G.04 and 2G.05 contain provisions regarding the placement of Preferential Lane regulatory
40 signs on freeways and expressways.

41 **Standard:**

42 The ~~R3-10, R3-11, R3-11a, R3-11e, R3-13, R3-13a, R3-14, and R3-14a~~ signs illustrated in Figure
43 2G-1 that incorporate the diamond symbol shall be used exclusively with preferential ~~only~~ lanes for
44 high-occupancy vehicles to indicate the particular occupancy requirement and time restrictions
45 applying to that lane. The ~~R3-10a, R3-11b, and R3-14b~~ signs illustrated in Figure 2G-1 that do not
46 have a diamond symbol shall be used ~~in situations where a~~ with preferential ~~only~~ lanes ~~is that are not an~~
47 HOV lanes, but ~~is are~~ designated for use by other types of vehicles (such as bus and/or taxi use).

48 **Option:**

49 Agencies may select from either the HOV abbreviation or the diamond symbol, or use both, to reference
50 the HOV lane designation. this paragraph was relocated from Section 2B.27

51 ~~The diamond symbol may be used instead of the word message HOV.~~

52 **Standard:**

1 When the diamond symbol (or HOV abbreviation) is used without text on the ~~ground- post-~~
2 mounted Preferential ~~Only~~ Lane (R3-10 series, R3-11 series, and R3-12 series) regulatory signs, it shall
3 be centered on the top line of the sign. When the diamond symbol (or HOV abbreviation) is used with
4 associated text on the ~~ground- post-~~mounted Preferential ~~Only~~ Lane (R3-10 series, R3-11 series, and
5 R3-12 series) regulatory signs, it shall appear to the left of the associated text. When the diamond
6 symbol is used on the overhead Preferential ~~Only~~ Lane (R3-13, R3-13a, R3-14, and R3-14a) regulatory
7 signs, it shall appear in the top left quadrant. The diamond symbol for the R3-15, ~~and R3-15a, R3-15b,~~
8 and R3-15c signs shall appear on the left side of the sign. The diamond symbol shall not be used on the
9 bus, taxi, or bicycle Preferential ~~Only~~ Lane signs. ~~the sequence of the last two sentences was reversed~~

10 The Vehicle Occupancy Definition, Periods of Operation, and Preferential Lane Advance regulatory
11 signs for HOV signs (see Section 2B.26) lanes shall display the minimum allowable vehicle occupancy
12 requirement established for each HOV lane, ~~The vehicle occupancy requirement established for an~~
13 ~~HOV lane shall be referenced~~ displayed immediately after the word message HOV or the diamond
14 symbol. ~~The diamond symbol shall be restricted for use with HOV lanes only.~~ ~~this paragraph is a~~
15 ~~combination of two paragraphs that were relocated from Section 2B.27~~

16 Support:

17 The agencies that own and operate ~~preferential only~~ HOV lanes ~~for high-occupancy vehicles (HOV lanes)~~
18 ~~shall~~ have the authority and responsibility to determine how they are operated and the minimum occupancy
19 requirements ~~for vehicles operating in HOV lanes. The minimum occupancy requirement shall be two~~
20 ~~occupants per vehicle.~~ Information about federal requirements for certain types of vehicles not meeting the
21 minimum occupancy requirement to be eligible to use HOV lanes that receive Federal-aid program funding
22 and about requirements associated with proposed significant changes to the operation of an existing HOV lane
23 and certain vehicles are contained in the “Federal-Aid Highway Program Guidance on High Occupancy
24 Vehicle (HOV) Lanes” (see Section 1A.11). ~~this paragraph was relocated from Section 2B.27~~

25 ~~Option:~~

26 ~~The ground-mounted Preferential Only Lane Operational (R3-11 series) signs and the overhead~~
27 ~~Preferential Only Lane Operational (R3-14 series) signs may be used to supplement changeable message signs~~
28 ~~that are used to convey preferential only lane restrictions.~~

29 ~~Support:~~

30 ~~Figures 2E-46 through 2E-52 show example signing layouts using the R3-10 through R3-15 series signs~~
31 ~~for various preferential only lane applications.~~

32 Standard:

33 The provisions of Sections 2G.03 through 2G.07 regarding regulatory signs for Preferential lanes
34 shall apply to managed lanes operated at all times or at certain times by varying vehicle occupancy
35 requirements (HOV) or by using vehicle type restrictions as a congestion management strategy. Such
36 managed lanes shall use changeable message signs or changeable message elements within static signs to
37 display the appropriate regulatory sign messages only when they are in effect.

38 When certain types of vehicles (such as trucks) are prohibited from using a managed lane or when a
39 managed lane is restricted to use by only certain types of vehicles during certain operational strategies,
40 regulatory signs or regulatory panels within the appropriate guide signs that include changeable
41 message elements shall be used to display the open/closed status of the managed lane for such vehicle
42 types.

43 When the vehicle occupancy required for use of an HOV lane is varied as a part of a managed lane
44 operational strategy, regulatory signs that include changeable message elements shall be used to display
45 the required vehicle occupancy in effect.

46 Support:

47 See Section 2G.17 for regulatory signs for managed lanes that use tolling or pricing as a congestion
48 management strategy, either exclusively or with other management strategies.

49 Figures 2G-2 and 2G-3 illustrate the use of regulatory signs for the beginning, along the length, and at the
50 end of contiguous or buffer-separated preferential lanes that provide continuous access with the adjacent
51 general-purpose lanes.

52 Section ~~2B.27~~ 2G.04 Preferential ~~Only~~ Lanes for High-Occupancy Vehicles (HOVs) Vehicle
53 Occupancy Definition Regulatory Signs (R3-10 Series and R3-13 Series)

1 **Standard:**

2 The R3-10, ~~R3-10b~~, R3-13, and R3-13a Vehicle Occupancy Definition signs (see Figure 2G-1) shall
3 be used ~~in situations~~ where agencies determine that it is appropriate to provide a sign that defines the
4 ~~operational strategy (such as minimum occupancy or types of vehicles) that is being used to manage or~~
5 ~~regulate the vehicles that are permitted~~ allowed to use ~~a preferential only~~ an HOV lane. this paragraph
6 was relocated from Section 2B.26

7 Guidance:

8 The Inherently Low Emission Vehicle (ILEV) (~~R3-10b~~ R3-10a) sign (see Figure 2G-1) should be used ~~to~~
9 ~~indicate that~~ when it is permissible for a properly labeled and certified ILEV, regardless of the number of
10 occupants, to use an HOV lane. When used, the ILEV signs should be ~~ground-~~ post-mounted in advance of
11 and at intervals along the HOV lane based upon engineering judgment and the placement of other Preferential
12 Lane regulatory signs. The ~~R3-10b~~ R3-10a sign is only applicable to HOV lanes and should not to be used
13 with other preferential ~~only~~ lane applications. this paragraph was relocated from Section 2B.26

14 Support:

15 ~~Inherently low emission vehicles~~ ILEVs are defined by the Environmental Protection Agency (EPA) as
16 vehicles having no fuel vapor (hydrocarbon) emissions. ~~These vehicles must and are certified by the EPA as~~
17 meeting the emissions standards and requirements specified in 40 CFR 88-311-93 and 40 CFR 88.312-93(c).
18 this paragraph was relocated from Section 2B.26

19 Guidance:

20 The legend format of the R3-10 and R3-13 signs should have ~~this~~ the following sequence: this paragraph
21 was relocated from Section 2B.26

- 22 A. Top Line: "HOV 2+ ONLY" (or 3+ or 4+ if appropriate)
23 B. Bottom Lines: "2 OR MORE PERSONS PER VEHICLE" (or 3 or 4 if appropriate)

24 The legend format of the R3-13a sign should have the following sequence:

- 25 A. Top Line: "HOV 2+ ONLY" (or 3+ or 4+ if appropriate)
26 B. Middle Lines: "2 OR MORE PERSONS PER VEHICLE" (or 3 or 4 if appropriate)
27 C. Bottom Lines: Times and days the occupancy restriction is in effect

28 Support:

29 Section 2G.17 contains information regarding the legends of Vehicle Occupancy Definition signs for a
30 priced managed lane that has an occupancy requirement for non-toll travel.

31 **Standard:**

32 For barrier- or buffer-separated or contiguous preferential lanes where access between the
33 preferential and general-purpose lanes is restricted to designated locations, an overhead Vehicle
34 Occupancy Definition (R3-13 or R3-13a) sign, ~~which defines the occupancy requirement,~~ shall be
35 installed at least 1/2 mile in advance of the beginning of or initial entry point to an HOV lane. These
36 signs shall only be displayed in advance of the beginning of or initial entry point to HOV lanes. this
37 paragraph was relocated from Section 2B.28

38 Option:

39 For barrier-separated ~~preferential only~~ HOV lanes, the sequence of a post-mounted Periods of Operation
40 (R3-11a) sign followed by a ~~ground-~~ post-mounted Vehicle Occupancy Definition (R3-10) signs ~~defining the~~
41 occupancy requirement may be alternated in series with Preferential Only Lane Operational (R3-11, R3-11a,
42 R3-11b, or R3-11c) signs. ~~These signs~~ may be located at intervals of approximately ~~0.6~~ 1/2 mile along the
43 length of the ~~preferential only~~ HOV lane, at intermediate entry points, and at designated enforcement areas as
44 defined by the operating agency. this paragraph was relocated from Section 2B.28

45 **Standard:**

46 For buffer-separated or contiguous HOV lanes where access is restricted to designated locations,
47 the sequence of a post-mounted Periods of Operation (R3-11a) sign followed by a ~~Ground-~~ post-
48 mounted Vehicle Occupancy Definition (R3-10) signs ~~defining the occupancy requirement~~ shall be
49 located ~~and alternated with Preferential Only Lane Operational (R3-11 series) signs in series~~ at
50 intervals not greater than ~~0.6~~ 1/2 mile along the length of the ~~preferential only~~ access-restricted HOV
51 lane, at designated gaps ~~in the buffer~~ where vehicles are allowed to legally access the ~~preferential only~~
52 HOV lane, and within designated enforcement areas as defined by the operating agency. this sentence
53 came from a paragraph in Section 2B.28

1 For ~~concurrent-flow preferential-only~~ buffer-separated or contiguous HOV lanes where continuous
2 access with the adjacent general-purpose lanes is provided, the sequence of a post-mounted Periods of
3 Operation (R3-11a) sign followed by a ~~ground-~~ post-mounted Vehicle Occupancy Definition (R3-10)
4 signs ~~defining the occupancy requirement, and ILEV (R3-10a) signs if appropriate,~~ shall be located ~~and~~
5 ~~alternated with Preferential Only Lane Operational (R3-11-series) signs in series~~ at intervals not greater
6 than ~~0.6 1/2~~ mile along the length of the ~~preferential-only~~ HOV lane. this paragraph was relocated from
7 Section 2B.28

8 Guidance:

9 The signs within each Preferential Lane regulatory sign sequence should be separated by a minimum
10 distance of 800 feet and a maximum distance of 1,000 feet.

11 Standard:

12 For all types of direct access ramps that provide access to or lead to preferential-only HOV lanes, a
13 ~~ground-~~ post-mounted Vehicle Occupancy Definition (R3-10) sign ~~defining the occupancy requirement,~~
14 ~~and an ILEV (R3-10a) sign if appropriate, and a Preferential Only Lane Operational (R3-11-series) sign~~
15 shall be used at the beginning or initial entry point for ~~all types of the~~ direct access ramps ~~that provide~~
16 ~~access or lead to preferential-only lanes.~~ this paragraph was relocated from Section 2B.28

17 Standard:

18 ~~The requirements for a minimum number of occupants in a vehicle to use an HOV lane shall be in~~
19 ~~effect for most, or all, of at least one of the usual times of the day when the demand to travel is greatest~~
20 ~~(such as morning or afternoon peak travel periods) and the traffic congestion problems on the roadway~~
21 ~~and adjoining transportation corridor are at their worst.~~

22 ~~The Federal Highway Administration (FHWA) shall be consulted if a significant operational change~~
23 ~~is proposed that could reasonably be expected to affect a specific HOV lane or portions of the HOV~~
24 ~~system that were funded or approved by FHWA. This shall include portions of the local, regional, or~~
25 ~~Federal-aid highway system, where operational changes might significantly impact the operation of one~~
26 ~~HOV lane or portions of the regional HOV system. To assure consistency with the provisions of Titles~~
27 ~~23 and 49 of the United States Code (U.S.C), the important issues and possible impacts of any~~
28 ~~significant operational changes shall be reviewed to determine if any Federal approval is required.~~

29 ~~In accordance with the "Federal Aid Highway Program Guidance on High Occupancy Vehicle~~
30 ~~(HOV) Lanes" (see Section 1A.11), a proposed test or demonstration project that seeks to significantly~~
31 ~~change the operation of the HOV lanes for any length of time shall require a Federal review as outlined~~
32 ~~in Section 2 of the "Federal Aid Highway Program Guidance on High Occupancy Vehicle (HOV)~~
33 ~~Lanes" prior to initiating such a test or demonstration project. Also in accordance with the Federal~~
34 ~~Aid Highway Program Guidance on HOV lanes, any proposal to significantly change the operation of~~
35 ~~an HOV lane shall require some form of Federal review, which might require potential action.~~

36 Support:

37 ~~FHWA Division Offices, with involvement from the Federal Transit Administration (FTA), are~~
38 ~~responsible for reviewing proposals to significantly change the operation of HOV lanes. Federal interests in~~
39 ~~this review include commitments made during the National Environmental Policy Act process as described in~~
40 ~~Title 23 CFR, Part 771, in project agreements, transportation planning requirements, and transportation~~
41 ~~conformity requirements under the Clean Air Act (40 CFR, Part 51).~~

42 ~~Proposals to adjust only the HOV lane hours of operation during the day (for example, minor changes in~~
43 ~~hours during peak travel periods) or the occupancy requirements (for example, HOV 3+ to HOV 2+) are not~~
44 ~~typically considered significant operational changes and might not require an explicit Federal review or~~
45 ~~approval.~~

46 ~~Any action that has the potential to adversely affect the area's flow of traffic, roadway and traveler safety,~~
47 ~~or the environment might be considered to be a significant operational change. Any proposal to significantly~~
48 ~~adjust the hours of operation, or to convert an HOV lane to a general purpose travel lane, would be considered~~
49 ~~a significant operational change to the original project design concept or scope. Examples of significant~~
50 ~~operational changes could include:~~

- 51 ~~A. Switching from 24-hour HOV lane operations to only a portion of the day or week,~~
- 52 ~~B. Implementing a pricing option to an existing HOV lane (such as HOT lane or toll lane),~~
- 53 ~~C. Significantly reducing the hours of operation of an HOV lane that is operational during only one peak~~
54 ~~travel period, or~~

1 ~~D. Managing or operating the HOV lane in a manner that renders it functionally inoperable or obsolete~~
2 ~~(such as not providing enforcement of the occupancy requirement).~~

3 ~~Guidance:~~

4 ~~An engineering study based on the current and estimated future travel demand for a corridor and facility~~
5 ~~should be the basis for determining when, during a typical day, there should be a minimum occupancy~~
6 ~~requirement for a vehicle to use an HOV lane.~~

7 ~~Support:~~

8 ~~Inherently low-emission vehicle (ILEV) eligibility, testing and certification requirements, labeling, and~~
9 ~~other regulatory provisions are developed and administered through the Environmental Protection Agency~~
10 ~~(EPA). EPA is the only entity with the authority to certify ILEVs. Vehicle manufacturers must request the~~
11 ~~EPA to grant an ILEV certification for any vehicle to be considered and labeled as meeting those standards.~~
12 ~~According to the EPA, 1996 was the first year that they certified any ILEVs. EPA regulations specify that~~
13 ~~ILEVs must meet the emission standards specified in 40 CFR 88.311-93 and their labeling must be in~~
14 ~~accordance with 40 CFR 88.312-93(c). EPA established the ILEV concept to recognize vehicles with no fuel~~
15 ~~vapor (hydrocarbons) emissions. Zero emission vehicles (electric powered vehicles) that have no emissions~~
16 ~~are the only other type of clean fuel vehicles that are allowed to use HOV lanes.~~

17 ~~Standard:~~

18 ~~Agencies shall permit a vehicle with less than the required number of occupants to operate on HOV~~
19 ~~lanes if:~~

- 20 ~~A. The vehicle is properly labeled and certified as an ILEV and the lane is not a bus only HOV~~
21 ~~lane, or~~
22 ~~B. The HOV lanes are part of a project that is participating in the FHWA Value Pricing Pilot~~
23 ~~Program (see Section 2 of the “Federal Aid Highway Program Guidance on High Occupancy~~
24 ~~Vehicle (HOV) Lanes”).~~

25 ~~Motorcycles shall be permitted to use HOV lanes that receive Federal aid program funding.~~

26 **Section ~~2B.28~~ 2G.05 Preferential ~~Only~~ Lane Periods of Operation Regulatory Signs**
27 **Applications and Placement (R3-11 Series and R3-14 Series)**

28 ~~Guidance:~~

29 The sizes of ~~the ground-~~ post-mounted ~~Preferential Only Lane Operational~~ Periods of Operation (R3-11
30 series) signs should remain consistent to accommodate any manual addition or ~~subtraction~~ removal of a single
31 line of text for each sign. this paragraph was relocated from Section 2B.26

32 ~~Support:~~

33 Consistent sign sizes are beneficial for agencies when ordering sign materials, as well as when making
34 text changes to existing signs if changes occur to operating times or occupancy restrictions in the future. For
35 example, the R3-11c sign has space for one line located below “24 HOURS” if an agency ~~desires to add~~
36 determines that it is appropriate to display additional information (such as “MON – FRI”), yet the R3-11c sign
37 has the same dimensions as the other R3-11 series signs. this paragraph was relocated from Section 2B.26

38 ~~Standard:~~

39 When used, the ~~ground-~~ post-mounted ~~Preferential Only Lane Operational~~ Periods of Operation
40 (R3-11 series) signs shall be located adjacent to the preferential ~~only~~ lane, and the overhead ~~Preferential~~
41 ~~Only Lane Operational~~ Periods of Operation (R3-14 series) signs shall be mounted directly over the
42 lane. this paragraph was relocated from Section 2B.26

43 The legend format of the ~~ground-~~ post-mounted ~~Preferential Only Lane Operational~~ Periods of
44 Operation (R3-11 series) signs shall have the following sequence: this paragraph was relocated from
45 Section 2B.26

- 46 A. Top Lines: Lanes applicable, such as “RIGHT LANE” or “2 RIGHT ~~2~~ LANES” or “THIS
47 LANE”
48 B. Middle Lines: Eligible uses, such as “HOV 2+ ONLY” (or 3+ or 4+ if appropriate) or “BUSES
49 ONLY” or other applicable uses or eligible turning movements
50 C. Bottom Lines: Applicable times and days, such as “7 AM – 9 AM” or “6:30 AM – 9:30 AM,
51 MON-FRI”

1 The legend format of the overhead ~~Preferential Only Lane Operational~~ Periods of Operation (R3-14
2 series) signs shall have the following sequence: this paragraph was relocated from Section 2B.26

- 3 A. Top Line: Eligible uses, such as “HOV 2+ ONLY” (or 3+ or 4+ if appropriate) or “BUSES
4 ONLY” or other ~~types of vehicles~~ applicable uses or eligible turning movements
5 B. Bottom Lines: Applicable times and days, with the time and day placed above the down arrow,
6 such as “7 AM – 9 AM” or “6:30 AM – 9:30 AM, MON-FRI” (When the operating periods
7 exceed the available line width, the hours and days of the week shall be stacked as shown for the
8 R3-14a sign in Figure 2G-1.)

9 For preferential lanes that are in effect on a full-time basis, either the full-time Periods of Operation
10 (R3-11b and R3-14b) signs shall be used, or the legends of the part-time Periods of Operations (R3-11,
11 R3-11a, R3-14, R3-14a) signs shall be modified to display the legend 24 HOURS.

12 The full-time Periods of Operation (R3-14b) sign shall not be used where the preferential lane is in
13 effect only on a part-time basis.

14 Option:

15 Where additional movements are permitted from a preferential ~~only~~ lane on an approach to an
16 intersection, the format and words used in the legend in the middle lines on the ~~ground-~~ post-mounted
17 ~~Preferential Only Lane Operational~~ Periods of Operation (R3-11 series) signs and on the top line of the
18 overhead ~~Preferential Only Lane Operational~~ Periods of Operation (R3-14 series) signs may be modified to
19 accommodate the permitted movements (such as “HOV 2+ AND RIGHT TURNS ONLY”). this paragraph
20 was relocated from Section 2B.26

21 A MOTORCYCLES ALLOWED (R3-11P) plaque may be used where motorcycles, regardless of the
22 number of occupants, are allowed to use an HOV lane.

23 **Standard:**

24 If used, the MOTORCYCLES ALLOWED plaque shall be mounted below a post-mounted
25 Preferential Lane Periods of Operation (R3-11, R3-11a, or R3-11c) sign.

26 For all barrier- or buffer-separated or contiguous preferential ~~only~~ lanes where access is restricted
27 to designated locations, an overhead ~~Preferential Only Lane Operational~~ Periods of Operation (R3-14
28 series) sign shall be used at the beginning or initial entry point, and at any intermediate ~~access~~ entry
29 points or gaps in the barrier where vehicles are allowed to legally access the ~~barrier-separated access-~~
30 restricted preferential ~~only~~ lanes. For all barrier-separated and buffer-separated preferential lanes,
31 Ground- post-mounted ~~Preferential Only Lane Operational~~ Periods of Operation (R3-11 series) signs
32 shall be used only as a supplement to the overhead signs at the beginning or initial entry point, or at any
33 intermediate ~~access~~ entry points or gaps in the barrier or buffer.

34 ~~For buffer-separated preferential only lanes (painted buffer of 2 feet or more), an overhead~~
35 ~~Preferential Only Lane Operational (R3-14 series) sign shall be used at the beginning or initial entry~~
36 ~~point, and at intermediate access points or gaps where vehicles are allowed to legally access the buffer-~~
37 ~~separated preferential only lane, this paragraph was incorporated into the previous paragraph~~

38 For buffer-separated or contiguous preferential lanes where continuous access with the adjacent
39 general-purpose lanes is provided, including those where a preferential lane is added to the roadway
40 (see Figure 2G-2 for HOV lanes) and those where a general-purpose lane transitions into a preferential
41 lane (see Figure 2G-3 for HOV lanes), an overhead Periods of Operation (R3-14 series) sign shall be
42 used at the beginning or initial entry point of the preferential lane.

43 Guidance:

44 Overhead (R3-14 series) or post-mounted (R3-11 series) Periods of Operation signs should be installed at
45 periodic intervals along the length of a contiguous or buffer-separated preferential lane where continuous
46 access with the adjacent general-purpose lanes is provided.

47 Option:

48 Additional overhead (R3-14 series) or post-mounted (R3-11 series) Periods of Operation signs may be
49 provided along the length of any type of preferential lane.

50 On conventional roads, the overhead Periods of Operation (R3-14 series) signs may be installed at the
51 beginning or entry points and/or at intermediate points along preferential lanes in any geometric
52 configuration.

53 **Standard:**

1 For all types of direct access ramps that provide access to or lead to preferential lanes, a post-
2 mounted Periods of Operation (R3-11 series) sign shall be used at the beginning or initial entry point of
3 the direct access ramp.

4 Option:

5 For direct access ramps to preferential ~~only~~ lanes, an overhead ~~Preferential Only Lane Operational~~ Periods
6 of Operation (R3-14 series) sign may be used at the beginning or initial entry point to supplement the required
7 ~~ground-~~ post-mounted signs.

8 Lane-use control signals (see Chapter 4M) may be used at access points to preferential lanes to indicate
9 that a ramp or access roadway leading to the preferential lane or facility, or one or more specific lanes of the
10 facility, are open or closed (see Figure 2G-14).

11 ~~Standard:~~

12 ~~A ground-mounted Preferential Only Lane Operational (R3-11, R3-11a, R3-11b, or R3-11d) sign~~
13 ~~shall be installed at the beginning, initial entry point, intermediate access points, and direct access~~
14 ~~ramps to all types of preferential only lanes. The overhead Preferential Only Lane Operational (R3-14~~
15 ~~series) signs shall be installed only at the beginning or initial entry point to all types of preferential only~~
16 ~~lanes.~~

17 ~~Option:~~

18 ~~Additional ground-mounted Preferential Only Lane (R3-10, R3-11, R3-11a, R3-11b, or R3-11e) signs~~
19 ~~may be provided along the length of a preferential only lane.~~

20 ~~For barrier-separated reversible flow preferential only lanes, Preferential Only Lane signs may be either~~
21 ~~static or changeable message type.~~

22 ~~For buffer-separated preferential only lanes, overhead Preferential Only Lane Operational (R3-14 series)~~
23 ~~signs may be used at specific locations and intervals along the length of the preferential only lane to~~
24 ~~supplement the ground-mounted R3-10 signs defining the occupancy requirement and the Preferential Only~~
25 ~~Lane Operational (R3-11 series) signs based on an engineering study.~~

26 ~~For concurrent-flow preferential only lanes, overhead Preferential Only Lane Operational (R3-14 series)~~
27 ~~signs may be used at specific locations and intervals along the length of the preferential only lane to~~
28 ~~supplement the ground-mounted R3-10 signs defining the occupancy requirement and the Preferential Only~~
29 ~~Lane Operational (R3-11 series) signs based on an engineering study.~~

30 ~~Support:~~

31 ~~Section 2B.26 contains provisions regarding the use of changeable message signs for preferential only~~
32 ~~lanes.~~

33 ~~Section 2E.59 contains additional provisions regarding signing for preferential only lanes on freeway and~~
34 ~~expressway facilities. Figures 2E-46 through 2E-52 show application and placement examples for~~
35 ~~Preferential Only Lane signs for a variety of preferential only lane situations.~~

36 Section 2G.06 Preferential Lane Advance Regulatory Signs (R3-12, R3-12e, R3-12f, R3-15, R3- 37 15a, and R3-15d)

38 Guidance:

39 The Preferential Lane Advance (R3-12, R3-12f, R3-15, and R3-15d) signs should be used for advance
40 notification of a barrier-separated, buffer-separated, or contiguous preferential lane that is added to the
41 general-purpose lanes (see Figure 2G-12).

42 The Preferential ~~Only~~ Lane ~~Ahead~~ Advance (~~R3-10a, R3-12, R3-12e~~ and R3-15a) signs should be used
43 for advance notification of a general-purpose lane that becomes a preferential ~~only~~ lane. (see Figure 2G-13).
44 this paragraph was relocated from Section 2B.26

45 Option:

46 The legends on the R3-12f and R3-15d signs may be modified to suit the type of preferential lane.

47 ~~Overhead Preferential Only Lane Ahead (R3-15) signs may be placed approximately 1 mile and 2 miles in~~
48 ~~advance of the beginning or initial entry points to any type of preferential only lane.~~ this paragraph was
49 relocated from Section 2B.28

50 ~~The ground-mounted Preferential Only Lane Ahead (R3-12) sign may be installed at a minimum of 1 mile~~
51 ~~in advance of the beginning or initial entry point to any type of preferential only lane.~~ this paragraph was
52 relocated from Section 2B.28

1 Guidance:

2 ~~For all barrier-separated preferential only lanes, an overhead Preferential Only Lane Ahead (R3-15) sign~~
3 ~~should be installed and located at least 1 mile in advance of the beginning or initial entry point.~~ this paragraph
4 was relocated from Section 2B.28

5 On conventional roads, for general-purpose lanes that become preferential lanes, a post-mounted (R3-12e)
6 or overhead (R3-15a) Preferential Lane Advance sign should be installed in advance of the beginning of or
7 initial entry point to the preferential lane at a distance determined by engineering judgment based on speed,
8 traffic characteristics, and other site-specific considerations. The distance selected should provide adequate
9 opportunity for ineligible vehicles to vacate the lane prior to the beginning of the restriction.

10 On freeways and expressways, for general-purpose lanes that become preferential lanes, an overhead
11 Preferential Lane Advance (R3-15a) sign should be installed at least 1 mile in advance of the beginning of the
12 preferential lane restriction.

13 Option:

14 Additional post-mounted or overhead Preferential Lane Advance signs may be placed farther in advance
15 of or closer to the beginning or initial entry points to a preferential lane.

16 Section 2G.07 Preferential Lane Ends Regulatory Signs (R3-12a, R3-12b, R3-12c, R3-12d, R3- 17 12g, R3-12h, R3-15b, R3-15c, and R3-15e)

18 Standard:

19 ~~The A ground- post-mounted Preferential ~~Only~~ Lane Ends 1/2 Mile (R3-12b or R3-12h) sign shall~~
20 ~~be installed at least 1/2 mile in advance of the termination of ~~an HOV~~ a preferential lane.~~ this paragraph
21 was relocated from Section 2B.28

22 Except as provided in Paragraph 6, ~~The a ground-~~ post-mounted Preferential ~~Only~~ Lane Ends (R3-
23 12a ~~or R3-12g~~) sign shall be installed at the point where ~~the a preferential only lane~~ and restriction ends
24 and traffic must merge into the general-purpose lanes.

25 ~~All longitudinal pavement markings, as well as word and symbol pavement markings, associated~~
26 ~~with the preferential only lane shall end where the R3-12a sign designating the end of the preferential~~
27 ~~only lane restriction is installed.~~ this deleted sentence is now covered in Chapter 3B

28 A post-mounted Preferential Lane Ends (R3-12d) sign shall be installed at least 1/2 mile in advance
29 of the point where a preferential lane restriction ends and the lane becomes a general-purpose lane.

30 Except as provided in Paragraph 7, a post-mounted Preferential Lane Ends (R3-12c) sign shall be
31 installed at the point where a preferential lane restriction ends and the lane becomes a general-purpose
32 lane.

33 Option:

34 The legends on the R3-12g and R3-15e signs may be modified to suit the type of preferential lane.

35 An overhead Preferential Lane Ends (R3-15b or R3-15e) sign may be installed instead of or in addition to
36 a post-mounted R3-12a or R3-12g sign at the point where a preferential lane and restriction ends and traffic
37 must merge into the general-purpose lanes.

38 An overhead Preferential Lane Ends (R3-15c) sign may be installed instead of or in addition to a post-
39 mounted R3-12c sign at the point where the preferential lane restriction ends and the lane becomes a general-
40 purpose lane.

41 Section 2G.08 Warning Signs on Median Barriers for Preferential Lanes

42 Option:

43 When a warning sign applicable only to a preferential lane is installed on a median barrier with limited
44 lateral clearance to the adjacent travel lanes or shoulders, the warning sign may have a vertical rectangular
45 shape. For a High Occupancy Vehicle lane, such signs may be used instead of using the HOV Plaque (W16-
46 11P) (see Section 2G.09) with a standard diamond-shaped warning sign.

47 Standard:

48 When a vertical rectangular-shaped warning sign applicable only to a preferential lane is installed
49 on a median barrier, the top portion of the sign shall be comprised of a white symbol or legend denoting
50 the type of preferential lane (such as the diamond symbol for HOV or the legend BUS LANE) on a
51 black background with a white border, and the bottom portion of the sign shall be comprised of the

1 standard word message or symbol of the standard warning sign as a black legend on a yellow
2 background with a black border (see Figure 2G-4).

3 Guidance:

4 Where lateral clearance is limited, such as when a post-mounted warning sign applicable only to a
5 preferential lane is installed on a median barrier, the edges of the sign should not project beyond the outer
6 edges of the barrier.

7 Option:

8 Where lateral clearance is limited, warning signs applicable only to a preferential lane that are post-
9 mounted on a median barrier and that are 72 inches or less in width may be skewed up to 45 degrees in order
10 to fit within the barrier width or may be mounted higher, such that the vertical clearance to bottom of the sign,
11 light fixture, or its structural support, whichever is lowest, is not less than 14 feet above any portion of the
12 pavement and shoulders.

13 Standard:

14 Where lateral clearance is limited, Preferential Lane warning signs that are post-mounted on a
15 median barrier and that that are wider than 72 inches shall be mounted with a vertical clearance that
16 complies with the provisions of Section 2A.18 for overhead mounting.

17 **Section ~~2C.52~~ 2G.09 High-Occupancy Vehicle (HOV) Plaque (W16-11P)**

18 Option:

19 In situations where there is a need to warn drivers in an HOV lane of a specific condition, a HOV (W16-
20 11P) plaque (see Figure 2G-4) may be used above a warning sign. The HOV plaque may be used to
21 differentiate a warning sign specific for HOV lanes when the sign is also visible to traffic on the ~~adjoining~~
22 adjacent general-purpose roadway. Among the warning signs that may be possible applications of the HOV
23 plaque are the ~~Advisory Speed~~, Advisory Exit Speed, Added Lane, and Merge signs.

24 The diamond symbol may be used instead of the word message HOV on the W16-11P plaque. When
25 appropriate, the words LANE or ONLY may be used on this plaque.

26 Support:

27 Section 2G.08 contains information regarding warning signs that can be mounted on barriers for HOV or
28 other types of preferential lanes.

29 **Section ~~2E.59~~ 2G.10 Preferential ~~Only~~ Lane Guide Signs – General** Section 2E.59 was split into 30 four Sections and substantially edited

31 Support:

32 Preferential lanes are used on freeways, expressways, and conventional roads. Except as otherwise
33 provided, Sections 2G.10 through 2G.15 apply only to guide signs for preferential lanes on freeways and
34 expressways.

35 Guidance:

36 On conventional roads, guide signs applicable only to preferential lanes are ordinarily not needed, but if
37 used they should comply with the provisions for guide signs in Chapter 2D and any principles for Preferential
38 Lane guide signs in Sections 2G.10 through 2G.15 that engineering judgment finds to be appropriate for the
39 conditions.

40 Support:

41 Consistency in signs and pavement markings for preferential lanes plays a critical role in building public
42 awareness, understanding, and acceptance, and makes enforcement more effective.

43 Additional guidance and standards related to the designation, operational considerations, signing signs,
44 pavement markings, and other considerations for preferential ~~only~~ lanes is provided in Sections 2G.03 through
45 2G.07, and 2G.09, ~~3B.22~~, and ~~3B.23~~ Chapter 3D.

46 Guidance:

47 ~~Because consistency in signing and pavement markings for preferential only lanes within a State or~~
48 ~~metropolitan area plays a critical role in building public awareness, understanding, and acceptance, and makes~~
49 ~~enforcement more effective, an engineering study should be conducted to determine~~ The appropriate
50 combinations of pavement markings and standard overhead ~~signs~~, and ~~ground-~~ post-mounted regulatory,

1 warning, and guide signs ~~and pavement markings~~ for a specific preferential ~~only~~ lane application should be
2 selected based on an engineering study.

3 If overhead signs applicable only to a preferential lane are located in approximately the same longitudinal
4 position along the highway as overhead signs applicable only to the general-purpose lanes, the signs for the
5 preferential lane should be separated laterally from the signs for the general-purpose lanes to the maximum
6 extent practical to minimize conflicting information.

7 The Preferential ~~Only~~ Lane ~~signing~~ signs should be designed and located to avoid overloading the road
8 user. Based on the importance of the sign, ~~the following priority regulatory signs~~ should be given: ~~regulatory,~~
9 ~~advance regulatory,~~ priority over guide, then signs. The order of priority of guide signs should be Advance
10 Guide, Preferential Lane Entrance Direction, and finally ~~next~~ Preferential Lane Exit Destination supplemental
11 guide signs.

12 **Standard:**

13 Signs applicable only to a preferential lane shall be distinguished from signs applicable to general-
14 purpose lanes by the inclusion of the applicable symbol(s) and/or word(s).

15 **Support:**

16 The symbol and/or word message that appears on a particular guide sign applicable only to a preferential
17 lane will vary based on the specific type of allowed traffic and on other related operational constraints that
18 have been established for a particular lane, such as an HOV lane, a bus lane, or a taxi lane.

19 **Standard:**

20 For HOV lanes, the diamond symbol shall appear on each Advance Guide sign, Preferential Lane
21 Entrance Direction sign, and Preferential Lane Entrance Gore sign, as shown in Figures 2G-5 through
22 2G-7 for the designated entry and exit points for barrier- and buffer-separated geometric
23 configurations and direct access ramps to or from such lanes. The diamond symbol shall not be used
24 with preferential lanes for other types of traffic, such as bus lanes or taxi lanes.

25 Signing for an HOV lane that is managed by means of varying the occupancy requirement in
26 response to changing conditions shall also comply with these provisions.

27 ~~Either the HOV abbreviation or~~ The diamond symbol shall ~~appear~~ be displayed in the legend of
28 each Preferential ~~only~~ Lane guide sign at the designated entry and exit points for all types of HOV lanes
29 (including barrier- and buffer-separated, ~~concurrent flow~~ contiguous, and direct access ramps) in order
30 to alert motorists that there is a minimum allowable vehicle occupancy requirement for vehicles to use
31 the HOV lanes ~~and to inform them of the times during which these vehicle occupancy requirements are~~
32 ~~in effect.~~ Guide signs shall not display the occupancy requirement for the preferential lane.

33 A combination of guide and regulatory signs shall be used in advance of and at the initial entry
34 point and all intermediate entry points from general-purpose lanes or facilities to ~~all~~ contiguous,
35 barrier-separated, and buffer-separated preferential ~~only~~ lanes where access between the preferential
36 and general-purpose lanes is restricted to designated locations. ~~The Advance Guide signs for~~
37 ~~preferential only lanes shall be consistent with the requirements of Section 2E.30.~~ The regulatory signs
38 shall comply with the provisions of Sections 2G.03 through 2G.07.

39 Regulatory signs alone shall be used in advance of, at the beginning of, and at periodic intervals
40 along contiguous or buffer-separated preferential lanes that provide continuous access between the
41 adjacent general-purpose lanes and the preferential lane (see Figures 2G-12 and 2G-13). The design
42 and placement of the regulatory signs shall comply with the provisions of Sections 2G.03 through
43 2G.07.

44 Except as otherwise provided in Sections 2G.10 through 2G.13, guide signs applicable to a
45 preferential lane with a vehicle occupancy requirement shall be distinguished from those applicable to
46 general-purpose lanes by displaying the white diamond symbol on a black background at the left-hand
47 edge of these signs.

48 **Option:**

49 When post-mounted guide signs applicable only to a preferential lane are installed on a median barrier
50 with limited lateral clearance to the adjacent travel lanes or shoulders, the guide signs may have a vertical
51 rectangular shape.

52 **Standard:**

1 When vertical rectangular shaped guide signs applicable only to a preferential lane are installed on
2 a median barrier, the top portion of the signs shall be comprised of the applicable white symbol or
3 white word message that identifies the type of preferential lane (such as the diamond symbol for an
4 HOV lane) on a black background with a white border, and the bottom portion of the sign shall be
5 comprised of the appropriate guide sign legend on a green background with a white border (see Figures
6 2G-3, 2G-6, and 2G-7).

7 Guidance:

8 Where lateral clearance is limited, such as when a ~~ground-~~ post-mounted Preferential ~~Only~~ Lane guide
9 sign is installed on a median barrier, the edges of the sign should not project beyond the outer edges of the
10 barrier.

11 Option:

12 Where lateral clearance is limited, Preferential ~~Only~~ Lane (~~R3-10, R3-11, and R3-12 series~~) guide signs
13 that are 72 inches or less in width may be skewed up to 45 degrees in order to fit within the barrier width or
14 may be mounted ~~at a height of 14 feet or more above the roadway~~ higher, such that the vertical clearance to
15 the bottom of the sign, light fixture, or its structural support, whichever is lowest, is not less than 14 feet
16 above any portion of the pavement and shoulders.

17 **Guidance Standard:**

18 Where lateral clearance is limited, Preferential ~~Only~~ Lane guide signs that are post-mounted on a
19 median barrier and that are wider than 72 inches ~~should shall~~ be mounted ~~at a height of at least 14 feet~~
20 ~~above the roadway~~ with a vertical clearance that complies with the provisions of Section 2A.18 for
21 overhead mounting.

22 Option:

23 Lane-use control signals (see Chapter 4M) may be used at access points to preferential lanes to indicate
24 that a ramp or access roadway leading to or from the preferential lane or facility, or one or more specific lanes
25 of the facility, are open or closed.

26 Changeable message signs may ~~be used to~~ supplement, substitute for, or be incorporated into static guide
27 signs where travel conditions change or where multiple types of operational strategies (such as variable
28 occupancy requirements, vehicle types, or pricing policies) are used and varied throughout the day or week to
29 manage the use of, control of, or access to preferential ~~only~~ lanes.

30 **Standard:**

31 When changeable message signs (see ~~Section 2A.07~~ Chapter 2L) are used as ~~regulatory or~~ guide
32 signs for preferential ~~only~~ lanes, they shall be the required sign size and shall display the required letter
33 height and legend format that corresponds to the type of roadway facility and design speed.

34 Advance Guide signs, Preferential Lane Entrance Direction signs, and Preferential Lane Entrance
35 Gore signs for the initial entry point and intermediate entry points into a preferential lane from the
36 general-purpose lanes on the same designated route shall not identify the entry point as an exit by using
37 the word “EXIT” on the sign or on a plaque.

38 Guidance:

39 Advance Guide signs and Preferential Lane Entrance Direction signs for initial and intermediate entry
40 points into a preferential lane should use the word “ENTRANCE,” such as “HOV LANE ENTRANCE” (see
41 Figures 2G-5 and 2G-6) to convey the fact that vehicles are not leaving the designated route.

42 Preferential Lane Entrance Gore signs (see Figure 2G-7) at the initial entry point to a preferential lane
43 should use the word “ENTRANCE.” Preferential Lane Entrance Gore signs at intermediate entry points to a
44 barrier-separated preferential lane where the sign would be located immediately adjacent to and directly
45 viewed by traffic in the preferential lane should not use the word “ENTRANCE.”

46 **Standard:**

47 When the entry point is on the left-hand side of the general-purpose lanes, a LEFT (E1-5aP) plaque
48 (see Figure 2E-22) shall be added to the top left edge of the Advance Guide and Preferential Lane
49 Entrance Direction signs. The LEFT plaque shall not be used on a preferential lane regulatory sign.

50 ~~Reversible flow or express lanes that do not have any specific vehicle occupancy or designation~~
51 ~~restrictions shall be consistent with the requirements of Chapters 2B and 3B.~~

1 ~~Overhead preferential only lane guide signs shall be used only as a supplement to ground-mounted~~
2 ~~preferential only lane guide signs unless an engineering study identifies that ground-mounted guide~~
3 ~~signs are not appropriate for a particular situation or location.~~

4 ~~Guidance:~~

5 ~~Existing sign and bridge structures should be used to the extent practical for the installation of preferential~~
6 ~~only lane signs. Where possible, advance guide and guide signs that are provided for preferential only lanes~~
7 ~~should share sign structures spanning the preferential only lanes and the adjoining freeway facility.~~

8 ~~Standard:~~

9 ~~Ground-mounted and overhead advance guide signs, guide signs, and exit signs applicable to HOV~~
10 ~~lanes and direct access ramps to HOV lanes shall contain the HOV diamond symbol in the upper left~~
11 ~~corner of the sign as shown in Figures 2E-46 through 2E-52. The diamond symbol shall not be used~~
12 ~~with lanes designated for bus or taxi traffic.~~

13 ~~Option:~~

14 ~~Agencies may select from either the HOV abbreviation or the diamond symbol to reference the HOV lane~~
15 ~~designation.~~

16 ~~Standard:~~

17 ~~For concurrent flow preferential only lanes, including those where a preferential only lane is added~~
18 ~~to the roadway (see Figure 2E-48 for HOV lanes) and those where a general purpose lane transitions~~
19 ~~into a preferential only lane on the roadway (see Figure 2E-49 for HOV lanes), an overhead regulatory~~
20 ~~(R3-14 or R3-14a) sign shall be used.~~

21 Section 2G.11 Guide Signs for Initial Entry Points to Preferential Lanes relocated from Section

22 2E.59

23 **Standard:**

24 ~~Ground-mounted~~ Except where a buffer-separated or contiguous preferential lane is added or
25 where a general-purpose lane becomes a buffer-separated or contiguous preferential lane, and provides
26 continuous access with the adjacent general-purpose lanes as illustrated in Figures 2G-2 and 2G-3, an
27 Advance Guide signs shall be provided at least 1/2 mile prior to the beginning or initial entry point to
28 all types of preferential only lanes in any type of geometric configuration (including barrier-separated,
29 buffer-separated, and concurrent flow). Ground-mounted guide signs shall be provided at the
30 beginning or initial entry point and at intermediate access points to all types of preferential only lanes.
31 A Preferential Lane Entrance Direction sign shall also be provided at the initial entry point. Advance
32 Guide and Preferential Lane Entrance Direction signs for such entry points shall not include the word
33 “EXIT” (see Section 2G.10).

34 Guidance:

35 An Advance Guide sign should also be installed and located approximately 1 mile in advance of the initial
36 entry point to a preferential lane that restricts access with the adjacent general-purpose lanes to designated
37 locations.

38 Option:

39 ~~Overhead advance guide signs and overhead guide signs may be used in advance of, at the beginning or~~
40 ~~initial entry point, and at designated intermediate access points to any type of preferential only lane. An~~
41 ~~Advance Guide signs may also be installed and located approximately 1 mile and 2 miles in advance of the~~
42 ~~beginning or initial entry point to any type of a preferential only lane that restricts access with the adjacent~~
43 ~~general-purpose lanes to designated locations.~~

44 **Standard:**

45 For barrier-separated, buffer-separated, or contiguous preferential only lanes where entry is
46 restricted to only designated points, overhead the Advance Guide and overhead guide Preferential Lane
47 Entrance Direction signs shall be provided in advance of and at the beginning or initial entry point to
48 the preferential only lanes (see Figure 2E-46 for HOV lanes) mounted overhead. Overhead guide signs
49 shall also be used at all intermediate entry points to barrier-separated preferential only lanes (see
50 Figure 2E-47 for HOV lanes).

51 Guidance:

1 ~~Advance~~ Preferential Lane Exit Destination guide signs, identifying final destination and downstream exit
2 locations accessible from the preferential lane (see Figures 2G-8, 2G-13, 2G-14, and 2G-16), should be
3 installed in advance of ~~designated the initial~~ entry points ~~and along the length of~~ to access-restricted
4 preferential ~~only~~ lanes (such as barrier- and buffer-separated). ~~In addition to the routes that typically appear~~
5 ~~on advance destination guide signs, these signs should also include destinations.~~ These signs should be
6 located based on the priority of the message, the available space, the existing signs on adjoining adjacent
7 general-purpose traffic lanes, roadway and traffic characteristics, the proximity to existing overhead signs, the
8 ability to install overhead signs, and other unique local factors.

9 **Standard:**

10 Advance destination guide signs for preferential lanes shall include an upper section displaying a
11 black legend that includes the type of preferential lane and the word “EXITS,” such as “HOV EXITS,”
12 on a white background. For preferential lanes that incorporate a vehicle occupancy requirement, the
13 white diamond symbol on a black background shall be displayed at the left edge of this upper section
14 (see Figure 2G-8).

15 **Support:**

16 Figure 2G-8 shows an example of signs for the initial entry point to a preferential lane.

17 **Guidance:**

18 ~~Where conditions restrict the ability to provide more than one advance guide sign in advance of any type~~
19 ~~of preferential only lane, the advance guide sign that is installed should be placed at least 1/2 mile in advance~~
20 ~~of the beginning or entry point to the preferential only lane.~~

21 **Option:**

22 ~~Advance guide signs may be provided for preferential only lanes with unrestricted access, such as~~
23 ~~concurrent flow preferential only lanes.~~

24 **Guidance:**

25 ~~For barrier-separated preferential only lanes where conditions restrict the ability to provide more than one~~
26 ~~advance guide sign prior to the entrance to the preferential only lane, the sign should be placed approximately~~
27 ~~1/2 mile in advance of the exit. In these situations, the installation of the corresponding regulatory and next~~
28 ~~exit supplemental signs should be located based on the priority of the message and the available space.~~

29 **Section 2G.12 Guide Signs for Intermediate Entry Points to Preferential Lanes** relocated from
30 Section 2E.59

31 **Standard:**

32 For barrier-separated, buffer-separated, and contiguous preferential lanes where entry is restricted
33 only to designated points, an overhead Preferential Lane Entrance Direction sign shall be provided at
34 intermediate entry points to the preferential lane from the general-purpose lanes.

35 **Guidance:**

36 For barrier- and buffer-separated preferential lanes where intermediate entry from the general-purpose
37 lanes is provided via a separate lane or ramp (see Figure 2G-9), at least one Advance Guide sign should be
38 provided in addition to the Preferential Lane Entrance Direction sign.

39 For access-restricted preferential lanes where intermediate entrance and egress are at the same designated
40 access location, the Preferential Lane Entrance Direction sign should be located between 1/2 and 1/4 of the
41 length of the designated entry area, as measured from the downstream end of the entry area (see Figure 2G-
42 10).

43 **Standard:**

44 The Advance Guide signs, if used for intermediate entry points to a preferential lane from the
45 general-purpose lanes, shall be overhead.

46 **Option:**

47 Advance Guide signs may be provided at approximately 1/2 mile, 1 mile, and 2 miles in advance of
48 intermediate entry points from the general-purpose lanes to a preferential lane.

49 **Standard:**

50 Advance Guide and Preferential Lane Entrance Direction signs for intermediate entry points shall
51 not include the word “EXIT” (see Section 2G.10).

1 Guidance:

2 Exit Destination guide signs, identifying the final destination and downstream exit locations accessible
3 from the preferential lane, should be installed in advance of intermediate entry points from the general-
4 purpose lanes to access-restricted preferential lanes.

5 Support:

6 Section 2G.11 contains information on the design and placement of Preferential Lane Exit Destination
7 guide signs.

8 Figures 2G-9 and 2G-10 show examples of signs for various geometric configurations of intermediate
9 entry to a barrier- or buffer-separated preferential lane where access is restricted to designated locations.

10 **Section 2G.13 Guide Signs for Egress from Preferential Lanes to General-Purpose Lanes**
11 relocated from Section 2E.59

12 **Standard:**

13 For barrier-separated, buffer-separated, and contiguous preferential ~~only~~ lanes where egress is
14 restricted only to designated points, ~~ground-~~ post-mounted Advance ~~exit~~ Guide and ~~ground-~~ post-
15 mounted ~~Exit~~ Intermediate Egress Direction signs (see Figure 2G-11) shall be installed ~~prior to and at~~
16 ~~the intermediate exit points of the preferential only lanes (see Figure 2E-47 for HOV lanes). Ground-~~
17 ~~mounted guide signs shall be mounted~~ in the median or on median barriers that separate two directions
18 of traffic ~~prior to and at the intermediate exit points from the preferential lanes to the general-purpose~~
19 lanes (see Figure 2G-9).

20 The legends of these signs shall refer to the next exit or exits from the general-purpose lanes by
21 displaying the appropriate destination information, exit number(s), or both. The Intermediate Egress
22 Direction signs for egress from the preferential lanes to the general-purpose lanes shall not refer to the
23 egress as an exit.

24 Support:

25 Section 2G.10 contains information on the design of post-mounted guide signs applicable to a preferential
26 lane when installed on a median barrier. Figures 2G-9 and 2G-12 show examples of signs for various
27 geometric configurations of intermediate egress from a barrier- or buffer-separated preferential lane where
28 access is restricted to designated locations.

29 Guidance:

30 Where two or more adjacent preferential lanes are present in a single direction, consideration should be
31 given to the use of overhead guide signs to display the information related to egress from the preferential
32 lanes.

33 For barrier-separated and buffer-separated preferential lanes where egress from a preferential lane to the
34 general-purpose lanes is restricted only to designated points via a separate lane or ramp, the Advance Guide
35 and Intermediate Egress Direction signs for the egress should be mounted overhead and a Pull-Through sign
36 should be mounted with the Intermediate Egress Direction sign (see Figure 2G-12).

37 **Standard:**

38 For preferential lanes that incorporate a vehicle occupancy requirement, the design of the overhead
39 Advance Guide and Egress Direction signs for intermediate egress from the preferential lanes to the
40 general-purpose lanes shall display a white diamond symbol on a black background at the left-hand
41 edge of the signs.

42 The design of Pull-Through signs when used in conjunction with an Egress Direction sign at an
43 intermediate egress from the preferential lanes to the general-purpose lanes shall be distinguished from
44 those applicable to general-purpose lanes by inclusion of an upper section with the applicable black
45 legend on a white background, such as HOV LANE. For preferential lanes that incorporate a vehicle
46 occupancy requirement, the white diamond symbol on a black background shall be displayed at the
47 left-hand edge of this upper section.

48 ~~Option:~~

49 ~~For barrier-separated preferential only lanes, an advance destination guide sign may be used in the vicinity~~
50 ~~of designated intermediate entry and exit points.~~

51 ~~Standard:~~

~~For buffer-separated preferential only lanes (painted buffer of 2 feet or more) where access is restricted to designated entry points, ground-mounted guide signs shall be mounted in the median or on median barriers separating two directions of traffic. Ground-mounted advance exit and ground-mounted exit signs shall be installed prior to and at the intermediate exit points of buffer-separated preferential only lanes (see Figure 2E-47 for HOV lanes).~~

~~Option:~~

~~For buffer-separated preferential only lanes, an advance destination guide sign may be used in the vicinity of designated intermediate entry and exit points.~~

~~Guidance:~~

~~For buffer-separated HOV lanes, guide and regulatory signs should be provided to alert HOV lane users and non-users of the minimum allowable vehicle occupancy requirement and the locations of the designated entry and exit points.~~

Section 2G.14 Guide Signs for Direct Entrances to Preferential Lanes from Another Highway

Standard:

For direct access ramps to **HOV preferential** lanes, ~~advance guide signs shall be provided along the adjoining surface streets to direct traffic into~~ from a transit facility (such as a park & - ride lot or a transit station or terminal) that ultimately leads to HOV lanes is accessible from surface streets, advance guide signs shall be provided along the adjoining surface streets to direct traffic into and through the transit facility to the preferential lane (see Figure 2G-13 for HOV lanes). relocated from Section 2E.59

Support:

Figures 2G-14 ~~through 2E-52~~ provides examples of recommended uses and layouts of signs for HOV lanes for direct access ramps, park & - ride lots, and access from surface streets, ~~and exclusive preferential only lane ramps at interchanges that directly connect two freeway facilities. Direct access ramps to preferential only lanes sometimes form a three or four legged intersection that is controlled by either static signs or traffic control signals.~~ relocated from Section 2E.59

Section 2G.15 Guide Signs for Direct Exits from Preferential Lanes to Another Highway

Standard:

For ~~concurrent flow~~ **contiguous HOV preferential** lanes on the left-hand side of the roadway ~~with unrestricted access~~, Advance Guide and guide signs, Exit Direction signs, and Exit Gore signs (see Figure 2G-14) specifically applicable to the preferential lanes shall only be used on for exits to direct access ramps, such as HOV lane only ramps (see Figure 2G-15) or ramps to park & - ride lots facilities (see Figures 2E-50 and 2E-51 for HOV lanes). relocated from Section 2E.59

The design of Advance Guide, Exit Direction, and Pull-Through signs for direct exits from preferential lanes shall be distinguished from those applicable to general-purpose lanes by inclusion of an upper section with the applicable black legend on a white background, such as HOV LANE (for Pull-Through signs) or HOV EXIT (for Advance Guide and Exit Direction signs). For preferential lanes that incorporate a vehicle occupancy requirement, the white diamond symbol on a black background shall be displayed at the left-hand edge of this upper section (see Figures 2G-15 and 2G-16).

Guidance:

Advance Guide and Exit Direction signs for exits to direct access ramps from a preferential lane should be mounted overhead. A Pull-Through sign should be used with the Exit Direction sign at exits to direct access ramps.

Standard:

Post-mounted guide signs in a vertical rectangular shape installed on a median barrier shall not be used for the Advance Guide and Exit Direction signs for exits to direct access ramps.

Because direct access ramps for preferential **only** lanes at interchanges connecting two freeways are typically left-hand side exits and typically have design speeds similar to the preferential **only** lane, overhead Advance Guide signs and overhead ~~guide~~ Exit Direction signs shall be provided in advance of

1 and at the entry point to each freeway-to-freeway preferential ~~only~~ lane ramp (see Figure 2G-16 ~~for~~
2 ~~HOV lanes~~). ~~relocated from Section 2E.59~~

3 Guidance:

4 The use of guide signs for preferential ~~only~~ lanes at freeway interchanges should ~~conform to~~ comply with
5 the provisions for regulatory and guide signs ~~requirements~~ established in this Manual. ~~relocated from Section~~
6 ~~2E.59~~

7 Support:

8 ~~The use of advance guide and~~ Guide signs for direct access ramps for preferential ~~only~~ lanes at
9 interchanges connecting two freeways ~~is~~ are similar to those for a connecting ramp between two freeway
10 facilities. ~~relocated from Section 2E.59~~

11 Section 2G.16 Signs for Priced Managed Lanes – General

12 Support:

13 A priced managed lane is a managed lane that employs tolling or pricing, typically through electronic toll
14 collection, to manage congestion levels and maintain a certain level of service for users of the facility. A
15 priced managed facility typically provides a less congested alternative to adjacent lanes along the same
16 designated route, or to a nearby facility, that experience recurring congestion during peak periods. A priced
17 managed lane might allow non-toll travel by certain vehicles based on occupancy or other criteria. A variety
18 of operational management strategies might be used in conjunction with tolling or pricing.

19 The number and combination of operational strategies that are applied to a managed lane to manage
20 congestion or improve efficiency might be practically limited by the amount of information that can be legibly
21 displayed on signs or in signing sequences and still be readily comprehended by road users. Such factors to
22 consider when evaluating alternatives for managed lanes are locations of signs for general-purpose
23 interchanges and for other roadway conditions, the number of intermediate access points between the
24 managed and general-purpose lanes and the need to repeat the operational information, and the distance over
25 which a signing sequence that displays all of the eligibility requirements can be displayed.

26 Because managed lanes have the capability to employ a variety of operational strategies on a changing
27 basis, it is not practical to assign a naming convention to such lanes for the purpose of signing based on the
28 specific operational management strategies, as is more readily accomplished with other types of preferential
29 lanes, such as HOV, Bus, or Bike lanes. Instead, the various requirements, restrictions, and eligibility criteria
30 are more appropriately conveyed through a sequence of regulatory and guide signs with a more encompassing
31 designation for the purpose of providing directional information.

32 As priced managed lanes become more prevalent as an operational strategy, it will be important to
33 establish a uniform naming convention to distinguish those lanes that are an alternative to travel on adjacent
34 general-purpose lanes on the same designated route to effectively communicate to motorists the range of basic
35 requirements for similar facilities in different regions.

36 Standard:

37 Priced managed lanes that are adjacent to general-purpose lanes along the same designated route
38 shall be signed using the legend EXPRESS or EXPRESS LANE(S). This provision shall apply when
39 any of the following operational strategies is used for a managed lane:

- 40 A. All users of the managed lane are charged a fixed or variable toll;
- 41 B. General-purpose traffic using the managed lane is charged a fixed or variable toll, but HOV
42 traffic is allowed to travel without being charged a toll on either a full- or part-time basis;
- 43 C. General-purpose traffic using the managed lane is charged a fixed or variable toll, but HOV
44 traffic is offered a discounted toll on either a full- or part-time basis; or
- 45 D. General-purpose traffic using the managed lane is charged a fixed or variable toll, but HOV
46 traffic registered with a local program travels at a discounted toll or without being charged a
47 toll on either a full- or part-time basis (a transponder or other identifier is typically required of
48 HOVs to indicate registration in conjunction with electronic or visual enforcement and
49 verification of vehicle occupancy).

50 The legends EXPRESS and EXPRESS LANE(S) shall not be used on signs for entrances to
51 highways on which all lanes are managed and there are no adjacent general-purpose lanes on the same
52 designated route. The legends EXPRESS and EXPRESS LANE(S) shall not be used on signs for a
53 managed ramp connection that provides an alternative to a general-purpose ramp connection (see

1 Figure 2F-7), except where the ramp leads directly to a managed lane as described in Section 2G.14.
2 The legends EXPRESS and EXPRESS LANE(S) shall not be used on signs for open-road tolling lanes
3 that bypass a conventional toll plaza (see Chapter 2F).

4 The diamond symbol shall be reserved exclusively for preferential lanes whose operational strategy
5 is occupancy-based only (see Sections 2G.03 through 2G.14) and shall not be used to designate a
6 managed lane in which other operational strategies, such as tolling and pricing, are employed to allow
7 general-purpose traffic to use the lane.

8 Section 2G.17 Regulatory Signs for Priced Managed Lanes

9 Standard:

10 Except as otherwise provided in this Section, the provisions of Sections 2G.03 through 2G.07
11 regarding regulatory signs for Preferential lanes shall apply to priced managed lanes operated at all
12 times or at certain times with a toll payment requirement of some or all vehicles to use the lane(s). Such
13 managed lanes shall use changeable message signs or changeable message elements within static signs to
14 display the appropriate regulatory sign messages only when they are in effect.

15 Regulatory signs for preferential lanes shall be appropriately modified for adaptation to a priced
16 managed lane, where applicable, as shown in Figure 2G-17.

17 Regulatory signs shall be used to indicate the toll charged. If the toll varies, regulatory signs that
18 include changeable message elements, such as the R3-48 and R3-48a signs that are shown in Figure 2G-
19 17, shall be used to display the actual toll amount in effect at any given time.

20 When only vehicles with a registered ETC account are allowed to use a managed lane where some
21 or all vehicles are charged a toll, regulatory signs to indicate such a restriction shall be provided and
22 shall incorporate the pictograph adopted by the toll facility's ETC payment system and the word
23 ONLY (see Section 2G.18 for the incorporation of such regulatory legends into the guide signs for the
24 entrances to such facilities). The display of the ETC system pictograph shall comply with the provisions
25 of Sections 2F.03 and 2F.04 as shown in Figures 2G-17 and 2G-18.

26 When HOV traffic is allowed to use a priced managed lane without paying a toll and registration in
27 a local program is not required to receive the toll exemption, the Vehicle Occupancy Definition (R3-10
28 or R3-13) signs (see Section 2G.04) shall be modified to delete the diamond symbol to create priced
29 managed lane Vehicle Occupancy Definition (R3-40 and R3-43) signs to indicate the minimum
30 occupancy related to the management strategy (see Figure 2G-17).

31 A priced managed lane Periods of Operation (R3-44 or R3-44a) sign (see Figure 2G-17) shall be
32 installed at the beginning or initial entry point, and at any intermediate entry points where vehicles are
33 allowed to legally enter an access-restricted priced managed lane.

34 When the vehicle occupancy required for non-toll use of a managed lane is varied as a part of a
35 priced managed lane operational strategy, regulatory signs that include changeable message elements
36 shall be used to display the required vehicle occupancy in effect for non-toll travel.

37 Option:

38 Where registration in a local program or ETC account is required for HOV traffic to travel in a priced
39 managed lane without being charged a toll or by being charged a discounted toll, such information may be
40 displayed on a separate sign within the sequence of the required regulatory and guide signs.

41 Standard:

42 R3-42 Series and R3-45 Series signs (see Figure 2G-17) shall be installed in accordance with the
43 provisions of Section 2G.07 to indicate the termination of a priced managed lane or restriction. The R3-
44 42, R3-42a, and R3-45 signs shall be used only where the managed lane and restriction end and traffic
45 must merge into the general-purpose lanes. The R3-42b, R3-42c, and R3-45a signs shall be used only
46 where the managed lane restriction ends and the lane becomes a general-purpose lane.

47 Section 2G.18 Guide Signs for Priced Managed Lanes

48 Standard:

49 Except as otherwise provided in this Section, guide signs for barrier-separated, buffer-separated,
50 and contiguous managed lanes shall follow the specific provisions for Preferential Lane guide signs
51 contained in Sections 2G.10 through 2G.15. Except as otherwise provided in this Section, guide signs

1 for highways on which all lanes are managed shall follow the general provisions for freeway and
2 expressway guide signs as contained in Chapter 2E as a whole. Guide signs for highways on which all
3 lanes are managed and tolling or pricing is used as a management strategy shall follow the applicable
4 provisions for toll road guide signs as contained in Chapter 2F, in addition to the general provisions of
5 Chapter 2E.

6 If fixed or variable tolls are used as an operational strategy for a managed lane, the guide signs shall
7 comply with the provisions of Sections 2F.03, 2F.04, and 2F.17 regarding the use, size, and placement of
8 ETC-account pictographs.

9 Support:

10 Figure 2G-18 shows examples of Guide signs for entrances to priced managed lanes and other ETC
11 account-only toll facilities that incorporate header panels with ETC account pictographs and regulatory
12 legends.

13 Guidance:

14 Exit Destination supplemental guide signs, identifying final destination and downstream exit locations
15 accessible from the managed lane (see Figure 2G-19), should be installed in advance of the initial entry points
16 to priced managed lanes. These signs should be located in accordance with the provisions of Paragraph 5 of
17 Section 2G.11.

18 For managed lanes that are available as an alternative to travel on adjacent general-purpose lanes on the
19 same designated route, changeable message signs indicating the comparative travel times or congestion levels
20 using the managed lanes versus the general-purpose lanes (see Figure 2G-20) should be installed in advance
21 of the initial and intermediate entry points to the managed lanes.

22 Option:

23 Changeable message signs may also be used on non-managed highways to display comparative travel
24 times or congestion levels for a nearby managed highway.

25 Standard:

26 Guide signs at the initial and intermediate entry points to a priced managed lane in which all
27 general-purpose passenger vehicles are allowed shall include the legend EXPRESS or EXPRESS
28 LANE(S). The guide signs shall incorporate the pictograph of the ETC account system into a header
29 panel within the guide sign in accordance with Sections 2F.03, 2F.04, and 2F.17. For a priced managed
30 lane that allows non-toll travel by HOV traffic without registration in a local program, the header panel
31 shall be modified to a regulatory format to display both the pictograph of the ETC account system and
32 the minimum occupancy requirement for non-toll travel with a black legend on a white background
33 (see Figure 2G-19).

34 Guide signs at the initial and intermediate entry points to a managed lane that allows only HOV
35 traffic with either a fixed or variable occupancy requirement shall follow the provisions of Sections
36 2G.10 through 2G.12 and 2G.14.

37 Support:

38 Figures 2G-21 through 2G-24 show examples of guide signs for various configurations of initial and
39 intermediate entrances to a priced managed lane.

40 Standard:

41 The use and locations of guide signs for intermediate egress locations and direct exits from a priced
42 managed lane (see Figures 2G-24 through 2G-27) shall comply with the provisions of Sections 2G.13
43 and 2G.15. The signs shall be suitably modified to display header messages of white legend on a green
44 background that relate the guide sign legends to the managed lane(s) as appropriate in accordance with
45 the following:

46 A. Post-mounted or overhead-mounted Advance Guide signs for intermediate egress to the general-
47 purpose lanes shall include the legend LOCAL EXITS in a header panel within the guide signs,
48 destination information or the exit number(s) for the next exit(s) accessible from the general-
49 purpose lanes, and the appropriate distance information to the location of the egress (see
50 Figures 2G-24 and 2G-25).

51 B. Post-mounted or overhead-mounted Intermediate Egress Direction signs shall include the legend
52 LOCAL EXITS in a header panel within the signs, the destination information or the exit

1 number(s) of the next exit(s) accessible from the general-purpose lanes, and a diagonally
2 upward-pointing directional arrow (see Figures 2G-24 and 2G-25).

3 C. For direct exits to another roadway, the legend EXPRESS EXIT shall be used on the Advance
4 Guide and Exit Direction signs (see Figure 2G-26).

5 D. For pull-through signs, the legend EXPRESS LANE(S) shall be used, either as a header panel
6 within the pull-through sign or as the principal legend of the sign without a header panel (see
7 Figures 2G-25, 2G-26, and 2G-27).

8 Support:

9 Section 2G.13 contains information on the use of overhead-mounted guide signs for intermediate egress to
10 the general-purpose lanes.

11 Figures 2G-28 and 2G-29 show examples of guide signing for direct entrances to a priced managed lane
12 from a crossroad or surface street.

3 **Section 2H.01 Sizes of General Information Signs**

4 **Standard:**

5 Except as provided in Section 2A.11, the sizes of General Information signs that have a
6 standardized design shall be as shown in Table 2H-1.

7 **Support:**

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

9 **Option:**

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

11 **Section ~~2D.48~~ 2H.02 General Information Signs (I Series)**

12 **Support:**

13 Of interest to the traveler, though not directly necessary for guidance, are numerous kinds of information
14 that can properly be conveyed by General Information signs (see Figure 2H-1) or miscellaneous information
15 signs (see Section 2H.04). They include such items as State lines, city limits, other political boundaries, time
16 zones, stream names, elevations, landmarks, and similar items of geographical interest, and safety and
17 transportation-related messages. Chapter 2M contains recreational and cultural interest area symbol signs that
18 are sometimes used in combination with General Information signs.

19 **Guidance:**

20 General Information signs should not be installed within a series of guide signs or at other equally critical
21 locations, unless there are specific reasons for orienting the road user or identifying control points for
22 activities that are clearly in the public interest. On all such signs, the designs should be simple and dignified,
23 devoid of any advertising, and in general ~~conformance~~ compliance with other guide signing.

24 **Standard:**

25 **Except for political boundary ~~and scenic by-way logos and~~ signs, General Information signs shall**
26 **have white legends and borders on green rectangular-shaped backgrounds.**

27 **Option:**

28 An information symbol sign (I-5 through ~~I-8 I-9, I-11~~) may be used to identify a route leading to a
29 transportation or general information facility, or to provide additional guidance to the facility. The symbol
30 sign may be supplemented by an educational plaque where necessary; also, the name of the facility may be
31 used if needed to distinguish between similar facilities.

32 The Advance Turn (M5 series) or Directional Arrow (M6 series) auxiliary signs shown in Figure 2H-1
33 with white arrows on green backgrounds may be used with General Information symbol signs to create a
34 General Information Directional Assembly.

35 Guide signs for commercial service airports and non-carrier airports may be provided from the nearest
36 Interstate, other freeway, or conventional highway intersection directly to the airport, normally not to exceed
37 15 miles. The Airport (I-5) symbol sign along with a supplemental plaque may be used to indicate the
38 specific name of the airport. An Airport symbol sign, with or without a supplemental name plaque or the
39 word AIRPORT, and an arrow may be used as a trailblazer.

40 **Standard:**

41 **Adequate trailblazer signs shall be in place prior to installing the airport guide signs.**

42 **Support:**

43 Location and placement of all airport guide signs depends upon the availability of longitudinal spacing on
44 highways.

45 **Option:**

46 The Recycling Collection Center (I-11) symbol sign may be used to direct road users to recycling
47 collection centers.

48 **Guidance:**

49 The Recycling Collection Center symbol sign should not be used on freeways and expressways.

1 **Standard:**

2 **If used on freeways or expressways, the Recycling Collection Center symbol sign shall be considered**
3 **one of the supplemental sign destinations.**

4 **When a sign is used to display a safety or transportation-related message, the display format shall**
5 **not be of a type that would be considered similar to advertising displays. Messages and symbols that**
6 **resemble any official traffic control device shall not be used on safety or transportation-related message**
7 **signs.**

8 Option:

9 The pictograph of a political jurisdiction logos (such as a State, county, or municipal corporation) may be
10 placed displayed on the a political boundary General Information signs. ~~The logo may have different colors-~~
11 ~~and shapes but should be simple, dignified, and devoid of any advertising.~~

12 **Standard:**

13 **If used, the height of a pictograph on a political boundary General Information sign shall not**
14 **exceed two times the height of the upper-case letters of the principal legend on the sign. The pictograph**
15 **shall comply with the provisions of Section 2A.06.**

16 **Section ~~2D.47~~ 2H.03 Traffic Signal Speed Sign (I1-1)**

17 Option:

18 The Traffic Signal Speed (I1-1) sign (see Figure 2H-1), reading SIGNALS SET FOR XX MPH, may be
19 used to indicate a section of street or highway on which the traffic control signals are coordinated into a
20 progressive system timed for a specified speed at all hours during which they are operated in a coordinated
21 mode.

22 If different system progression speeds are set for different times of the day, a changeable message element
23 may be used for the numerals of the Traffic Signal Speed (I1-1) sign. If the system is operated in coordinated
24 mode only during certain times, a blank-out version of the Traffic Signal Speed (I1-1) sign may be used to
25 display the message only during those times.

26 Guidance:

27 If used, the sign should be mounted as near as practical to each intersection where the timed speed
28 changes, and at intervals of several blocks throughout any section where the timed speed remains constant.

29 **Standard:**

30 **The Traffic Signal Speed sign shall be a minimum of ~~12 x 18~~ 24 x 36 inches with the longer**
31 **dimension vertical. It shall have a white message and border on a green background.**

32 **Section ~~2E.55~~ 2H.04 Miscellaneous ~~Guide~~ Information Signs**

33 Support:

34 Miscellaneous ~~Guide~~ information are used to point out geographical features, such as rivers and summits,
35 and other jurisdictional boundaries (see Section 2H.02). Figure 2H-1 shows examples of miscellaneous
36 information (I-2 and I-3) signs.

37 Option:

38 Miscellaneous ~~Guide~~ information signs may be used if they do not interfere with signing for interchanges
39 or other critical points.

40 Guidance:

41 Miscellaneous ~~Guide~~ information signs should not be installed unless there are specific reasons for
42 orienting the road users or identifying control points for activities that are clearly in the public interest. If
43 Miscellaneous ~~Guide~~ information signs are to be of value to the road user, they should be consistent with
44 other ~~freeway or expressway~~ guide signs in design and legibility. On all such signs, the design should be
45 simple and dignified, devoid of any tendency toward flamboyant advertising, and in general ~~conformance~~
46 compliance with other ~~freeway and expressway~~ signing.

47 **Section ~~2D.46~~ 2H.05 Reference Location Signs (D10-1 through D10-3) and Intermediate**
48 **Reference Location Signs (D10-1a through D10-3a)**

49 Support:

50 There are two types of reference location signs:

- 1 A. Reference Location (D10-1, 2, and 3) signs show an integer distance point along a highway, and
- 2 B. Intermediate Reference Location (D10-1a, 2a, and 3a) signs also show a decimal between integer
- 3 distance points along a highway.

4 **Standard:**

5 Except ~~as provided in the Option below~~ when Enhanced Reference Location signs (see Section
6 2H.06) are used instead, Reference Location (D10-1 through D10-3) signs ~~(see Section 2D.46)~~ shall be
7 placed on all expressway facilities that are located on a route where there is reference location sign
8 continuity and on all freeway facilities to assist road users in estimating their progress, to provide a
9 means for identifying the location of emergency incidents and traffic crashes, and to aid in highway
10 maintenance and servicing. relocated from Section 2E.54

11 **Option:**

12 Reference Location (D10-1 to D10-3) signs (see Figure 2H-2) may be installed along any section of a
13 highway route or ramp to assist road users in estimating their progress, to provide a means for identifying the
14 location of emergency incidents and traffic crashes, and to aid in highway maintenance and servicing.

15 To augment the reference location sign system, Intermediate Reference Location (D10-1a to D10-3a)
16 signs (see Figure 2H-3), which show the tenth of a mile with a decimal point, may be installed at one tenth of
17 a mile intervals, or at some other regular spacing.

18 **Standard:**

19 When Intermediate Reference Location (D10-1a to D10-3a) signs are used to augment the reference
20 location sign system, the reference location sign at the integer mile point shall display a decimal point
21 and a zero numeral.

22 When placed on freeways or expressways, ~~Reference Location (D10-1 to D10-3)~~ reference location
23 signs shall contain 10-inch white numerals on a 12-inch wide green background with a white border.
24 The signs shall be 24, 36, or 48 inches in height for one, two, or three digits, respectively, and shall
25 contain the abbreviation word MILE in 4-inch white letters.

26 When placed on conventional roads, ~~Reference Location (D10-1 to D10-3)~~ reference location signs
27 shall contain 6-inch white numerals on a green background that is at least 10 inches wide with a white
28 border. The signs shall contain the abbreviation word MILE in 4-inch white letters.

29 ~~The design details for reference location signs shall be as shown in the “Standard Highway Signs”~~
30 ~~book (see Section 1A.11).~~

31 Reference location signs shall have a minimum mounting height of 4 feet, ~~to~~ measured vertically
32 from the bottom of the sign ~~in accordance with the mounting height requirements of delineators (see~~
33 ~~Section 3D.04)~~ to the elevation of the near edge of the roadway, and shall not be governed by the
34 mounting height requirements prescribed in Section 2A.18.

35 The distance numbering shall be continuous for each route within a State, except where overlaps
36 occur (see Section 2E.31). Where routes overlap, reference location sign continuity shall be established
37 for only one of the routes. If one of the overlapping routes is an Interstate route, that route shall be
38 selected for continuity of distance numbering.

39 **Guidance:**

40 The route selected for continuity of distance numbering should also have continuity in interchange exit
41 numbering (see Section 2E.31). relocated from Section 2E.54

42 On a route without reference location sign continuity, the first reference location sign beyond the overlap
43 should indicate the total distance traveled on the route so that road users will have a means of correlating their
44 travel distance between reference location signs with that shown on their odometer.

45 **Standard:**

46 For divided highways, the distance measurement shall be made on the northbound and eastbound
47 roadways. The reference location signs for southbound or westbound roadways shall be set at locations
48 directly opposite the reference location signs for the northbound or eastbound roadways.

49 **Guidance:**

50 Zero distance should begin at the south and west State lines, or at the south and west terminus points
51 where routes begin within a State.

52 **Standard:**

1 Except as provided in ~~the Option below~~ [Paragraph 15](#), reference location signs shall be installed on
2 the right-hand side of the roadway.

3 Option:

4 Where conditions limit or restrict the use of reference location signs on the right-hand side of the
5 roadway, they may be installed in the median. On two-lane conventional roadways, reference location signs
6 may be installed on one side of the roadway only and may be installed back-to-back. Reference location signs
7 may be placed up to 30 feet from the edge of the pavement.

8 If a reference location sign cannot be installed in the correct location, it may be moved in either direction
9 as much as 50 feet.

10 Guidance:

11 If a reference location sign cannot be placed within 50 feet of the correct location, it should be omitted.

12 ~~Option:~~

13 ~~Enhanced reference location signs (see Section 2E.54) may also be used on conventional roads.~~

14 Section ~~2E.54~~ [2H.06](#) Reference Location Signs and Enhanced Reference Location Signs (D10- 15 4, D10-5)

16 Support:

17 ~~Reference Location (D10-1 through D10-3) signs and Intermediate Reference Location (D10-1a through~~
18 ~~D10-3a) signs and their applications are described in Section 2D.46.~~

19 There are two types of enhanced reference location signs:

- 20 A. Enhanced Reference Location signs (D10-4), and
- 21 B. Intermediate Enhanced Reference Location signs (D10-5).

22 Option:

23 Enhanced Reference Location (D10-4) signs (see Figure 2H-4), which enhance the reference location sign
24 system by identifying the route, may be placed on freeways or expressways (instead of Reference Location
25 signs) or on conventional roads.

26 To augment an enhanced reference location sign system, Intermediate Enhanced Reference Location
27 (D10-5) signs (see Figure 2H-4), which show the tenth of a mile with a decimal point, may be installed along
28 any section of a highway route or ramp at one tenth of a mile intervals, or at some other regular spacing.

29 Standard:

30 If enhanced reference location signs are used, they shall be vertical ~~panels~~ [signs](#) having blue or
31 green backgrounds with white numerals, letters, and borders, except for the route shield, which shall be
32 the standard color and shape. The top line shall consist of the cardinal direction for the roadway. The
33 second line shall consist of the applicable route shield for the roadway. The third line shall identify the
34 mile reference for the location and the bottom line of the Intermediate Enhanced Reference Location
35 sign shall give the tenth of a mile reference for the location. The bottom line of the Intermediate
36 Enhanced Reference Location sign shall contain a decimal point. The height of the legend on enhanced
37 reference location signs shall be a minimum of 6 inches. The height of the route shield on enhanced
38 reference location signs shall be a minimum of 12 inches.

39 The background color shall be the same for all enhanced reference location signs within a
40 jurisdiction.

41 ~~The design details for enhanced reference location signs shall be as shown in the “Standard~~
42 ~~Highway Signs” book (see Section 1A.11).~~

43 ~~Enhanced reference location signs shall have a minimum mounting height of 4 feet to the bottom of~~
44 ~~the sign in accordance with the mounting height requirements of delineators (see Section 3D.04), and~~
45 ~~shall not be governed by the mounting height requirements prescribed in Section 2A.18.~~

46 ~~The distance numbering shall be continuous for each route within any State, except where overlaps~~
47 ~~occur (see Section 2E.28). Where routes overlap, enhanced reference location sign continuity shall be~~
48 ~~established for only one of the routes. If one of the overlapping routes is an Interstate route, that route~~
49 ~~shall be selected for continuity of distance numbering.~~

~~The distance measurement shall be made on the northbound and eastbound roadways. The enhanced reference location signs for southbound or westbound roadways shall be set at locations directly opposite the enhanced reference location signs for the northbound or eastbound roadways.~~

~~Guidance:~~

~~The route selected for continuity of distance numbering should also have continuity in interchange exit numbering (see Section 2E.28). relocated to Section 2H.05 On a route without enhanced reference location sign continuity, the first enhanced reference location sign beyond the overlap should indicate the total distance traveled on the route so that road users will have a means of correlating their travel distance between enhanced reference location signs with that shown on their odometer.~~

~~Standard:~~

~~Except as provided in the Option below, enhanced reference location signs shall be installed on the right side of the roadway.~~

~~Option:~~

~~Where conditions limit or restrict the use of enhanced reference location signs on the right side of the roadway, they may be installed in the median. In urban areas, Intermediate Enhanced Reference Location signs may be installed on the right side of the roadway, in the median, or on ramps to replace or to supplement the reference location signs. Enhanced Reference Location signs may be installed back to back in median locations.~~

Support:

The provisions in Section 2H.05 regarding mounting height, distance numbering and measurements, sign continuity, and placement with respect to the right-hand shoulder and/or median for reference location signs also apply to enhanced reference location signs. added to replace the previous six paragraphs in order to eliminate repetition

Section ~~2D.50~~ 2H.07 Trail Auto Tour Route Signs

Support:

Trail Auto Tour Route signs are informational signs, plaques, or shields designed to provide road users with route guidance in following ~~a trail~~ an auto tour route of particular cultural, historical, or educational significance.

Signed auto tour routes are used in some cases to generally follow the historical route of a trail, such as the National Historic Trails administered by the National Park Service. Examples include auto tour routes that parallel the Lewis and Clark National Historic Trail, the Oregon National Historic Trail, and the Santa Fe National Historic Trail.

Guidance:

~~Primary guidance should be in the form of printed literature and strip maps rather than trail signing.~~

If shields or other similar signs are used to provide route guidance in following an auto tour route, they should be designed in accordance with the sizes and other design principles for route signs, such as those described in Sections 2D.10 through 2D.12.

Option:

Trail Auto Tour Route signs may be installed on a highway if they have been approved by the appropriate transportation agency.

Standard:

Auto Tour Route signs shall not be installed on freeways or expressways, except as necessary to provide continuity between discontinuous segments of conventional roadways that are designated as auto tour routes, for which the freeway or expressway provides the only connection between the segments. If installed on freeways or expressways, Auto Tour Route signs shall be installed as independent trailblazer assemblies (see Sections 2D.35 and 2E.27) and shall not be installed with other Route signs or confirmation assemblies or on guide signs. If installed on freeways or expressways, Auto Tour Route trailblazer assemblies shall be installed at less frequent intervals than route confirmation assemblies.

Section 2H.08 Acknowledgment Signs

Support:

1 Acknowledgment signs are a way of recognizing a company, business, or volunteer group that provides a
2 highway-related service. Acknowledgment signs include sponsorship signs for adopt-a-highway litter
3 removal programs, maintenance of a parkway or interchange, and other highway maintenance or
4 beautification sponsorship programs.

5 Guidance:

6 A State or local highway agency that elects to have an acknowledgment sign program should develop an
7 acknowledgment sign policy. The policy should require that eligible sponsoring organizations comply with
8 State laws prohibiting discrimination based on race, religion, color, age, sex, national origin, and other
9 applicable laws. The acknowledgment sign policy should include all of the provisions regarding sign
10 placement and sign design that are described in this Section.

11 Standard:

12 Because regulatory, warning, and guide signs have a higher priority, acknowledgment signs shall
13 only be installed where adequate spacing is available between the acknowledgment sign and other
14 higher priority signs. Acknowledgment signs shall not be installed in a position where they would
15 obscure the road users' view of other traffic control devices.

16 Acknowledgment signs shall not be installed at any of the following locations:

17 A. On the front or back of, adjacent to, or around any other traffic control device, including traffic
18 signs, highway traffic signals, and changeable message signs;

19 B. On the front or back of, adjacent to, or around the supports or structures of other traffic
20 control devices, or bridge piers; or

21 C. At key decision points where a road user's attention is more appropriately focused on other
22 traffic control devices, roadway geometry, or traffic conditions, including exit and entrance
23 ramps, intersections, grade crossings, toll plazas, temporary traffic control zones, and areas of
24 limited sight distance.

25 Guidance:

26 The minimum spacing between acknowledgment signs and any other traffic control signs, except parking
27 regulation signs, should be:

28 A. 150 feet on roadways with speed limits of less than 30 mph,

29 B. 200 feet on roadways with speed limits of 30 to 45 mph, and

30 C. 500 feet on roadways with speed limits greater than 45 mph.

31 If the placement of a newly-installed higher-priority traffic control device, such as a higher-priority sign, a
32 highway traffic signal, or a temporary traffic control device, conflicts with an existing acknowledgment sign,
33 the acknowledgment sign should be relocated, covered, or removed.

34 Option:

35 State or local highway agencies may develop their own acknowledgment sign designs and may also use
36 their own pictograph (see definition in Section 1A.13) and/or a brief jurisdiction-wide program slogan as part
37 of any portion of the acknowledgment sign, provided that the signs comply with the provisions for shape,
38 color, and lettering style in this Chapter and in Chapter 2A.

39 Guidance:

40 Acknowledgment signs should clearly indicate the type of highway services provided by the sponsor.

41 Standard:

42 In addition to the general provisions for signs described in Chapter 2A and the sign design
43 principles covered in the "Standard Highway Signs and Markings" book (see Section 1A.11),
44 acknowledgment sign designs developed by State or local highway agencies shall comply with the
45 following provisions:

46 A. Neither the sign design nor the sponsor acknowledgment logo shall contain any contact
47 information, directions, slogans (other than a brief jurisdiction-wide program slogan, if used),
48 telephone numbers, or Internet addresses, including domain names and uniform resource
49 locators (URL);

50 B. Except for the lettering, if any, on the sponsor acknowledgment logo, all of the lettering shall be
51 in upper-case letters as provided in the "Standard Highway Signs and Markings" book (see
52 Section 1A.11);

- 1 C. In order to keep the main focus on the highway-related service and not on the sponsor
2 acknowledgment logo, the area reserved for the sponsor acknowledgment logo shall not exceed
3 1/3 of the total area of the sign and shall be a maximum of 8 square feet, and shall not be located
4 at the top of the sign;
5 D. The entire sign display area shall not exceed 24 square feet;
6 E. The sign shall not contain any messages, lights, symbols, or trademarks that resemble any
7 official traffic control devices;
8 F. The sign shall not contain any external or internal illumination, light-emitting diodes, luminous
9 tubing, fiber optics, luminescent panels, or other flashing, moving, or animated features; and
10 G. The sign shall not distract from official traffic control messages such as regulatory, warning, or
11 guidance messages.

12 Support:

13 Examples of acknowledgment sign designs are shown in Figure 2H-5.

3 **Section 2I.01 Sizes of General Service Signs**

4 **Standard:**

5 Except as provided in Section 2A.11, the sizes of General Service signs that have a standardized
6 design shall be as shown in Table 2I-1.

7 **Support:**

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

9 **Option:**

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

11 **Section ~~2D.45~~ 2I.02 General Service Signs (~~D9 Series~~) for Conventional Roads**

12 **Support:**

13 On conventional roads, commercial services such as gas, food, and lodging generally are within sight and
14 are available to the road user at reasonably frequent intervals along the route. Consequently, on this class of
15 road there usually is no need for special signs calling attention to these services. Moreover, General Service
16 signing is usually not required in urban areas except for hospitals, law enforcement assistance, tourist
17 information centers, and camping.

18 **Option:**

19 General Service signs (see Figure 2I-1) may be used where such services are infrequent and are found
20 only on an intersecting highway or crossroad.

21 **Standard:**

22 **All General Service signs and supplemental sign panels shall have white letters, symbols, arrows,**
23 **and borders on a blue background.**

24 **Guidance:**

25 General Service signs should be installed at a suitable distance in advance of the turn-off point or
26 intersecting highway.

27 States that elect to provide General Service signing should establish a statewide policy or warrant for its
28 use, and criteria for the availability of services. Local jurisdictions electing to use such signing should follow
29 State policy for the sake of uniformity.

30 **Option:**

31 Individual States may sign for whatever alternative fuels are available at appropriate locations.

32 **Standard:**

33 **General Service signs, if used at intersections, shall be accompanied by a directional message.**

34 **Option:**

35 The Advance Turn (M5 series) or Directional Arrow (M6 series) auxiliary signs with white arrows on
36 blue backgrounds as shown in Figure 2I-1 may be used with General Service symbol signs to create a General
37 Service Directional Assembly.

38 The General Service sign legends may be either symbols or word messages.

39 **Standard:**

40 **Symbols and word message General Service legends shall not be intermixed on the same sign. The**
41 **Pharmacy (D9-20) sign shall only be used to indicate the availability of a pharmacy that is open, with a**
42 **State-licensed pharmacist present and on duty, 24 hours per day, 7 days per week, and that is located**
43 **within 3 miles of an interchange on the Federal-aid system. The D9-20 sign shall have a 24 HR (D9-**
44 **20aP) plaque mounted below it.**

45 **Support:**

46 Formats for displaying different combinations of these services are ~~presented~~ described in Section 2I.03.

47 **Option:**

1 If the distance to the next point at which services are available is 10 miles or more, a NEXT SERVICES
2 XX MILES (D9-17P) ~~sign plaque (see Figure 2I-2)~~ may be ~~used as a separate panel~~ installed below the
3 General Service sign (~~see Figure 2E-43~~).

4 The International Symbol of Accessibility for the Handicapped (D9-6) sign may be used beneath General
5 Service signs where paved ramps and rest room facilities accessible to, and usable by, the physically
6 handicapped are provided.

7 Guidance:

8 When the D9-6 sign is used in accordance with Paragraph 13, and van-accessible parking is available at
9 the facility, a VAN ACCESSIBLE (D9-6P) plaque (see Figure 2I-1) should be mounted below the D9-6 sign.

10 Option:

11 The Recreational Vehicle Sanitary Station (D9-12) sign may be used as needed to indicate the availability
12 of facilities designed for the use of dumping wastes from recreational vehicle holding tanks.

13 The Litter Container (D9-4) sign may be placed in advance of roadside turnouts or rest areas, unless it
14 distracts the driver's attention from other more important regulatory, warning, or directional signs.

15 ~~A Carpool Information (D12-2) sign (see Figure 2D-12) may be installed as needed (see Section 2E.57).~~

16 ~~Option:~~

17 The Emergency Medical Services (D9-13) symbol sign may be used to identify medical service facilities
18 that have been included in the Emergency Medical Services system under a signing policy developed by the
19 State and/or local highway agency.

20 **Standard:**

21 **The Emergency Medical Services symbol sign shall not be used to identify services other than**
22 **qualified hospitals, ambulance stations, and qualified free-standing emergency medical treatment**
23 **centers. If used, the Emergency Medical Services symbol sign shall be supplemented by a sign**
24 **identifying the type of service provided.**

25 Option:

26 The Emergency Medical Services symbol sign may be used above the HOSPITAL (D9-13a) ~~word-~~
27 ~~message~~ sign or Hospital (D9-2) symbol sign or above a sign with ~~either~~ the legend AMBULANCE
28 STATION (D9-13b), ~~or~~ EMERGENCY MEDICAL CARE (D9-13c), or TRAUMA CENTER (D9-13d). The
29 Emergency Medical Services symbol sign may also be used to supplement Telephone (D9-1), Channel 9
30 Monitored (D12-3), or POLICE (D9-14) signs.

31 **Standard:**

32 **The legend EMERGENCY MEDICAL CARE shall not be used for services other than qualified**
33 **free-standing emergency medical treatment centers.**

34 Guidance:

35 Each State should develop guidelines for the implementation of the Emergency Medical Services symbol
36 sign.

37 The State should consider the following guidelines in the preparation of its policy:

38 A. AMBULANCE

- 39 1. 24-hour service, 7 days per week.
- 40 2. Staffed by two State-certified persons trained at least to the basic level.
- 41 3. Vehicular communications with a hospital emergency department.
- 42 4. Operator should have successfully completed an emergency-vehicle operator training course.

43 B. HOSPITAL

- 44 1. 24-hour service, 7 days per week.
- 45 2. Emergency department facilities with a physician (or emergency care nurse on duty within the
46 emergency department with a physician on call) trained in emergency medical procedures on
47 duty.
- 48 3. Licensed or approved for definitive medical care by an appropriate State authority.
- 49 4. Equipped for radio voice communications with ambulances and other hospitals.

50 C. Channel 9 Monitored

- 51 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.

Section ~~2E-51~~ 2I.03 **General Service Signs for Freeways and Expressways**

Support:

General Service ([D9-18 series](#)) signs (see Figure 2I-3) are generally not appropriate at major interchanges (see [definition in](#) Section 2E.32 ~~for definition~~) and in urban areas.

~~Option:~~

~~If interchanges are not numbered, an action message such as NEXT EXIT or SECOND RIGHT may be used (see Figure 2E-41).~~

Standard:

General Service signs shall have white letters, symbols, [arrows](#), and borders on a blue background. Letter and numeral sizes shall ~~conform to~~ [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 ~~shown~~ [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 ~~shown~~ [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.
- C. Lodging if all of the following are available:
 1. Licensing or approval, where required;
 2. Adequate sleeping accommodations;
 3. Public telephone; and
 4. Modern sanitary facilities.
- D. Public Telephone if continuous operation, 7 days per week is available.
- E. Hospital if continuous emergency care capability, with a physician on duty 24 hours per day, 7 days per week is available. A physician on duty would include the following criteria and should be signed in accordance with the priority as follows:
 1. Physician on duty within the emergency department;
 2. Registered nurse on duty within the emergency department, with a physician in the hospital on call; or

- 1 3. Registered nurse on duty within the emergency department, with a physician on call from office
- 2 or home.
- 3 F. 24-Hour Pharmacy if a pharmacy is open, with a State-licensed pharmacist present and on duty, 24
- 4 hours per day, 7 days per week and is located within 3 miles of an interchange on the Federal-aid
- 5 system.
- 6 G. Camping if all of the following are available:
- 7 1. Licensing or approval, where required;
- 8 2. Adequate parking accommodations; and
- 9 3. Modern sanitary facilities and drinking water.

10 **Standard:**

11 **For any service that is operated on a seasonal basis only, the General Service signs shall be removed**

12 **or covered during periods when the service is not available.**

13 **The General Service signs shall be mounted in an effective location, between the Advance Guide**

14 **sign and the Exit Direction sign, in advance of the exit leading to the available services.**

15 **Guidance:**

16 The General Service sign should contain the interchange number, if any, as ~~illustrated~~ [shown](#) in Figure 2I-

17 3.

18 **Option:**

19 If the distance to the next point where services are available is greater than 10 miles, a NEXT SERVICES

20 XX MILES (D9-17P) [sign plaque](#) (see Figure 2I-2) may be ~~used as a separate sign panel~~ installed below the

21 Exit Direction sign.

22 **Standard:**

23 **Signs for services shall ~~conform to~~ [comply with](#) the format for General Service signs (see Section**

24 **2I.02) and as [specified provided herein in this Manual](#). ~~Letter and numeral sizes shall be as shown in~~**

25 **~~Tables 2E-1 through 2E-4~~. No more than six general road user services shall be displayed on one sign,**

26 **which includes any appended ~~sign panels~~ [supplemental signs or plaques](#). General Service signs shall**

27 **carry the legends for one or more of the following services: Food, Gas, Lodging, Camping, Phone,**

28 **Hospital, 24-Hour Pharmacy, or Tourist Information.**

29 **The qualified services available shall be ~~shown~~ [displayed](#) at specific locations on the sign.**

30 **To provide flexibility for the future when the service might become available, the sign space**

31 **normally reserved for a given service symbol or word shall be left blank when that service is not**

32 **present.**

33 **Guidance:**

34 The standard display of word messages should be FOOD and PHONE in that order on the top line, and

35 GAS and LODGING on the second line. If used, HOSPITAL and CAMPING should be on separate lines (see

36 Figure 2I-3).

37 **Option:**

38 Signing for DIESEL, LP-Gas, or other alternative fuel services may be substituted for any of the general

39 services or appended to such signs. The International Symbol of Accessibility for the Handicapped (D9-6)

40 sign ([see Figure 2I-1](#)) may be used for facilities that qualify.

41 **Guidance:**

42 When symbols are used for the road user services, they should be displayed as follows:

43 **A. Six services:**

- 44 1. Top row—GAS, FOOD, and LODGING
- 45 2. Bottom row—PHONE, HOSPITAL, and CAMPING

46 **B. Four services:**

- 47 1. Top row—GAS and FOOD
- 48 2. Bottom row—LODGING and PHONE

49 **C. Three services:**

- 50 1. Top row—GAS, FOOD, and LODGING

51 **Option:**

1 Substitutions of other services for any of the services ~~shown~~ described above in Paragraph 16 may be
2 made by placing the substitution in the lower right (four or six services) or extreme right (three services)
3 portion of the sign ~~panel~~. An action message or an interchange number may be used for symbol signs in the
4 same manner as they are used for word message signs. The Diesel Fuel (D9-11) symbol or the LP-Gas (D9-
5 15) symbol may be substituted for the symbol representing fuel or appended to such assemblies. The Tourist
6 Information (D9-10) symbol or the 24-Hour Pharmacy (D9-20 and D9-20aP) symbol may be substituted on
7 any of the ~~above~~ configurations provided in Paragraph 16.

8 At rural interchange areas where limited road user services are available and where it is unlikely that
9 additional services will be provided within the near future, a ~~sign panel having~~ supplemental plaque
10 displaying one to three services (words or symbols) may be appended ~~to~~ below a ground post-mounted
11 interchange guide sign*.

12 **Standard:**

13 **If more than three services become available at rural interchange areas where limited road user**
14 **services were anticipated, ~~any~~ the appended ~~sign panel~~ supplemental plaque described in Paragraph 18**
15 **shall be removed and replaced with an independently mounted General Service sign as described in this**
16 **Section.**

17 **Option:**

18 A separate Telephone Service (D9-1) sign (see Figure 2I-1) may be installed if telephone facilities are
19 located adjacent to the route at places where public telephones would not normally be expected.

20 The Recreational Vehicle Sanitary Station (D9-12) sign (see Figure 2I-1) may be used as needed to
21 indicate the availability of facilities designed for dumping wastes from recreational vehicle holding tanks.

22 In some locations, signs may be used to indicate that services are not available.

23 A separate ~~TRUCK PARKING~~ Truck Parking (D9-16) sign (see Figure 2I-1) may be ~~used on a separate~~
24 ~~sign panel mounted~~ below the other general road user services to direct truck drivers to designated parking
25 areas.

26 Section 2I.04 Interstate Oasis Signing

27 Support:

28 An Interstate Oasis is a facility near an Interstate highway that provides products and services to the
29 public, 24-hour access to public restrooms, and parking for automobiles and heavy trucks. Interstate Oasis
30 guide signs inform road users on Interstate highways as to the presence of an Interstate Oasis at an interchange
31 and which businesses have been designated by the State within which they are traveling as having met the
32 eligibility criteria of the Federal Highway Administration's Interstate Oasis policy. The FHWA's policy,
33 which is dated October 18, 2006, and which can be viewed on the MUTCD website at
34 <http://mutcd.fhwa.dot.gov/res-policy.htm>, provides a more detailed definition of an Interstate Oasis and
35 specifies the eligibility criteria for an Interstate Oasis designation in compliance with the requirements of laws
36 enacted by Congress.

37 Guidance:

38 If a State elects to provide or allow Interstate Oasis signing (see Figure 2I-4), there should be a statewide
39 policy, program, procedures, and criteria for the designation and signing of a facility as an Interstate Oasis that
40 complies with FHWA's policy and with the provisions of this Section.

41 States electing to provide or allow Interstate Oasis signing should use the following signing practices on
42 the freeway for any given exit to identify the availability of a designated Interstate Oasis:

43 A. If adequate sign spacing allows, a separate Interstate Oasis (D5-12) sign should be installed in an
44 effective location with spacing of at least 800 feet from other adjacent guide signs, including any
45 Specific Service signs. This Interstate Oasis sign should be located upstream from the Advance Guide
46 sign or between the Advance Guide sign and the Exit Direction sign for the exit leading to the
47 Interstate Oasis. The Interstate Oasis sign should have a white legend with a letter height of at least
48 10 inches and a white border on a blue background and should contain the words INTERSTATE
49 OASIS and the exit number or, for an unnumbered interchange, an action message such as NEXT
50 RIGHT. The names or logos of the businesses designated as Interstate Oases should not be included
51 on this sign.

52 B. If the spacing of the other guide signs precludes the use of a separate sign as described in Item A, an
53 INTERSTATE OASIS (D5-12P) supplemental plaque with a letter height of at least 10 inches and

1 with a white legend and border on a blue background should be appended above or below an existing
2 D9-18 series General Service sign for the interchange.

3 If a separate Interstate Oasis (D5-12) sign is installed, an Interstate Oasis sign panel should be
4 incorporated into the design of the sign (see Figure 2I-4).

5 **Standard:**

6 **The Interstate Oasis sign panel shall only be used on the separate Interstate Oasis sign where it is**
7 **accompanied by the words INTERSTATE OASIS and shall not be used independently without the**
8 **words.**

9 **Option:**

10 If Specific Service signing is provided at the interchange, a business designated as an Interstate Oasis and
11 having a business logo sign panel on the Food and/or Gas Specific Service signs may use the bottom portion
12 of the business logo sign panel to display the word OASIS.

13 **Standard:**

14 **If Specific Services signs containing the OASIS legend as a part of the business logo(s) are not used**
15 **on the ramp and if the Interstate Oasis is not clearly visible and identifiable from the exit ramp, a sign**
16 **with a white INTERSTATE OASIS legend with a letter height of at least 6 inches and a white border on**
17 **a blue background shall be provided on the exit ramp to indicate the direction and distance to the**
18 **Interstate Oasis.**

19 **If needed, additional trailblazer guide signs shall be used along the crossroad to guide road users to**
20 **an Interstate Oasis.**

21 **Section ~~2D.42~~ 2I.05 Rest Area and Other Roadside Area Signs (~~D5 Series~~)** this Section contains
22 **edited text that was formerly in Sections 2D.42, 2D.43, and 2E.52**

23 **~~Section 2D.43 Scenic Area Signs (D6 Series)~~**

24 **~~Section 2E.52 Rest and Scenic Area Signs~~**

25 **Standard:**

26 **Rest Area signs for this purpose (see Figure 2I-5) shall have a retroreflective white letters, symbols,**
27 **legend and border on a blue background.**

28 **Rest Area Signs (see Figure 2D-9) that include the legend REST AREA shall be used only where**
29 **parking and restroom facilities are available.**

30 **Option:**

31 ~~Messages such as REST AREA X MILE (D5-1), REST AREA (D5-2), PARKING AREA X MILE (D5-~~
32 ~~3), PARKING AREA (D5-4), ROADSIDE TABLE X MILE, ROADSIDE PARK X MILE, and PICNIC~~
33 ~~AREA X MILE may be used, as well as other appropriate messages.~~

34 **Guidance:**

35 ~~Signing for rest areas and scenic areas should conform to the provisions set forth in Sections 2D.42 and~~
36 ~~2D.43. However, the signs should be suitably enlarged for freeway or expressway application. A roadside~~
37 ~~area that does not contain restroom facilities should be signed to indicate the major road user service that is~~
38 ~~provided. For example, the sign legends for an area with only parking should be signed with a use the words~~
39 ~~PARKING AREA (D5-4) sign (see Figure 2E-44) instead of REST AREA. The sign legends for an area with~~
40 ~~only picnic tables and parking should be signed with a use words such as PICNIC AREA, (D5-5e) sign or a~~
41 ~~Picnic Table Area (D5-5a) symbol sign ROADSIDE TABLE, or ROADSIDE PARK instead of REST AREA.~~

42 Rest areas that have tourist information and welcome centers should be signed as discussed in Section
43 2I.08.

44 Scenic area signing should be consistent with that ~~specified~~ provided for rest areas, ~~Standard messages~~
45 ~~except that the legends~~ should read use words such as SCENIC AREA (D6-1), SCENIC VIEW (D6-2), or
46 SCENIC OVERLOOK (D6-3), or the equivalent instead of REST AREA.

47 **Option:**

48 ~~Scenic areas may be marked by signs (see Figure 2D-9) carrying the message SCENIC AREA, SCENIC~~
49 ~~VIEW, SCENIC OVERLOOK, or the equivalent, together with appropriate directional information.~~

50 **Guidance:**

1 ~~The design of the signs should be consistent with that specified for rest areas in Section 2D.42 and should~~
2 ~~be white letters, symbols, and border on a blue background. An advance sign and an additional sign at the~~
3 ~~turnoff point should be used for this kind of attraction.~~

4 If ~~used~~ a rest area or other roadside area is provided on a conventional road, a D5-1 and/or D5-1b Rest
5 Area signs should be installed in advance of ~~roadside parks or the~~ rest areas or other roadside area to permit
6 the driver to reduce speed ~~and leave in preparation for leaving~~ the highway ~~reasonably safely~~. A D5-5 sign
7 (or a D5-2 sign if an exit ramp is provided) should be installed at the turnoff point where the driver needs to
8 leave the highway to access the rest area or other roadside area.

9 **Standard:**

10 ~~On the approach to rest areas~~ If a rest area or other roadside area is provided on a freeway or expressway,
11 a ~~REST AREA advance guide~~ D5-1 sign shall should be placed 1 mile and/or 2 miles in advance of the rest
12 area.

13 **Standard:**

14 A D5-2 sign shall be placed at the rest area or other roadside area exit gore, ~~there shall be a sign~~
15 ~~with a message REST AREA together with an arrow indicating the appropriate turn as shown in~~
16 ~~Figure 2E-44.~~

17 **Option:**

18 A D5-1b sign may be placed between the ~~REST AREA advance guide~~ D5-1 sign and the exit gore ~~of the~~
19 ~~rest area exit, there may be a REST AREA (D5-1b) sign (see Figure 2E-5) on a freeway or expressway. The~~
20 ~~words NEXT RIGHT (E2-2) or an arrow may be included as part of the message. A second D5-1 sign may be~~
21 ~~used in place of the D5-1b sign with a distance to the nearest 1/2 or 1/4 mile displayed as a fraction rather than~~
22 ~~a decimal for distances of less than 1 mile.~~

23 To provide the road user with information on the location of succeeding rest areas, a NEXT REST AREA
24 XX MILES (D5-6) sign (see Figure 2I-5) may be installed independently or as a supplemental sign ~~panel~~
25 mounted below one of the REST AREA advance guide signs.

26 **Standard:**

27 All signs on freeways and expressways for rest and scenic other roadside areas shall have white
28 ~~letters, symbols, and borders on a blue background,~~ letter and numeral sizes shall that conform to
29 comply with the minimum requirements of Tables 2E-2 through 2E-5. The sizes for General Service
30 signs that have standardized designs shall be as shown in Table 2I-1.

31 **Option:**

32 If the rest area has facilities for the physically impaired (see Section 2I.02), the International Symbol of
33 Accessibility for the Handicapped (D9-6) sign (see Figure 2I-1) may be placed with or beneath the REST
34 AREA advance guide sign.

35 If telecommunication devices for the deaf (TDD) are available at the rest area, the TDD (D9-21) symbol
36 sign (see Figure 2I-1) may be used to supplement the advance guide signs for the rest area.

37 If wireless Internet services are available at the rest area, the Wi-Fi (D9-22) symbol sign (see Figure 2I-1)
38 may be used to supplement the advance guide signs for the rest area.

39 **Section 2I.06 Brake Check Area Signs (D5-13 and D5-14)**

40 **Guidance:**

41 If an area has been provided for drivers to check the brakes on their vehicle, a BRAKE CHECK AREA
42 XX MILES (D5-13) sign (see Figure 2I-6) should be installed in advance of the brake check area, and a D5-
43 14 sign (see Figure 2I-6) should be placed at the entrance to the brake check area.

44 **Section 2I.07 Chain-Up Area Signs (D5-15 and D5-16)**

45 **Guidance:**

46 If an area has been provided for drivers to pull off of the roadway to install chains on their tires, a
47 CHAIN-UP AREA XX MILES (D5-15) sign (see Figure 2I-6) should be installed in advance of the chain-up
48 area, and a D5-16 sign (see Figure 2I-6) should be placed at the entrance to the chain-up area.

49 **Section ~~2E.53~~ 2I.08 Tourist Information and Welcome Center Signs**

50 **Support:**

1 Tourist information and welcome centers have been constructed within rest areas on freeways and
2 expressways and are operated by either a State or a private organization. Others have been located within
3 close proximity to these facilities and operated by civic clubs, chambers of commerce, or private enterprise.

4 Guidance:

5 An excessive number of supplemental [sign](#) panels should not be installed with Tourist Information or
6 Welcome Center signs so as not to overload the road user.

7 **Standard:**

8 **Tourist Information or Welcome Center signs (see Figure 2I-7) shall have a white legend and**
9 **border on a blue background. Continuously staffed or unstaffed operation at least 8 hours per day, 7**
10 **days per week, shall be required.**

11 **If operated only on a seasonal basis, the Tourist Information or Welcome Center signs shall be**
12 **removed or covered during the off seasons.**

13 Guidance:

14 For freeway or expressway rest area locations that also serve as tourist information or welcome centers,
15 the following signing criteria should be used:

- 16 A. The locations for tourist information and welcome center Advance Guide, Exit Direction, and Exit
17 Gore signs should meet the General Service signing requirements described in Section 2I.03.
- 18 B. If the signing for the tourist information or welcome center is to be accomplished in conjunction with
19 the initial signing for the rest areas, the message on the Advance Guide ([D5-7](#)) sign should be REST
20 AREA, TOURIST INFO CENTER, XX MILES or REST AREA, STATE NAME (optional),
21 WELCOME CENTER XX MILES. On the Exit Direction ([D5-8 or D5-11](#)) sign the message should
22 be REST AREA, TOURIST INFO CENTER with a ~~an~~ [diagonally](#) upward-~~pointing~~ ~~sloping~~ [directional](#)
23 arrow (or NEXT RIGHT), or REST AREA, STATE NAME (optional), WELCOME CENTER with
24 a ~~an~~ [diagonally](#) upward-~~pointing~~ ~~sloping~~ [directional](#) arrow (or NEXT RIGHT).
- 25 C. If the initial rest area Advance Guide and Exit Direction signing is in place, these signs should
26 include, on supplemental signs ~~panels~~, the legend TOURIST INFO CENTER or STATE NAME
27 (optional), WELCOME CENTER.
- 28 D. The [Exit](#) Gore sign should contain only the legend REST AREA with the arrow and should not be
29 supplemented with any legend pertaining to the tourist information center or welcome center.

30 Option:

31 An alternative to the supplemental TOURIST INFO CENTER legend is the [Tourist Information](#) ~~Symbol~~
32 (D9-10) sign ([see Figure 2I-1](#)), which may be appended beneath the REST AREA advance guide sign.

33 The name of the State or local jurisdiction may appear on [the Advance Guide and Exit Direction](#) tourist
34 information/welcome center signs if the jurisdiction controls the operation of the tourist information or
35 welcome center and the center meets the operating criteria set forth ~~herein in this Manual~~ and is consistent
36 with State policies. ~~The State name may be used on the Advance Guide and the Exit Direction signs.~~

37 Guidance:

38 For tourist information centers [that are](#) located off the freeway or expressway facility, additional signing
39 criteria should be as follows:

- 40 A. Each State should adopt a policy establishing the maximum distance that a tourist information center
41 can be located from the interchange in order to be included on official signs.
- 42 B. The location of signing should be in accordance with requirements pertaining to General Service
43 signing (see Section 2I.03).
- 44 C. Signing along the crossroad should be installed to guide the road user from the interchange to the
45 tourist information center and back to the interchange.

46 Option:

47 As an alternative, the [Tourist Information](#) ~~Symbol~~ (D9-10) sign ([see Figure 2I-1](#)) may be appended to the
48 guide signs for the exit ~~providing that provides~~ access to the tourist information center. As a second
49 alternative, the [Tourist Information](#) ~~Symbol~~ sign may be combined with General Service signing.

50 **Section ~~2E.56~~ 2I.09 Radio Information Signing** this Section also contains edited text that was formerly
51 in Section 2D.45

52 Option:

1 Radio-Weather Information (D12-1) signs (see Figure 2I-8) may be used in areas where difficult driving
2 conditions commonly result from weather systems. Radio-Traffic Information signs may be used in
3 conjunction with traffic management systems.

4 **Standard:**

5 **Radio-Weather and Radio-Traffic Information signs shall have a white legend and border on a blue**
6 **background. Only the numerical indication of the radio frequency shall be used to identify a station**
7 **broadcasting travel-related weather or traffic information. No more than three frequencies shall be**
8 **~~shown~~ displayed on each sign. Only radio stations whose signal will be of value to the road user and**
9 **who agree to broadcast either of the following two items ~~below~~ shall be identified on Radio-Weather**
10 **and Radio-Traffic Information signs:**

- 11 A. **Periodic weather warnings at ~~no more than 15-minute intervals~~ a rate of at least once every 15**
12 **minutes during periods of adverse weather; or**
13 B. **Driving condition information (affecting the roadway being traveled) at a rate of at least once**
14 **every 15 minutes, or when required, during periods of adverse traffic conditions, and when**
15 **supplied by an official agency having jurisdiction.**

16 **If a station to be considered operates only on a seasonal basis, its signs shall be removed or covered**
17 **during the off season.**

18 **Guidance:**

19 The radio station should have a signal strength to adequately broadcast 70 miles along the route. Signs
20 should be spaced as needed for each direction of travel at distances determined by an engineering study. The
21 stations to be included on the signs should be selected in cooperation with the association(s) representing
22 major broadcasting stations in the area to provide: (1) maximum coverage to all road users on both AM and
23 FM frequencies; and (2) consideration of 24 hours per day, 7 days per week broadcast capability.

24 **Option:**

25 In roadway rest area locations, a smaller sign using a greater number of radio frequencies, but of the same
26 general design, may be used.

27 **Standard:**

28 **Radio-Weather and Radio-Traffic Information signs installed in rest areas shall be positioned such**
29 **that they are not visible from the main roadway.**

30 **Option:**

31 A Channel 9 Monitored (D12-3) sign (see Figure 2I-8) may be installed as needed. Official public
32 agencies or their designees may be ~~shown~~ displayed as the monitoring agency on the sign (see Section 2E.56).
33 ~~A Channel 9 Monitored (D12-3) sign or cellular phone sign may be installed as needed.~~

34 **Standard:**

35 **Only official public agencies or their designee shall be ~~shown~~ displayed as the monitoring agency on**
36 **the Channel 9 Monitored sign.**

37 **Option:**

38 An EMERGENCY ~~DIAL~~ CALL ~~XX~~ (D12-4) sign (see Figure 2I-8), along with the appropriate number
39 to ~~dial~~ call, may be used for cellular phone communications.

40 **Section 2I.10 TRAVEL INFO CALL 511 Signs (D12-5 and D12-5a)** this Section contains edited
41 **text that was formerly in Sections 2D.45 and 2E.56**

42 ~~Support:~~

43 ~~Section 2D.45 contains information about the use and application of TRAVEL INFO CALL 511 (D12-5)~~
44 ~~signs.~~

45 **Option:**

46 A TRAVEL INFO CALL 511 (D12-5) sign (see Figure 2I-8) may be installed if a 511 travel information
47 services telephone number is available to road users for obtaining traffic, public transportation, weather,
48 construction, or road condition information.

49 The ~~logo~~ pictograph of the transportation agency or the travel information service or program that is
50 providing the travel information may be incorporated within the D12-5 sign either above or below the
51 TRAVEL INFO CALL 511 legend.

1 **Standard:**

2 **The logo of a commercial entity shall not be incorporated within the TRAVEL INFO CALL 511**
3 **sign.**

4 **The TRAVEL INFO CALL 511 sign shall have a white legend and border on a blue background.**

5 Guidance:

6 If the ~~logo~~ pictograph of the transportation agency or the travel information service or program is used,
7 the ~~logo's~~ pictograph's maximum height should not exceed two times the letter height used in the legend of
8 the sign.

9 **Section ~~2E.57~~ 2I.11 Carpool and Ridesharing Signing**

10 Option:

11 In areas having carpool matching services, Carpool Information (D12-2) signs (see Figure 2I-8) may be
12 provided adjacent to highways with preferential lanes or along any other highway.

13 Carpool Information signs may include an Internet ~~addresses~~ domain name or telephone number~~s~~ of more
14 than four characters within the legend.

15 Guidance:

16 Because this is an information sign related to road user services, the Carpool Information sign should have
17 a white legend and border on a blue background.

18 **Standard:**

19 **If a local transit ~~logo~~ pictograph or carpool symbol is incorporated into the Carpool Information**
20 **sign, the maximum vertical dimension of the logo or symbol shall not exceed 18 inches.**

1 CHAPTER ~~2F~~ 2J. SPECIFIC SERVICE SIGNS

2 Section ~~2F.01~~ 2J.01 Eligibility

3 Standard:

4 Specific Service signs shall be defined as guide signs that provide road users with business
5 identification and directional information for services and for eligible attractions. Eligible service
6 categories shall be limited to gas, food, lodging, camping, attractions, and 24-hour pharmacies.

7 Guidance:

8 The use of Specific Service signs should be limited to areas primarily rural in character or to areas where
9 adequate sign spacing can be maintained.

10 Option:

11 Where an engineering study determines a need, Specific Service signs may be used on any class of
12 highways.

13 Guidance:

14 Specific Service signs should not be installed at an interchange where the road user cannot conveniently
15 reenter the freeway or expressway and continue in the same direction of travel.

16 Standard:

17 Eligible service facilities shall comply with laws concerning the provisions of public
18 accommodations without regard to race, religion, color, age, sex, or national origin, and laws
19 concerning the licensing and approval of service facilities.

20 The attraction services shall include only facilities which have the primary purpose of providing
21 amusement, historical, cultural, or leisure activities to the public.

22 Distances to eligible 24-hour pharmacies shall not exceed 3 miles in any direction of an interchange
23 on the Federal-aid system.

24 Guidance:

25 Except as ~~noted~~ provided in ~~the Option below~~ Paragraph 9, distances to eligible services other than
26 pharmacies should not exceed 3 miles in any direction.

27 Option:

28 If, within the 3-mile limit, facilities for the services being considered other than pharmacies are not
29 available or choose not to participate in the program, the limit of eligibility may be extended in 3-mile
30 increments until one or more facilities for the services being considered chooses to participate, or until 15
31 miles is reached, whichever comes first.

32 Guidance:

33 If State or local agencies elect to provide Specific Service signing, there should be a statewide policy for
34 such signing and criteria for the availability of the various types of services. The criteria should consider the
35 following:

36 A. To qualify for a GAS logo sign panel, a business should have:

- 37 1. Vehicle services including gas and/or alternative fuels, oil, and water;
- 38 2. Continuous operation at least 16 hours per day, 7 days per week for freeways and expressways,
39 and continuous operation at least 12 hours per day, 7 days per week for conventional roads; ~~and~~
- 40 3. Modern sanitary facilities and drinking water; and
- 41 4. Public telephone.

42 B. To qualify for a FOOD logo sign panel, a business should have:

- 43 1. Licensing or approval, where required;
- 44 2. Continuous operations to serve at least two meals per day, at least 6 days per week;
- 45 3. Modern sanitary facilities; and
- 46 4. Public telephone. ~~and~~

47 C. To qualify for a LODGING logo sign panel, a business should have:

- 48 1. Licensing or approval, where required;
- 49 2. Adequate sleeping accommodations;
- 50 3. Modern sanitary facilities; and

- 1 4. Public telephone. ~~and~~
- 2 D. To qualify for a CAMPING logo [sign](#) panel, a business should have:
 - 3 1. Licensing or approval, where required;
 - 4 2. Adequate parking accommodations; and
 - 5 3. Modern sanitary facilities and drinking water.
- 6 E. To qualify for an ATTRACTION logo [sign](#) panel, a facility should have:
 - 7 1. Regional significance, [in compliance with the provisions of Paragraph 6](#); and
 - 8 2. Adequate parking accommodations.

9 **Standard:**

10 **If State or local agencies elect to provide Specific Service signing for pharmacies, both of the**
11 **following criteria shall be met for a pharmacy to qualify for signing:**

- 12 A. The pharmacy shall be continuously operated 24 hours per day, 7 days per week, and shall have
- 13 a State-licensed pharmacist present and on duty at all times; and
- 14 B. The pharmacy shall be located within 3 miles of an interchange on the Federal-aid system.

15 [Support:](#)

16 [Section 2I.04 contains information regarding the Interstate Oasis program.](#)

17 **Section ~~2F.02~~ [2J.02](#) Application**

18 **Standard:**

19 The number of Specific Service signs along an approach to an interchange or intersection,
20 regardless of the number of service types displayed, shall be limited to a maximum of four. In the
21 direction of traffic, successive Specific Service signs shall be for 24-hour pharmacy, attraction, camping,
22 lodging, food, and gas services, in that order.

23 A Specific Service sign shall display the word message GAS, FOOD, LODGING, CAMPING,
24 ATTRACTION, or 24-HOUR PHARMACY, an appropriate directional legend such as the word
25 message EXIT XX, NEXT RIGHT, SECOND RIGHT, or directional arrows, and the related logo sign
26 panels.

27 No more than three types of services shall be represented on any sign or sign assembly. If three
28 types of services are ~~shown~~ [displayed](#) on one sign, then the logo [sign](#) panels shall be limited to two for
29 each service [type](#) (for a total of six logo [sign](#) panels). [If two types of services are displayed on one sign,](#)
30 [then the logo sign panels shall be limited to either three for each service type \(for a total of six logo sign](#)
31 [panels\) or four for one service type and two for the other service type \(for a total of six logo sign](#)
32 [panels\).](#) The legend and logo [sign](#) panels applicable to a service type shall be displayed such that the
33 road user will not associate them with another service type on the same sign.

34 No service type shall appear on more than ~~one~~ [two](#) signs (see [Paragraph 6](#)).

35 The signs shall have a blue background, a white border, and white legends of upper-case letters,
36 numbers, and arrows.

37 **Guidance:**

38 [Where a service type is displayed on two signs, the signs for that service should follow one another in](#)
39 [succession.](#)

40 The Specific Service signs should be located to take advantage of natural terrain, to have the least impact
41 on the scenic environment, and to avoid visual conflict with other signs within the highway right-of-way.

42 **Option:**

43 General Service signs (see Sections 2I.02 and 2I.03) may be used in conjunction with Specific Service
44 signs for eligible types of services that are not represented by a Specific Service sign.

45 **Support:**

46 Examples of Specific Service signs are shown in Figure 2J-1. Examples of sign locations are shown in
47 Figure 2J-2.

48 **Section ~~2F.03~~ [2J.03](#) Logos and Logo Sign Panels**

49 **Standard:**

1 A logo shall be either an identification symbol/trademark or a word message. Each logo shall be
2 placed on a separate logo sign panel that shall be attached to the Specific Service sign. Symbols or
3 trademarks used alone for a logo shall be reproduced in the colors and general shape consistent with
4 customary use, and any integral legend shall be in proportionate size. A logo that resembles an official
5 traffic control device shall not be used.

6 Guidance:

7 A word message logo, not using a symbol or trademark, should have a blue background with white legend
8 and border.

9 Support:

10 Section 2J.05 contains information regarding the minimum letter heights for logo sign panels.

11 Option:

12 Where business identification symbols or trademarks are used alone for a logo, the border may be omitted
13 from the logo sign panel.

14 A portion ~~at the bottom~~ of a ~~GAS~~ logo sign panel may be used to display ~~the legends for alternative fuels~~
15 ~~(see Section 2E.51) available at the facility~~ a supplemental message horizontally along the bottom of the logo
16 sign panel, provided that the message displays essential motorist information (see Figure 2J-3). ~~A portion at~~
17 ~~the bottom of a FOOD logo panel may be used to display the word CLOSED and the day of the week when~~
18 ~~the facility is closed.~~

19 Standard:

20 All supplemental messages shall be displayed within the logo sign panel and shall have letters and
21 numerals that comply with the minimum height requirements shown in Table 2J-1.

22 Guidance:

23 A logo sign panel should not display more than one supplemental message.

24 The supplemental message should be displayed in a color to contrast effectively with the background of
25 the business sign or separated from the other legend or logo by a divider bar.

26 State or local agencies that elect to allow supplemental messages on logo sign panels should develop a
27 statewide policy for such messages.

28 Support:

29 Typical supplemental messages might include DIESEL, 24 HOURS, CLOSED and the day of the week
30 when the facility is closed, ALTERNATIVE FUELS (see Section 2I.03), and RV ACCESS.

31 Option:

32 The RV ACCESS supplemental message may be circular.

33 Standard:

34 If the RV ACCESS supplemental message is circular, it shall be the abbreviation RV in black letters
35 inside a yellow circle with a black border and it shall be displayed within the logo sign panel near the
36 lower right-hand corner (see Figure 2J-4).

37 Guidance:

38 If the circular RV ACCESS supplemental message is used, the circle should have a diameter of 10 inches
39 and the letters should have a height of 6 inches.

40 If a State or local agency elects to display the designation of businesses as providing on-premise
41 accommodations for recreational vehicles with the RV ACCESS supplemental message or the RV Access
42 circular message, there should be a statewide policy for such designation and criteria for qualifying
43 businesses. The criteria should include such site conditions as access between the public roadway and the site,
44 on-premise geometry, and parking.

45 Option:

46 If a business designated as an Interstate Oasis (see Section 2I.04) has a business logo sign panel on the
47 Food and/or Gas Specific Service signs, the word OASIS may be displayed on the bottom portion of the logo
48 sign panel for that business.

49 Standard:

50 A logo sign panel shall not display the symbol/trademark or name of more than one business.

1 **Section ~~2F.04~~ 2J.04 Number and Size of Signs and Logos and Signs Panels**

2 Guidance:

3 Sign sizes should be determined by the amount and height of legend and the number and size of logo sign
4 panels attached to the sign. All logo sign panels on a sign should be the same size.

5 **Standard:**

6 **Each Specific Service sign or sign assembly shall be limited to no more than six logo sign panels.**
7 ~~There shall be no more than four logo panels for one of the two service types on the same sign or sign~~
8 ~~assembly.~~

9 Option:

10 Where more than six businesses of a specific service type are eligible for logo sign panels at the same
11 interchange, additional logo sign panels of that same specific service type may also be displayed in
12 accordance with the provisions of Paragraph 4. The additional logo sign panels may be displayed either by
13 placing more than one specific service type on the same sign (see Paragraph 3 of Section 2J.02) or by using a
14 second Specific Service sign of that specific service type if the additional sign can be added without exceeding
15 the limit of four Specific Service signs at an interchange or intersection approach (see Paragraph 6 of Section
16 2J.02).

17 **Standard:**

18 Where logo sign panels for more than six businesses of a specific service type are displayed at the
19 same interchange or intersection approach, the following provisions shall apply:

20 A. No more than 12 logo sign panels of a specific service type shall be displayed on no more than
21 two Specific Service signs or sign assemblies;

22 B. No more than six logo sign panels shall be displayed on a single Specific Service sign; and

23 C. No more than four Specific Service signs shall be displayed on the approach.

24 Support:

25 Section 2J.08 contains information regarding Specific Service signs for double-exit interchanges.

26 **Standard:**

27 **Each logo sign panel attached to a Specific Service sign shall have a rectangular shape with a width**
28 **longer than the height. A logo sign panel on signs for freeways and expressways shall not exceed 60**
29 **inches in width and 36 inches in height. A logo sign panel on signs for conventional roads and freeway**
30 **and expressway ramps shall not exceed 30 inches in width and 18 inches in height. The vertical and**
31 **horizontal spacing between logo sign panels shall not exceed 8 inches and 12 inches, respectively.**

32 Support:

33 Sections 2A.14, 2E.15, and 2E.16 contain information regarding borders, interline spacing, and edge
34 spacing.

35 **Section ~~2F.05~~ 2J.05 Size of Lettering**

36 **Standard:**

37 ~~All letters and numerals on Specific Service signs, except on the logo panels, shall be a minimum~~
38 ~~height of 10 inches for signs on freeways and expressways, and 6 inches for signs on conventional roads~~
39 ~~and ramps.~~

40 All Specific Service signs and logo sign panels shall have letter and numeral sizes that comply with
41 the minimum requirements of Table 2J-1.

42 Guidance:

43 Any legend on a symbol/trademark should be proportional to the size of the symbol/trademark.

44 **Section ~~2F.06~~ 2J.06 Signs at Interchanges**

45 **Standard:**

46 **The Specific Service signs shall be installed between the ~~previous~~ preceding interchange and at least**
47 **800 feet in advance of the Exit Direction sign at the interchange from which the services are available**
48 **(see Figure 2J-2).**

49 Guidance:

1 There should be at least an 800-foot spacing between the Specific Service signs, except for Specific
2 Service ramp signs. However, excessive spacing is not desirable. Specific Service ramp signs should be
3 spaced at least 100 feet from the Exit Gore sign, from each other, and from the ramp terminal.

4 **Section ~~2F.07~~ 2J.07 Single-Exit Interchanges**

5 **Standard:**

6 At **numbered** single-exit interchanges, the name of the service type followed by the exit number
7 shall be displayed on one line above the logo **sign** panels. At unnumbered interchanges, the directional
8 legend NEXT RIGHT (LEFT) shall be used.

9 At single-exit interchanges, Specific Service ramp signs shall be installed along the ramp or at the
10 ramp terminal for facilities that have logo **sign** panels displayed along the main roadway if the facilities
11 are not readily visible from the ramp terminal. Directions to the service facilities shall be indicated by
12 arrows on the ramp signs. Logo **sign** panels on Specific Service ramp signs shall be duplicates of those
13 displayed on the Specific Service signs located in advance of the interchange, but shall be reduced in
14 size ([see Paragraph 6 of Section 2J.04](#)).

15 **Guidance:**

16 Specific Service ramp signs should include distances to the service facilities.

17 **Option:**

18 An exit number plaque (see Section 2E.31) may be used instead of the exit number on the signs located in
19 advance of an interchange.

20 ~~The reduced size logo panels and signs also may be installed along the crossroad.~~

21 **Section ~~2F.08~~ 2J.08 Double-Exit Interchanges**

22 **Guidance:**

23 At double-exit interchanges, the Specific Service signs should consist of two sections, one for each exit
24 (see Figure 2J-1).

25 **Standard:**

26 At a double-exit interchange, the top section shall display the logo **sign** panels for the first exit and
27 the bottom section shall display the logo **sign** panels for the second exit. **At numbered interchanges**, the
28 name of the service type and the exit number shall be displayed above the logo **sign** panels in each
29 section. At unnumbered interchanges, the word message NEXT RIGHT (LEFT) and SECOND RIGHT
30 (LEFT) shall be used in place of the exit number. The number of logo **sign** panels on the sign (total of
31 both sections) or the sign assembly shall be limited to six.

32 **Guidance:**

33 [At a double-exit interchange, where a service type is displayed on two Specific Service signs in](#)
34 [accordance with the provisions of Section 2J.04, one of the signs should display the logo sign panels for that](#)
35 [service type for the businesses that are accessible from one of the two exits and the other sign should display](#)
36 [the logo sign panels for that service type for the businesses that are accessible from the other exit.](#)

37 **Option:**

38 At a double-exit interchange where there are four logo **sign** panels to be displayed for one of the exits and
39 one or two logo **sign** panels to be displayed for the other exit, the logo **sign** panels may be arranged in three
40 rows with two logo **sign** panels per row.

41 At a double-exit interchange, where a service is to be signed for only one exit, one section of the Specific
42 Service sign may be omitted, or a single exit interchange sign may be used. Signs on ramps and crossroads as
43 described in Section 2J.07 may be used at a double-exit interchange.

44 **Section 2J.09 Specific Service Trailblazer Signs**

45 **Support:**

46 [Specific Service trailblazer signs \(see Figure 2J-5\) are guide signs with one to four logo sign panels that](#)
47 [display business identification and directional information for services and for eligible attractions. Specific](#)
48 [Service trailblazer signs are installed along crossroads for facilities that have logo sign panels displayed along](#)
49 [the main roadway and ramp, and that require additional vehicle maneuvers.](#)

50 **Standard:**

1 Specific Service trailblazer signs shall be installed along crossroads where the route to the business
2 requires a direction change, where it is questionable as to which roadway to follow, or where additional
3 guidance is needed. Where it is not feasible or practical to install Specific Service trailblazer signs to
4 such businesses, those businesses shall not be considered eligible for signing from the ramp and main
5 roadway. A Specific Service trailblazer sign shall not be required at the point where the business is
6 visible from the roadway and its access is readily apparent.

7 Guidance:

8 If used, a Specific Service trailblazer sign should be located a maximum of 500 feet in advance of any
9 required turn.

10 Standard:

11 The location of other traffic control devices shall take precedence over the location of a Specific
12 Service trailblazer sign.

13 When used, each Specific Service trailblazer sign or sign assembly shall be limited to no more than
14 four logo sign panels. The logo sign panels on Specific Service trailblazer signs shall be duplicates of
15 those displayed on the Specific Service ramp signs.

16 Appropriate legends, such as directional arrows or the word message NEXT RIGHT or SECOND
17 RIGHT, shall be displayed with the logo sign panel to provide proper guidance. The directional legend
18 and border shall be white and shall be displayed on a blue background.

19 Option:

20 Specific Service trailblazer signs may contain various types of services on a single sign or on a sign
21 assembly.

22 Specific Service trailblazer signs may be placed farther from the edge of the road than other traffic control
23 signs.

24 **Section ~~2F.09~~ 2J.10 Signs at Intersections**

25 **Standard:**

26 **Where both tourist-oriented information (see Chapter 2K) and specific service information would**
27 **be needed at the same intersection, the design of the tourist-oriented directional signs shall be used, and**
28 **the needed specific service information shall be incorporated.**

29 **Guidance:**

30 If Specific Service signs are used on conventional roads or at intersections on expressways, they should be
31 installed between the previous interchange or intersection and at least 300 feet in advance of the intersection
32 from which the services are available.

33 The spacing between signs should be determined on the basis of an engineering study.

34 Logo sign panels should not be displayed for a type of service for which a qualified facility is readily
35 visible.

36 **Standard:**

37 **If Specific Service signs are used on conventional roads or at intersections on expressways, the name**
38 **of each type of service shall be displayed above its logo sign panel(s), together with an appropriate**
39 **legend, such as NEXT RIGHT (LEFT) or a directional arrow, either displayed on the same line as the**
40 **name of the type of service or displayed below the logo sign panel(s).**

41 **Option:**

42 ~~If Specific Service signs are used on conventional roads or at intersections on expressways, the NEXT~~
43 ~~RIGHT (LEFT) or other applicable directional legend or action message may be displayed below instead of~~
44 ~~above the logo panels. this paragraph was incorporated into the Standard in the previous paragraph~~

45 Signs similar to Specific Service ramp signs as described in Section 2J.07 may be provided on the
46 crossroad.

47 **Section ~~2F.10~~ 2J.11 Signing Policy**

48 **Guidance:**

49 Each highway agency that elects to use Specific Service signs should establish a signing policy that
50 includes, as a minimum, the guidelines of Section 2J.01 and at least the following criteria:

- 1 A. Selection of eligible businesses;
- 2 B. Distances to eligible services;
- 3 C. The use of logo [sign](#) panels, legends, and signs conforming with this Manual and State design
- 4 requirements;
- 5 D. Removal or covering of logo [sign](#) panels during off seasons for businesses that operate on a seasonal
- 6 basis;
- 7 E. The circumstances, if any, under which Specific Service signs ~~may~~ [are permitted to](#) be used in non-
- 8 rural areas; and
- 9 F. Determination of the costs to businesses for initial permits, installations, annual maintenance, and
- 10 removal of logo [sign](#) panels.

CHAPTER ~~2G~~ 2K. TOURIST-ORIENTED DIRECTIONAL SIGNS

Section ~~2G.01~~ 2K.01 Purpose and Application

Support:

Tourist-oriented directional signs are guide signs with one or more [sign](#) panels that display the business identification of and directional information for [eligible](#) business, service, and activity facilities.

Standard:

A facility shall be eligible for tourist-oriented directional signs only if it derives its major portion of income or visitors during the normal business season from road users not residing in the area of the facility.

Option:

Tourist-oriented directional signs may include businesses involved with seasonal agricultural products.

Standard:

When used, tourist-oriented directional signs shall be used only on rural conventional roads and shall not be used on conventional roads in urban areas or at interchanges on freeways or expressways.

Where both tourist-oriented directional signs and Specific Service signs (see Chapter 2J) would be needed at the same intersection, the tourist-oriented directional signs shall incorporate the needed information from, and be used in place of, the Specific Service signs.

~~Guidance:~~

~~Each State that elects to use tourist-oriented directional signs should have a State policy for use as indicated in Section 2G.07.~~

Option:

Tourist-oriented directional signs may be used in conjunction with General Service signs (see Section 2I.02).

Support:

[Section 2K.07 contains information on the adoption of a State policy for States that elect to use tourist-oriented directional signs.](#)

Section ~~2G.02~~ 2K.02 Design

Standard:

Tourist-oriented directional signs shall have one or more [sign](#) panels for the purpose of displaying the business identification of and directional information for eligible facilities. Each [sign](#) panel shall be rectangular in shape and shall have a white legend and border on a blue background.

The content of the legend on each [sign](#) panel shall be limited to the ~~business~~ identification and directional information for ~~no~~ more than one eligible business, service, or activity facility. The legends shall not include promotional advertising.

Guidance:

Each [sign](#) panel should have a maximum of two lines of legend including ~~no~~ more than one symbol, a separate directional arrow, and the distance to the facility ~~shown~~ [displayed](#) beneath the arrow. Arrows pointing to the left or up should be at the extreme left of the sign [panel](#). Arrows pointing to the right should be at the extreme right of the sign [panel](#). Symbols, when used, should be to the left of the word legend or logo [sign panel](#) (see Paragraph 7).

Option:

The General Service sign symbols (see Section 2I.02) and the symbols for recreational and cultural interest area signs (see Chapter 2M) may be used.

Logos ~~sign panels~~ (see Section 2J.03) for specific businesses, services, and activities may also be used. Based on engineering judgment, the hours of operation may be ~~added~~ [displayed](#) on the [sign](#) panels.

Standard:

When used, symbols and logos ~~sign panels~~ shall be an appropriate size (see Section 2K.04). Logos resembling official traffic control devices shall not be permitted.

Option:

1 The tourist-oriented directional sign may ~~have~~ display the word message TOURIST ACTIVITIES at the
2 top of the sign.

3 **Standard:**

4 The TOURIST ACTIVITIES word message shall ~~be~~ have a white legend in all upper-case letters
5 and a white border on a blue background. If used, it shall be placed above and in addition to the
6 directional sign panels.

7 Support:

8 Examples of tourist-oriented directional signs are shown in Figures 2K-1 and 2K-2.

9 **Section ~~2G.03~~ 2K.03 Style and Size of Lettering**

10 Guidance:

11 All letters and numbers on tourist-oriented directional signs, except on the logos ~~on~~ sign panels, should be
12 upper-case and at least 6 inches in height. Any legend on a logo should be proportional to the size of the logo.

13 **Standard:**

14 Design standards for ~~upper-case letters, lower-case~~ letters, numerals, and spacing shall be as
15 provided in the “Standard Highway Signs and Markings” book (see Section 1A.11).

16 **Section ~~2G.04~~ 2K.04 Arrangement and Size of Signs**

17 **Standard:**

18 The size of a tourist-oriented directional sign shall be limited to a maximum height of 6 feet.
19 ~~However,~~ Additional height shall be allowed to accommodate the addition of the optional TOURIST
20 ACTIVITIES message ~~discussed~~ provided in Section 2K.02 and the ~~directional word~~ action messages
21 ~~discussed~~ provided in Section 2K.05.

22 Guidance:

23 The number of intersection approach signs (one sign for tourist-oriented destinations to the left, one for
24 destinations to the right, and one for destinations straight ahead) installed in advance of an intersection should
25 not exceed three. The number of sign panels installed on each sign should not exceed four. The sign panels
26 for right-turn, left-turn, and straight-~~ahead~~ -through destinations should be on separate signs. The left-turn
27 destination sign should be located farthest from the intersection, then the right-turn destination sign, with the
28 straight-~~ahead~~ -through destination sign located closest to the intersection (see Figure 2K-2). Signs for
29 facilities in the straight-~~ahead~~ -through direction should be considered only when there are signs for ~~facilities~~
30 destinations in either the left or right direction.

31 ~~When it is~~ If it has been determined to be appropriate to combine the left-turn and right-turn destination
32 sign panels on a single sign, the left-turn destination sign panels should be above the right-turn destination
33 sign panels (see Figure 2K-1). When there are multiple destinations in the same direction, they should be in
34 order based on their distance from the intersection. Except as ~~noted~~ provided in ~~the Option Paragraph 5,~~
35 a straight-~~ahead~~ -through sign panel should not be combined with a sign displaying left- and/or right-turn
36 ~~facilities destinations.~~

37 The sign panels should not exceed the size necessary to accommodate two lines of legend without
38 crowding. Symbols and logos ~~on~~ sign panels on a directional sign panel should not exceed the height of two
39 lines of a word legend. All directional sign panels and other parts of the sign should be the same width,
40 which should not exceed 6 feet.

41 Option:

42 At intersection approaches where three or fewer facilities are ~~shown~~ displayed, the left-turn, right-turn,
43 and straight-~~ahead~~ -through destination sign panels may be combined on the same sign.

44 **Section ~~2G.05~~ 2K.05 Advance Signs**

45 Guidance:

46 Advance signs should be limited to those situations where sight distance, intersection vehicle maneuvers,
47 or other vehicle operating characteristics require advance notification of the ~~services~~ destinations and their
48 directions.

49 The design of the advance sign should be identical to the design of the intersection approach sign.
50 However, the directional arrows and distances to the ~~facilities destinations~~ destinations should be omitted- and the

1 ~~directional word~~ action messages NEXT RIGHT, NEXT LEFT, or AHEAD should be placed on the sign
2 above the business identification sign panels. The ~~directional word~~ action messages should have the same
3 letter height as the other word messages on the directional sign panels (see Figures 2K-1 and 2K-2).

4 **Standard:**

5 The ~~directional word~~ action messages sign panels shall ~~be~~ have a white legend in all upper-case
6 letters and a white border on a blue background.

7 Option:

8 The legend RIGHT 1/2 MILE or LEFT 1/2 MILE may be used on advance signs when there are
9 intervening minor roads.

10 The height required to add the directional word messages recommended for the advance sign may be
11 added to the maximum sign height of 6 feet.

12 Guidance:

13 The optional TOURIST ACTIVITIES message, when used on an advance sign, and the action message
14 should be combined on a single sign panel with TOURIST ACTIVITIES as the top line and the action
15 message as the bottom line (see Figure 2K-2).

16 **Section ~~2G.06~~ 2K.06 Sign Locations**

17 Guidance:

18 If used, the intersection approach signs should be located at least 200 feet in advance of the intersection.
19 Signs should be spaced at least 200 feet apart and at least 200 feet from other traffic control devices.

20 If used, advance signs should be located approximately 1/2 mile from the intersection with 500 feet
21 between these signs. In the direction of travel, the order of advance sign placement should be to show the
22 ~~facilities~~ destinations to the left first, then ~~facilities~~ destinations to the right, and last, the ~~facilities~~ destinations
23 straight ahead.

24 Position, height, and lateral ~~clearance~~ offset of signs should be governed by Chapter 2A except as
25 permitted in this Section.

26 Option:

27 Tourist-oriented directional signs may be placed farther from the edge of the road than other traffic
28 control signs.

29 **Standard:**

30 **The location of other traffic control devices shall take precedence over the location of tourist-**
31 **oriented directional signs.**

32 **Section ~~2G.07~~ 2K.07 State Policy**

33 **Standard:**

34 **To be eligible for tourist-oriented directional signing, facilities shall comply with applicable State**
35 **and Federal laws concerning the provisions of public accommodations without regard to race, religion,**
36 **color, age, sex, or national origin, and with laws concerning the licensing and approval of service**
37 **facilities. Each State that elects to use tourist-oriented directional signs shall adopt a policy that**
38 **complies with these provisions.**

39 Guidance:

40 The State policy should include:

- 41 A. A definition of tourist-oriented business, service, and activity facilities.
- 42 B. Eligibility criteria for signs for facilities.
- 43 C. Provision for incorporating Specific Service signs into the tourist-oriented directional signs as
44 required by Paragraph 5 of Section 2K.01.
- 45 D. Provision for covering signs during off seasons for facilities operated on a seasonal basis.
- 46 E. Provisions for signs to facilities that are not located on the crossroad when such facilities are eligible
47 for signs.
- 48 F. A definition of the immediate area in compliance with the provisions of Paragraph 2 of Section
49 2K.01. ~~The major portion of income or visitors to the facility should come from road users not~~
50 ~~residing in the immediate area of the facility.~~
- 51 G. Maximum distances to eligible facilities. The maximum distance should be 5 miles.

- 1 H. Provision for information centers (plazas) when the number of eligible sign applicants exceeds the
- 2 maximum permissible number of sign panel installations.
- 3 I. Provision for limiting the number of signs when there are more applicants than the maximum number
- 4 of signs permitted.
- 5 J. Criteria for use at intersections on expressways.
- 6 K. Provisions for controlling or excluding those businesses which have illegal signs as defined by the
- 7 Highway Beautification Act of 1965 (23 U.S.C. 131).
- 8 L. Provisions for States to charge fees to cover the cost of signs through a permit system.
- 9 M. A definition of the conditions under which the time of operation is ~~shown~~ [displayed](#).
- 10 N. Provisions for determining if advance signs will be permitted, and the circumstances under which they
- 11 will be installed.

1 **CHAPTER 2L. CHANGEABLE MESSAGE SIGNS** text was relocated from Sections 2A.07 and
2 **2E.21 to form this Chapter**

3 **Section 2L.01 Description of Changeable Message Signs**

4 Support:

5 ~~Changeable message signs, with more sophisticated technologies, are gaining widespread use to inform~~
6 ~~road users of variable situations, particularly along congested traffic corridors. Highway and transportation~~
7 ~~organizations are encouraged to develop and experiment (see Section 1A.10) with changeable message signs~~
8 ~~and to carefully evaluate such installations so that experience is gained toward adoption of future standards.~~

9 ~~Because technology for changeable message signs continues to advance, a specific standard for~~
10 ~~changeable message signs is not practical. Considerations that influence the selection of the best sign for a~~
11 ~~particular application include conspicuity, legibility, operation, and maintenance of the changeable message~~
12 ~~sign. This Section applies to signs for use on freeway and expressway mainlines. It is recognized that similar~~
13 ~~signs might be used on ramps and at ramp terminals where smaller letter heights and the number of messages~~
14 ~~might differ from the provisions of this Section.~~

15 A changeable message sign (CMS) is a traffic control device that is capable of displaying one or more
16 alternative messages. Some changeable message signs have a blank mode when no message is displayed,
17 while others display multiple messages with only one of the messages displayed at a time (such as
18 OPEN/CLOSED signs at weigh stations).

19 The provisions in this Chapter apply to both permanent and portable changeable message signs with
20 electronic displays. Additional provisions that only apply to portable changeable message signs can be found
21 in Section 6F.60. The provisions in this Chapter do not apply to changeable message signs with non-
22 electronic displays that are changed either manually or electromechanically, such as a hinged-panel, rotating-
23 drum, or back-lit curtain or scroll CMS.

24 **Guidance Standard:**

25 ~~Except for safety or transportation-related messages as provided in Paragraph 2 of Section 2L.02,~~
26 ~~changeable message signs should not be used to~~ shall display ~~information other than~~ only traffic
27 operational, regulatory, warning, and guidance information ~~related to traffic control.~~ ~~Changeable~~
28 ~~message signs shall display pertinent traffic operational and guidance information only, not advertising.~~
29 Advertising messages shall not be displayed on changeable message signs or its supports or other
30 equipment.

31 The design of legends for non-electronic display changeable message signs shall comply with the
32 provisions of Chapters 2A through 2K, 2M, and 2N of this Manual. ~~To the extent practical, the design~~
33 ~~and application of changeable message signs should conform to the general principles of this Manual.~~
34 ~~To the extent practical, changeable message signs, which are traffic control devices designed to display~~
35 ~~variable messages, shall conform to the principles established in this Manual, and with the design and~~
36 ~~applications prescribed in Sections 2E.21, 6F.02, and 6F.55.~~ All other changeable message signs shall
37 comply with the design and application principles established in this Chapter and in Chapter 2A.

38 Guidance:

39 Blank-out signs that display only single-phase, predetermined electronic-display legends that are limited
40 by their composition and arrangement of pixels or other illuminated forms in a fixed arrangement (such as a
41 blank-out sign indicating a part-time turn prohibition, a blank-out or changeable lane-use sign, or a
42 changeable OPEN/CLOSED sign for a weigh station) should comply with the provisions of the applicable
43 Section for the specific type of sign, provided that the letter forms, symbols, and other legend elements are
44 duplicates of the static messages as detailed in the “Standard Highway Signs and Markings” book (see Section
45 1A.11). Because such a sign is effectively an illuminated version of a static sign, the size of its legend
46 elements, the overall size of the sign, and placement of the sign should comply with the applicable provisions
47 for the static version of the sign.

48 **Section 2L.02 Applications of Changeable Message Signs**

49 Support:

50 Changeable message signs have a large number of applications including, but not limited to, the
51 following:

52 A. Incident management and route diversion

- 1 [B. Warning of adverse weather conditions](#)
- 2 [C. Special event applications associated with traffic control or conditions](#)
- 3 [D. Control at crossing situations](#)
- 4 [E. Lane, ramp, and roadway control](#)
- 5 [F. Priced or other types of managed lanes](#)
- 6 [G. Travel times](#)
- 7 [H. Warning situations](#)
- 8 [I. Traffic regulations](#)
- 9 [J. Speed control](#)
- 10 [K. Destination guidance](#)

11 Option:

12 Changeable message signs, ~~both permanent and portable~~, may be used by State and local highway
13 agencies to display safety [messages](#), ~~or~~ transportation-related messages, [emergency homeland security](#)
14 [messages](#), and America’s Missing: Broadcast Emergency Response (AMBER) alert messages.

15 [Guidance:](#)

16 State and local highway agencies ~~may~~ [should](#) develop and establish a policy regarding the display of
17 ~~safety and transportation-related messages on permanent and changeable message signs that specifies the~~
18 ~~allowable messages and applications, consistent with the provisions of this Manual~~ [the types of messages](#)
19 [provided in Paragraph 2. When changeable message signs are used at multiple locations to address a specific](#)
20 [situation, the message displays should be consistent along the roadway corridor and adjacent corridors, which](#)
21 [might necessitate coordination among different operating agencies.](#)

22 Support:

23 Examples of safety messages include “SEAT BELT BUCKLED?” and “DON’T DRINK AND DRIVE.”
24 Examples of transportation-related messages include “STADIUM EVENT SUNDAY, EXPECT DELAYS
25 NOON TO 4 PM” and “OZONE ALERT CODE RED—USE TRANSIT.”

26 [Guidance:](#)

27 When a CMS is used to display a safety or transportation related message, the ~~requirements of Section~~
28 ~~6F.55 should be followed. The~~ message should be simple, brief, legible, and clear. A CMS should not be
29 used to display a safety or transportation-related message if doing so would adversely affect ~~the~~ respect for the
30 sign. “CONGESTION AHEAD” or other overly simplistic or vague messages should not be displayed alone.
31 These messages should be supplemented with a message on the location or distance to the congestion or
32 incident, ~~how much~~ [delay is expected and travel time](#), alternative route, or other similar messages.

33 **Standard:**

34 **When a CMS is used to display a safety, ~~or~~ transportation-related, [emergency homeland security,](#)**
35 **[or AMBER alert](#) message, the display format shall not be of a type that could be considered similar to**
36 **advertising displays.**

37 [Support:](#)

38 [Section 2B.13 contains information regarding the design of changeable message signs that are used to](#)
39 [display variable speed limits that change based on ambient or operational conditions, or that display the speed](#)
40 [at which approaching drivers are traveling.](#)

41 [Section 2L.03 Legibility and Visibility of Changeable Message Signs](#)

42 [Support:](#)

43 [The maximum distance at which a driver can first correctly identify letters and words on a sign is called](#)
44 [the legibility distance of the sign. Legibility distance is affected by the characteristics of the sign design and](#)
45 [the visual capabilities of drivers. Visual capabilities, and thus legibility distances, vary among drivers.](#)

46 [For the more common types of changeable message signs, the longest measured legibility distances on](#)
47 [sunny days occur during mid-day when the sun is overhead. Legibility distances are much shorter when the](#)
48 [sun is behind the sign face, when the sun is on the horizon and shining on the sign face, or at night.](#)

49 [Visibility is the characteristic that enables a CMS to be seen. Visibility is associated with the point where](#)
50 [the CMS is first detected, whereas legibility is the point where the message on the CMS can be read.](#)
51 [Environmental conditions such as rain, fog, and snow impact the visibility of changeable message signs and](#)
52 [can reduce the available legibility distances. During these conditions, there might not be enough viewing time](#)
53 [for drivers to read the message.](#)

1 Guidance:

2 Changeable message signs used on roadways with speed limits of 55 mph or higher should be visible from
3 1/2 mile under both day and night conditions. The message should be designed to be legible from a minimum
4 distance of 600 feet for nighttime conditions and 800 feet for normal daylight conditions. When
5 environmental conditions that reduce visibility and legibility are present, or when the legibility distances
6 stated in the previous sentences in this paragraph cannot be practically achieved, messages composed of fewer
7 units of information should be used and consideration should be given to limiting the message to a single
8 phase (see Section 2L.05 for information regarding the lengths of messages displayed on changeable message
9 signs).

10 **Section 2L.04 Design Characteristics of Changeable Message Signs**

11 **Standard:**

12 ~~The display format~~ Changeable message signs shall not include advertising, animation, rapid
13 flashing, dissolving, exploding, scrolling, or other dynamic elements that are characteristic of sports
14 scoreboards or advertising displays.

15 Support:

16 Section 6F.61 contains information regarding the use of arrow boards that use flashing or sequential
17 displays for lane closures.

18 Guidance:

19 Except in the case of a limited-legend CMS (such as a blank-out or electronic-display changeable message
20 regulatory sign) that is used in place of a static regulatory sign or an activated blank-out warning sign that
21 supplements a static warning sign at a separate location, changeable message signs should be used as a
22 supplement to and not as a substitute for conventional signs and markings.

23 CMS should be limited to no more than three lines, with no more than 20 characters per line.

24 The spacing between characters in a word should be between 25 to 40 percent of the letter height. The
25 spacing between words in a message should be between 75 and 100 percent of the letter height. Spacing
26 between the message lines should be between 50 and 75 percent of the letter height.

27 Except as provided in Paragraph 18, word messages on changeable message signs should be composed of
28 all capital upper-case letters and have a desirable letter size of 18 inches or a minimum letter size of 10.6
29 inches. The minimum letter height should be 18 inches for changeable message signs on roadways with speed
30 limits of 45 mph or higher. The minimum letter height should be 12 inches for changeable message signs on
31 roadways with speed limits of less than 45 mph.

32 Support:

33 Using letter heights of more than 18 inches will not result in proportional increases in legibility distance.

34 Guidance:

35 The width-to-height ratio of the sign characters should be between 0.7 and 1.0. The stroke width-to-
36 height ratio should be 0.2.

37 Support:

38 The width-to-height ratio is commonly accomplished using a minimum font matrix density of five pixels
39 wide by seven pixels high.

40 **Standard:**

41 Changeable message signs shall automatically adjust their brightness under varying light conditions
42 to maintain legibility.

43 Guidance:

44 The luminance of changeable message signs should meet industry criteria for daytime and nighttime
45 conditions. Luminance contrast should be between 8 and 12 for all conditions.

46 Contrast orientation of changeable message signs should always be positive, that is, with luminous
47 characters on a dark or less luminous background.

48 Support:

49 Legibility distances for negative-contrast changeable message signs are likely to be at least 25 percent
50 shorter than those of positive-contrast messages. In addition, the increased light emitted by negative-contrast
51 changeable message signs has not been shown to improve detection distances.

1 **Standard:**

2 **The colors used for the legends and backgrounds on changeable message signs shall be as provided**
3 **in Table 2A-5.**

4 ~~**Option:**~~

5 ~~Changeable message signs (including portable changeable message signs) that display a regulatory or~~
6 ~~warning message may use a black background with a white, yellow, orange, red, or fluorescent yellow-green~~
7 ~~legend as appropriate, except where specifically restricted in this Manual for a particular sign.~~

8 **Guidance:**

9 If a black background is used, the color used for the legend on a changeable message sign should match
10 the background color that would be used on a standard sign for that type of legend, such as white for
11 regulatory, yellow for warning, orange for temporary traffic control, red for stop or yield, fluorescent pink for
12 incident management, and fluorescent yellow-green for bicycle, pedestrian, and school warning.

13 **Standard:**

14 **If a green background is used for a guide message on a CMS or if a blue background is used for a**
15 **motorist services message on a CMS, the background color shall be provided by green or blue lighted**
16 **pixels such that the entire CMS would be lighted, not just the white legend.**

17 **Support:**

18 Some CMS that employ newer technologies have the capability to display an exact duplicate of a standard
19 sign or other sign legend using standard symbols, the Standard Alphabets and letter forms, route shields, and
20 other typical sign legend elements with no apparent loss of resolution or recognition to the road user when
21 compared with a static version of the same sign legend. Such signs are of the full-matrix type and can
22 typically display full-color legends. Use of such technologies for new CMS is encouraged for greater
23 legibility of their displays and enhanced recognition of the message as it pertains to regulatory, warning, or
24 guidance information.

25 **Guidance:**

26 If used, the CMS described in the preceding paragraph should not display symbols or route shields unless
27 they can do so in the appropriate color combinations. For a single-phase message where the Standard
28 Alphabets and other legend elements of standard designs are used, the lettering style, size, and line spacing
29 should comply with the applicable provisions for the type of message displayed as provided elsewhere in this
30 Manual. For two-phase messages, larger legend heights should be used as described previously in this Section
31 because of the need for such messages to be legible at a greater distance. Regardless of the number of phases,
32 the CMS should comply with the legibility and visibility provisions of Section 2L.03.

33 **Section 2L.05 Message Length and Units of Information**

34 **Guidance:**

35 The maximum length of a message should be dictated by the number of units of information contained in
36 the message, in addition to the size of the CMS. A unit of information, which is a single answer to a single
37 question that a driver can use to make a decision, should not be more than four words.

38 **Support:**

39 In order to illustrate the concept of units of information, Table 2L-1 shows an example message that is
40 comprised of four units of information.

41 The maximum allowable number of units of information in a CMS message is based on the principles
42 described in this Section, the current highway operating speed, the legibility characteristics of the CMS, and
43 the lighting conditions.

44 **Standard:**

45 ~~No more than two displays should be used within any message cycle.~~ **Each message shall consist of**
46 **no more than two phases. A phase shall consist of no more than three lines of text. A three-line**
47 ~~changeable message sign shall be limited to not more than two messages. Each display should convey a~~
48 ~~single thought.~~ **Each phase shall be understood by itself regardless of the sequence in which it is read.**
49 **Messages shall be centered within each line of legend. Except for signs located on toll plaza structures**
50 **or other facilities with a similar booth-lane arrangement, if more than one CMS is visible to road users,**
51 **then only one sign shall display a sequential message at any given time.**

1 Techniques of message display such as fading, **rapid flashing**, exploding, dissolving, or moving
2 messages shall not be used. The text of the message shall not scroll or travel horizontally or vertically
3 across the face of the sign.

4 ~~Changeable message signs shall be capable of displaying several messages in a sequence. Such~~
5 ~~messages shall be changed manually, by remote control, or by automatic controls.~~

6 Guidance:

7 ~~Within the context of Section 2A.07, these practices should be followed for mainline freeway and~~
8 ~~expressway applications~~ When designing and displaying messages on changeable message signs, the
9 following principles relative to message design should be used:

- 10 A. The minimum time that an individual phase is displayed should be based on 1 second per word or 2
11 seconds per unit of information, whichever produces a lesser value. The display time for a phase
12 should never be less than 2 seconds.
- 13 B. The maximum cycle time of a two-phase message should be 8 seconds.
- 14 C. The duration between the display of two phases should not exceed 0.3 seconds.
- 15 D. No more than three units of information should be displayed on a phase of a message.
- 16 E. No more than four units of information should be in a message when the traffic operating speeds are
17 35 mph or more.
- 18 F. No more than five units of information should be in a message when the traffic operating speeds are
19 less than 35 mph.
- 20 G. Only one unit of information should appear on each line of the CMS.
- 21 H. Compatible units of information should be displayed on the same message phase.

22 Option:

23 A unit of information consisting of more than one word may be displayed on more than one line. ~~The~~
24 ~~entire message cycle should be readable at least twice by drivers traveling at the posted speed, the off-peak~~
25 ~~85th percentile speed, or the operating speed.~~ An additional changeable message sign at a downstream
26 location may be used for the purpose of allowing the entire message to be read twice.

27 Guidance:

28 If more than two phases would be needed to display the necessary information, additional changeable
29 message signs should be used to display this information as a series of two distinct, independent messages
30 with a maximum of two phases at each location, in accordance with the provisions of Paragraph 4.

31 ~~Section 1A.15 contains information regarding the use of abbreviations on traffic control devices,~~
32 ~~including changeable message signs.~~ When the message on a CMS includes an abbreviation, the provisions of
33 Section 1A.15 should be used.

34 **Section 2L.06 Installation of Permanent Changeable Message Signs**

35 Guidance:

36 A CMS that is used in place of a static sign (such as a blank-out or variable legend regulatory sign) should
37 be located in accordance with the provisions of Chapter 2A. The following factors should be considered when
38 installing other permanent changeable message signs:

- 39 A. Changeable message signs should be located sufficiently upstream of known bottlenecks and high
40 crash locations to enable road users to select an alternate route or take other appropriate action in
41 response to a recurring condition.
- 42 B. Changeable message signs should be located sufficiently upstream of major diversion decision points,
43 such as interchanges, to provide adequate distance over which road users can change lanes to reach
44 one destination or the other.
- 45 C. Changeable message signs should not be located within an interchange except for toll plazas or
46 managed lanes.
- 47 D. Changeable message signs should not be positioned at locations where the information load on drivers
48 is already high because of guide signs and other types of information.
- 49 E. Changeable message signs should not be located in areas where drivers frequently perform lane-
50 changing maneuvers in response to static guide sign information, or because of merging or weaving
51 conditions.

52 Support:

1 Information regarding the design and application of portable changeable message signs in temporary
2 traffic control zones is contained in Section 6F.60.

1 **CHAPTER ~~2H~~ 2M. RECREATIONAL AND CULTURAL INTEREST AREA SIGNS**

2 **Section ~~2H.01~~ 2M.01 Scope**

3 Support:

4 Recreational or cultural interest areas are attractions or traffic generators that are open to the general
5 public for the purpose of play, amusement, or relaxation. Recreational attractions include such facilities as
6 parks, campgrounds, gaming facilities, and ski areas, while examples of cultural attractions include museums,
7 art galleries, and historical buildings or sites.

8 The purpose of recreation and cultural interest area signs is to guide road users to a general area and then
9 to specific facilities or activities within the area.

10 Option:

11 Recreational and cultural interest area [guide](#) signs ~~that depict~~ [directing road users to](#) significant traffic
12 generators may be used on freeways and expressways where there is direct access to these areas as ~~discussed~~
13 [provided](#) in Section 2M.09.

14 Recreational and cultural interest area signs may be used off the road network, as appropriate.

15 **Section ~~2H.02~~ 2M.02 Application of Recreational and Cultural Interest Area Signs**

16 Support:

17 ~~Standards~~ [Provisions](#) for signing recreational or cultural interest areas are subdivided into two different
18 types of signs: (1) symbol signs and (2) destination guide signs.

19 Guidance:

20 When highway agencies decide to provide recreational and cultural interest area signing, these agencies
21 should have a policy for such signing. The policy should establish signing criteria for the eligibility of the
22 various types of services, accommodations, and facilities. These signs should not be used where they might
23 be confused with other traffic control signs.

24 Option:

25 Recreational and cultural interest area [guide](#) signs may be used on any road to direct persons to facilities,
26 structures, and places, and to identify various services available to the general public. These [guide](#) signs may
27 also be used in recreational or cultural interest areas for signing non-vehicular events and amenities such as
28 trails, structures, and facilities.

29 [Support:](#)

30 [Section 2A.12 contains information regarding the use of recreational and cultural interest area symbols on](#)
31 [other types of signs.](#)

32 **Section ~~2H.03~~ 2M.03 Regulatory and Warning Signs**

33 Standard:

34 All regulatory and warning signs installed on public roads and streets within recreational and
35 cultural interest areas shall ~~conform to~~ [comply with](#) the requirements of Chapters 2A, 2B, ~~and~~ 2C, [7B,](#)
36 [8B, and 9B.](#)

37 **Section ~~2H.04~~ 2M.04 General Design Requirements for Recreational and Cultural Interest**
38 **[Area Symbol Guide Signs](#)**

39 Standard:

40 Recreational and cultural interest area symbol [guide](#) signs shall be square or rectangular in shape
41 and shall have a white symbol or message and white border on a brown background. The symbols shall
42 be grouped into the following usage and series categories (~~see the “Standard Highway Signs” book for~~
43 ~~design details~~) [this was added to the Support sentence in the next paragraph for clarity:](#)

- 44 A. General ~~Information (RG Series)~~ [Applications](#),
- 45 B. Accommodations ~~Services (RA Series)~~,
- 46 C. ~~Motorist Services (RM Series)~~,
- 47 D. Land Recreation ~~(RL series)~~,
- 48 E. Water Recreation ~~(RW Series)~~, and
- 49 F. Winter Recreation ~~(RS Series)~~.

1 Support:

2 Table 2M-1 contains a listing of the symbols within each series category. Drawings [showing the design](#)
3 [details](#) for these symbols are found in the “Standard Highway Signs [and Markings](#)” book (see Section 1A.11).

4 Option:

5 Mirror images of symbols may be used where the reverse image will better convey the message.

6 Section ~~2H.05~~ [2M.05](#) Symbol Sign Sizes

7 Guidance:

8 Recreational and cultural interest area symbol signs should be 24 x 24 inches. Where greater visibility or
9 emphasis is needed, larger sizes should be used. Symbol sign enlargements should be in 6-inch increments.

10 Recreational and cultural interest area symbol signs should be 30 x 30 inches when used on [guide signs on](#)
11 freeways or expressways.

12 Option:

13 A smaller size of 18 x 18 inches may be used on low-speed, low-volume roadways and on non-road
14 applications.

15 Section ~~2H.06~~ [2M.06](#) Use of Educational Plaques

16 Guidance:

17 Educational plaques should accompany all initial installations of recreational and cultural interest area
18 symbol signs. The educational plaque should remain in place for at least 3 years after the initial installation.
19 If used, the educational plaque should be the same width as the symbol sign.

20 Option:

21 Symbol signs that are readily recognizable by the public may be installed without educational plaques.

22 Support:

23 Figure 2M-1 illustrates some examples of the use of educational plaques.

24 Section ~~2H.07~~ [2M.07](#) Use of Prohibitive Circle and Diagonal Slash for Non-Road Applications

25 Standard:

26 Where it is necessary to indicate a ~~restriction~~ [prohibition of an activity or an item](#) within a
27 recreational or cultural interest area [for non-road use and a standard regulatory sign for such a](#)
28 [prohibition is not provided in Chapter 2B, a red diagonal slash may be used to indicate that the activity](#)
29 ~~is prohibited~~ [the appropriate recreational and cultural interest area symbol shall be used in](#)
30 [combination with a red prohibitive circle and red diagonal slash. The recreational and cultural interest](#)
31 [area symbol and the sign border shall be black and the sign background shall be white. The symbol](#)
32 [shall be scaled proportionally to fit completely within the circle and the diagonal slash shall be oriented](#)
33 [from the upper left to the lower right portions of the circle as shown in Figure 2M-1.](#)

34 ~~The red diagonal slash, if used on a recreational and cultural interest area sign, shall be placed from~~
35 ~~the upper left corner to the lower right corner of the sign face (see Figure 2H-1).~~ Requirements for
36 retroreflection of the red [circle and red diagonal](#) slash shall be the same as those requirements for
37 [backgrounds, legends, symbols, arrows, and borders.](#)

38 ~~Support:~~

39 ~~Figure 2H-1 illustrates some examples of the use of prohibitive slashes.~~

40 Section ~~2H.08~~ [2M.08](#) Placement of Recreational and Cultural Interest Area Symbol Signs

41 Standard:

42 If used, recreational and cultural interest area symbol signs shall be placed in accordance with the
43 general requirements contained in Chapter 2A. The symbol(s) shall be placed [as sign panels](#) in the
44 uppermost part of the sign ~~assembly~~ and the directional information shall be placed below the
45 symbol(s).

46 [Except as provided in Paragraph 3, where if](#) the name of the recreational or cultural interest area
47 facility or activity is ~~shown~~ [displayed](#) on a ~~general directional~~ [destination](#) guide sign [\(see Section 2M.09\)](#)
48 and a symbol is used, the symbol shall be placed below the name (see Figure 2M-2).

1 Option:

2 When the legend Wildlife Viewing Area is displayed with the RS-076 symbol on a destination guide sign,
3 the symbol may be placed to the left or right of the legend and the arrow may be placed below the symbol (see
4 Figure 2M-2).

5 The symbols displayed with the facility or activity name may be placed below the destination guide sign
6 as illustrated in Figure 2M-2 instead of as sign panels placed with the destination guide sign.

7 Secondary symbols of a smaller size (18 x 18 inches) may be placed beneath the primary symbols (see
8 Drawing A in Figure 2M-1), where needed.

9 Standard:

10 **Recreational and cultural interest area symbols installed for non-road use shall be placed in**
11 **accordance with the general sign position requirements of the authority having jurisdiction.**

12 Support:

13 Figure 2M-3 illustrates typical height and lateral mounting positions. Figure 2M-4 illustrates some
14 examples of the placement of symbol signs within a recreational or cultural interest area. Figures 2M-5
15 through 2M-10 illustrate some of the symbols that can be used.

16 Guidance:

17 The number of symbols used in a single sign assembly should not exceed four.

18 Option:

19 ~~Symbols for recreational or cultural interest areas may be used as legend components for a directional sign~~
20 ~~assembly. The Advance Turn (M5 series) or Directional Arrow (M6 series) auxiliary signs with white arrows~~
21 ~~on brown backgrounds shown in Figure 2D-5 may be used with Recreational and Cultural Area Interest~~
22 ~~symbol guide signs to create a Recreational and Cultural Interest Area Directional Assembly. The symbols~~
23 ~~may be used singularly, or in groups of two, three, or four on a single sign assembly (see Figures 2M-1, 2M-3,~~
24 ~~and 2M-4). Smaller size secondary symbols (see Figure 2H-1) may be placed beneath the primary symbols,~~
25 ~~where needed.~~

26 **Section ~~2H.09~~ 2M.09 Destination Guide Signs**

27 Guidance:

28 When recreational or cultural interest area destinations are ~~shown~~ displayed on supplemental guide signs,
29 the sign should be rectangular or trapezoidal in shape. The order of preference for use of shapes and colors
30 should be as follows: (1) rectangular with a white legend and border on a green background; (2) rectangular
31 with a white legend and border on a brown background; or (3) trapezoidal with a white legend and border on a
32 brown background.

33 **Standard:**

34 **Whenever the trapezoidal shape is used, the color combination shall be a white legend and border**
35 **on a brown background.**

36 Option:

37 ~~White on brown~~ Destination guide signs with a white legend and border on a brown background may be
38 posted at the first point where an access or crossroad intersects a highway where recreational or cultural
39 interest areas are a significant destination along conventional roads, expressways, or freeways. ~~White on~~
40 ~~brown~~ Supplemental guide signs with a white legend and border on a brown background may be used along
41 conventional roads, expressways, or freeways to direct road users to recreational or cultural interest areas.
42 Where access or crossroads lead exclusively to the recreational or cultural interest area, the advance guide
43 sign and the exit direction sign may ~~be white on brown~~ have a white legend and border on a brown
44 background.

45 **Standard:**

46 ~~Linear parkway type highways that primarily function as arterial connectors, even if they also~~
47 ~~provide access to recreational or cultural interest areas, shall not qualify for the use of white on brown~~
48 ~~destination guide signs. Directional guide signs used on these highways shall conform to Chapter 2D.~~

49 All Exit Gore (E5-1 and E5-1a) signs (see Section 2E.37) shall have a white legend and border on a
50 green background. The background color of the interchange Exit Number (E1-5P and E1-5bP) ~~panel~~
51 plaque (see Section 2E.31) shall match the background color of the guide sign. Design characteristics of

1 conventional road, expressway, or freeway guide signs shall ~~conform to~~ comply with Chapter 2D or 2E
2 except as ~~specified~~ provided in this Section for color combination.

3 The advance guide sign and the Exit Direction sign shall retain the white-on-green color
4 combination where the crossroad leads to a destination other than a recreational or cultural interest
5 area.

6 Support:

7 Figure 2M-2 illustrates destination guide signs commonly used for identifying recreational or cultural
8 interest areas or facilities.

9 Section 2M.10 Memorial or Dedication Signing this text was relocated from the first four paragraphs
10 of Section 2D.49

11 Support:

12 Legislative bodies will occasionally adopt an act or resolution memorializing or dedicating a highway,
13 bridge, or other component of the highway.

14 Guidance:

15 Such memorial or dedication names should not appear on or along a highway, or be placed on bridges or
16 other highway components. ~~The requirement for signing should be carried out by placing~~ If a route, bridge, or
17 highway component is officially designated as a memorial or dedication, and if notification of the memorial or
18 dedication is to be made on the highway right-of-way, such notification should consist of installing this text
19 was relocated from Section 2E.08 a memorial or dedication plaque marker in a rest area, scenic overlook,
20 recreational area, or other appropriate location where parking is provided with the signing inconspicuously
21 located relative to vehicle operations along the highway.

22 Option:

23 If the installation of a memorial or dedication plaque marker off the main roadway is not practical,
24 memorial or dedication signs may be installed on the mainline.

25 Guidance:

26 Memorial or dedication signs should have a white legend and border on a brown background.

27 **Standard:**

28 Where such memorial or dedication signs are installed on the mainline, (1) memorial or dedication
29 names shall not appear on directional guide signs, (2) memorial or dedication signs shall not interfere
30 with the placement of any other necessary ~~highway~~ signing, and (3) memorial or dedication signs shall
31 not compromise the safety or efficiency of traffic flow. The memorial or dedication signing shall be
32 limited to one sign at an appropriate location in each route direction, each as an independent sign
33 installation.

34 Memorial or dedication signs shall be rectangular in shape. The legend displayed on memorial or
35 dedication signs shall be limited to the name of the person or entity being recognized and a simple
36 message preceding or following the name, such as “DEDICATED TO” or “Memorial Parkway.”
37 Additional legend, such as biographical information, shall not be displayed on memorial or dedication
38 signs. Decorative or graphical elements, pictographs, logos, or symbols shall not be displayed on
39 memorial or dedication signs. All letters and numerals displayed on memorial or dedication signs shall
40 be as provided in the “Standard Highway Signs and Markings” book (see Section 1A.11). The route
41 number or officially mapped name of the highway shall not be displayed on the memorial or dedication
42 sign.

43 Memorial or dedication names shall not appear on supplemental signs or on any other information
44 sign on or along the highway or its intersecting routes.

45 Option:

46 The lettering for the name of the person or entity being recognized may be composed of a combination of
47 lower-case letters with initial upper-case letters.

48 Guidance:

49 Freeways and expressways should not be signed as memorial or dedicated highways. this sentence was
50 relocated from Section 2E.08

51 Support:

1 Named highways are officially designated and shown on official maps and serve the purpose of providing
2 route guidance, primarily on unnumbered highways. A highway designated as a memorial or dedication is not
3 considered to be a named highway. Section 2D.53 contains provisions for the signing of named highways.

CHAPTER ~~2I~~ 2N. EMERGENCY MANAGEMENT SIGNING

Section ~~2I.01~~ 2N.01 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.

Section ~~2I.02~~ 2N.02 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.

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 ~~a~~ the standard ~~triangular plaque, as~~ symbol that is illustrated ~~for~~ with in the upper left corner of the EM-7c and EM-7d signs in Figure 2N-1, ~~for~~ marking areas contaminated by biological and chemical warfare agents and radioactive fallout.

Section ~~2I.03~~ 2N.03 Evacuation Route Signs (EM-1 and EM-1a)

Standard:

The Evacuation Route (EM-1 and EM-1a) signs ~~(see Figure 2I-1)~~ shall ~~be~~ display a ~~rectangular sign with a~~ blue circular symbol ~~with~~ 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 Paragraph 3) and the 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 diameter of the circular symbol shall be 1 inch smaller than the width of the sign. 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:

~~The arrow may be a separate panel attached to the face of the sign.~~

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 Figure 2D-5, 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.

~~The legend on the EVACUATION ROUTE sign may be modified to describe the type of evacuation route, such as HURRICANE.~~

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 ~~the~~ an Evacuation Route sign ~~with a diameter of 3.5 inches.~~

Standard:

~~The legend and arrow of the EVACUATION ROUTE sign shall be white on a blue circular background. The corners of the sign outside of the blue circle shall be white. The entire sign shall be retroreflective.~~ 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, the Evacuation Route sign, with the appropriate arrow, shall be installed 150 to 300 feet in advance of, and at, any turn in an approved evacuation route. The sign shall also be installed elsewhere for straight-ahead confirmation where needed.

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, ~~it~~ 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 ~~to~~ or more than 10 feet to the ~~right side~~ 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 ~~Emergency Management~~ 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.

Section ~~2I.04~~ 2N.04 AREA CLOSED Sign (EM-2)

Standard:

The AREA CLOSED (EM-2) sign (see Figure 2N-1) 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.

Section ~~2I.05~~ 2N.05 TRAFFIC CONTROL POINT Sign (EM-3)

Standard:

1 **The TRAFFIC CONTROL POINT (EM-3) sign (see Figure 2N-1) shall be used to designate a**
2 **location where an official traffic control point has been set up to impose such controls as are necessary**
3 **to limit congestion, expedite emergency traffic, exclude unauthorized vehicles, or protect the public.**

4 **The sign shall be installed in the same manner as the AREA CLOSED sign (see Section 2N.04), and**
5 **at the point where traffic must stop to be checked.**

6 **The standard STOP (R1-1) sign shall be used in conjunction with the TRAFFIC CONTROL**
7 **POINT sign. The TRAFFIC CONTROL POINT sign shall consist of a black legend and border on a**
8 **retroreflectorized white background.**

9 Guidance:

10 The TRAFFIC CONTROL POINT sign should be mounted directly below the STOP sign.

11 **Section ~~2I.06~~ 2N.06 MAINTAIN TOP SAFE SPEED Sign (EM-4)**

12 Option:

13 The MAINTAIN TOP SAFE SPEED (EM-4) sign (see Figure 2N-1) may be used on highways where
14 conditions are such that it is prudent to evacuate or traverse an area as quickly as possible.

15 Where an existing Speed Limit (R2-1) sign is in a suitable location, the MAINTAIN TOP SAFE SPEED
16 sign may conveniently be mounted directly over the face of the speed limit sign that it supersedes.

17 Support:

18 Since any speed zoning would be impractical under such emergency conditions, no minimum speed limit
19 can be prescribed by the MAINTAIN TOP SAFE SPEED sign in numerical terms. Where traffic is
20 supervised by a traffic control point, official instructions will usually be given verbally, and the sign will serve
21 as an occasional reminder of the urgent need for maintaining the proper ~~reasonably safe~~ speed.

22 Guidance:

23 The sign should be installed as needed, in the same manner as other standard speed signs.

24 **Standard:**

25 **If used in rural areas, the MAINTAIN TOP SAFE SPEED sign shall be mounted on the right-hand**
26 **side of the road at a horizontal distance of not less than 6 feet or more than 10 feet from the roadway**
27 **edge, and ~~with its lower edge not less than~~ at a minimum height, measured vertically from the bottom of**
28 **the sign to the elevation of the near edge of the traveled way, of 5 feet ~~above the pavement, 6 to 10 feet~~**
29 **from the roadway edge. If used in urban areas, the minimum height, measured vertically from the**
30 **bottom of the sign to the top of the curb, or in the absence of curb, measured vertically from the bottom**
31 **of the sign to the elevation of the near edge of the traveled way, shall be ~~not less than~~ 7 feet, and the**
32 **nearest edge of the sign shall be not less than 1 foot back from the face of the curb.**

33 **Section ~~2I.07~~ 2N.07 ROAD (AREA) USE PERMIT REQUIRED FOR THRU TRAFFIC Sign** 34 **(EM-5)**

35 Support:

36 The intent of the ROAD (AREA) USE PERMIT REQUIRED FOR THRU TRAFFIC (EM-5) sign (see
37 Figure 2N-1) is to notify road users of the presence of the traffic control point so that those who do not have
38 priority permits issued by designated authorities can take another route, or turn back, without making a
39 needless trip and without adding to the screening load at the post. Local traffic, without permits, can proceed
40 as far as the traffic control post.

41 **Standard:**

42 **If used, the ROAD (AREA) USE PERMIT REQUIRED FOR THRU TRAFFIC (EM-5) sign shall**
43 **be used at an intersection that is an entrance to a route on which a traffic control point is located.**

44 **If used, the sign shall be installed in a manner similar to that of the MAINTAIN TOP SAFE SPEED**
45 **sign (see Section 2N.06).**

46 **Section ~~2I.08~~ 2N.08 Emergency Aid Center Signs (EM-6 Series)**

47 **Standard:**

48 **In the event of emergency, State and local authorities shall establish various centers for civilian**
49 **relief, communication, medical service, and similar purposes. To guide the public to such centers a**
50 **series of directional signs shall be used.**

1 Emergency Aid Center (EM-6 series) signs (see Figure 2N-1) shall carry the designation of the
2 center and an arrow indicating the direction to the center. They shall be installed as needed, at
3 intersections and elsewhere, on the right-hand side of the roadway, in urban areas at a minimum
4 height, measured vertically from the bottom of the sign to the top of the curb, or in the absence of curb,
5 measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way, ~~in~~
6 urban areas of at least 7 feet, and not less than 1 foot back from the face of the curb, and in rural areas
7 at a minimum height, measured vertically from the bottom of the sign to the elevation of the near edge
8 of the traveled way, of 5 feet, and at a horizontal distance of not less than 6 feet ~~to~~ or more than 10 feet
9 from the roadway edge.

10 Emergency Aid Center signs shall carry one of the following legends, as appropriate, or others
11 designating similar emergency facilities:

- 12 A. MEDICAL CENTER (EM-6a),
- 13 B. WELFARE CENTER (EM-6b),
- 14 C. REGISTRATION CENTER (EM-6c), or
- 15 D. DECONTAMINATION CENTER (EM-6d).

16 The Emergency Aid Center sign shall be a horizontal rectangle. Except as provided in Paragraph 5,
17 the identifying word and the word CENTER, the directional arrow, and the border shall be black on a
18 white background.

19 Option:

20 When Emergency Aid Center signs are used in an incident situation, such as during the aftermath of a
21 nuclear or biological attack, the background color may be fluorescent pink (see Chapter 6I).

22 ~~Section 2I.09~~ 2N.09 Shelter Directional Signs (EM-7 Series)

23 **Standard:**

24 Shelter Directional (EM-7 series) signs (see Figure 2N-1) shall be used to direct the public to
25 selected shelters that have been licensed and marked for emergency use.

26 The installation of Shelter Directional signs shall ~~conform to~~ comply with established ~~highway~~
27 signing standards. Where used, the signs shall not be installed in competition with other necessary
28 highway guide, warning, and regulatory signs.

29 The Shelter Directional sign shall be a horizontal rectangle. Except as provided in Paragraph 4, the
30 identifying word and the word SHELTER, the directional arrow, the distance to the shelter, and the
31 border shall be black on a white background.

32 Option:

33 When Shelter Directional signs are used in an incident situation, such as during the aftermath of a nuclear
34 or biological attack, the background color may be fluorescent pink (see Chapter 6I).

35 The distance to the shelter may be omitted from the sign when appropriate.

36 Shelter Directional signs may carry one of the following legends, or others designating similar emergency
37 facilities:

- 38 A. EMERGENCY (EM-7a),
- 39 B. HURRICANE (EM-7b),
- 40 C. FALLOUT (EM-7c), or
- 41 D. CHEMICAL (EM-7d).

42 If appropriate, the name of the facility may be used.

43 The Shelter Directional signs may be installed on the Interstate Highway System or any other major
44 highway system when it has been determined that a need exists for such signs as part of a State or local shelter
45 plan.

46 The Shelter Directional signs may be used to identify different routes to a shelter to provide for rapid
47 movement of large numbers of persons.

48 **Guidance:**

49 The Shelter Directional sign should be used sparingly and only in conjunction with approved plans of
50 State and local authorities.

51 ~~As a general rule,~~ The Shelter Directional sign should not be posted more than 5 miles from a shelter.

CHAPTER 3A. GENERAL

Section 3A.01 Functions and Limitations

Support:

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

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

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

~~The general functions of longitudinal lines are:~~ relocated to Section 3A.06 and upgraded to Standard

~~A. A double line indicates maximum or special restrictions;~~

~~B. A solid line discourages or prohibits crossing (depending on the specific application);~~

~~C. A broken line indicates a permissive condition, and~~

~~D. A dotted line provides guidance.~~

Section 3A.02 Standardization of Application

Standard:

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

Guidance:

Before any new highway, [private road open to public travel](#) (see definition in Section 1A.13), paved detour, or temporary route is opened to ~~traffie~~ [public travel](#), all necessary markings should be in place.

Standard:

Markings that must be visible at night shall be retroreflective unless ambient illumination assures that the markings are adequately visible. All markings on Interstate highways shall be retroreflective.

Markings that are no longer applicable for roadway conditions or restrictions and that might cause confusion for the road user shall be removed or obliterated to be unidentifiable as a marking as soon as practical. [this sentence was relocated from the previous paragraph](#)

Option:

[Until they can be removed or obliterated](#), markings may be temporarily masked with tape [that is approximately the same color as the pavement](#) ~~until they can be removed or obliterated~~.

[Section 3A.03 Maintaining Minimum Pavement Marking Retroreflectivity](#)

[\(This section is reserved for future text based on FHWA rulemaking.\)](#)

Section ~~3A.03~~ [3A.04](#) Materials

Support:

Pavement and curb markings are commonly placed by using paints or thermoplastics; however, other suitable marking materials, including raised pavement markers and colored pavements, are also used. Delineators, ~~object markers, barriades~~, and channelizing devices are visibly placed in a vertical position similar to signs above the roadway.

[Some marking systems consist of clumps or droplets of material with visible open spaces of bare pavement between the material droplets. These marking systems can function in a manner that is similar to](#)

1 [the marking systems that completely cover the pavement surface and are suitable for use as pavement](#)
2 [markings if they meet the other pavement marking requirements of the highway agency.](#)

3 Guidance:

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

5 Consideration should be given to selecting pavement marking materials that will minimize tripping or loss
6 of traction for [road users, including](#) pedestrians, ~~and~~ bicyclists, [and motorcyclists.](#)

7 ~~Object markers and~~ relocated to Section 2C.63 Delineators should not present a vertical or horizontal
8 clearance obstacle for pedestrians.

9 Section ~~3A.04~~ [3A.05](#) Colors

10 Standard:

11 Markings shall be yellow, white, red, ~~or~~ [blue, or purple.](#) The colors for markings shall conform to
12 the standard highway colors. Black in conjunction with one of the ~~above~~ colors [mentioned in the first](#)
13 [sentence of this paragraph](#) shall be a usable color.

14 When used, white markings for longitudinal lines shall delineate:

- 15 A. The separation of traffic flows in the same direction, or
- 16 B. The right-[hand](#) edge of the roadway.

17 When used, yellow markings for longitudinal lines shall delineate:

- 18 A. The separation of traffic traveling in opposite directions,
- 19 B. The left-[hand](#) edge of the roadways of divided ~~and one-way~~ highways and [one-way streets or](#)
20 [ramps, or](#)
- 21 C. The separation of two-way left-turn lanes and reversible lanes from other lanes.

22 When used, red raised pavement markers [or delineators](#) shall delineate:

- 23 A. [Truck escape ramps, or](#)
- 24 B. [One-way](#) roadways, [ramps, or travel lanes](#) that shall not be entered or used [in the direction](#)
25 [from which the markers are visible.](#)

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

29 [When used, purple markings shall supplement lane line or edge line markings for toll plaza](#)
30 [approach lanes that are restricted to use only by vehicles with registered electronic toll collection](#)
31 [accounts.](#)

32 Option:

33 [Colors used for official route shield signs \(see Section 2D.11\) may be used as colors of symbol markings](#)
34 [to simulate route shields on the pavement \(see Section 3B.20.\)](#)

35 Black may be used in combination with the ~~above~~ colors [mentioned in the first sentence of Paragraph 1](#)
36 where a light-colored pavement does not provide sufficient contrast with the markings.

37 Support:

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

40 Section ~~3A.05~~ [3A.06](#) Functions, Widths, and Patterns of Longitudinal Pavement Markings

41 Standard:

42 [The general functions of longitudinal lines shall be:](#) relocated from Section 3A.01 and upgraded to
43 [Standard](#)

- 44 [A. A double line indicates maximum or special restrictions,](#)
- 45 [B. A solid line discourages or prohibits crossing \(depending on the specific application\),](#)
- 46 [C. A broken line indicates a permissive condition, and](#)
- 47 [D. A dotted line provides guidance or warning of a downstream change in lane function.](#)

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

- 49 A. ~~▲~~ Normal line ~~is~~ 4 to 6 inches wide.

- 1 B. ~~A~~ Wide line ~~is~~ is at least twice the width of a normal line.
2 C. ~~A~~ Double line ~~consists of~~ consists of two parallel lines separated by a discernible space.
3 D. ~~A~~ Broken line ~~consists of~~ consists of normal line segments separated by gaps.
4 E. ~~A~~ Dotted line ~~shall consist of~~ shall consist of noticeably shorter line segments separated by shorter gaps than
5 used for a broken line. The width of a dotted line extension shall be at least the same as the
6 width of the line it extends.

7 Support:

8 The width of the line indicates the degree of emphasis.

9 Guidance:

10 Broken lines should consist of 10-foot line segments and 30-foot gaps, or dimensions in a similar ratio of
11 line segments to gaps as appropriate for traffic speeds and need for delineation.

12 Support:

13 Patterns for dotted lines depend on the application (see Sections 3B.04 and 3B.08.)

14 ~~Option~~ Guidance:

15 A dotted line for line extensions within an intersection or taper area ~~may~~ should consist of 2-foot line
16 segments and 2- to 6-foot gaps. A dotted line ~~for lane drop/add markings~~ used as a lane line ~~may~~ should
17 consist of 3-foot line segments and 9-foot gaps.

1 CHAPTER 3B. PAVEMENT AND CURB MARKINGS

2 Section 3B.01 ~~Centerline~~ Center Line Pavement Markings and Warrants

3 Standard:

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

7 Option:

8 ~~Centerline~~ Center line pavement markings may be placed at a location that is not the geometric center of
9 the roadway.

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

14 Standard:

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

- 17 A. Two-direction passing zone markings consisting of a normal broken yellow line where crossing
18 the ~~centerline~~ center line markings for passing with care is permitted for traffic traveling in
19 either direction;
- 20 B. One-direction no-passing zone markings consisting of a double yellow line, one of which is a
21 normal broken yellow line and the other is a normal solid yellow line, where crossing the
22 ~~centerline~~ center line markings for passing with care is permitted for the traffic traveling
23 adjacent to the broken line, but is prohibited for traffic traveling adjacent to the solid line; ~~and~~
24 or
- 25 C. Two-direction no-passing zone markings consisting of two normal solid yellow lines where
26 crossing the ~~centerline~~ center line markings for passing is prohibited for traffic traveling in
27 either direction.

28 A single solid yellow line shall not be used as a center line marking on a two-way roadway.

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

32 Guidance:

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

36 Support:

37 Sections 11-301(c) and 11-311(c) of the “Uniform Vehicle Code (UVC)” contain information regarding
38 left turns across center line no-passing zone markings and paved medians, respectively. The UVC can be
39 obtained from the National Committee on Uniform Traffic Laws and Ordinances at the address shown on
40 Page i.

41 Standard:

42 ~~Centerline~~ Center line markings shall be placed on all paved urban arterials and collectors that
43 have a traveled way of 20 feet or more in width and an ADT of 6,000 vehicles per day or greater.
44 ~~Centerline~~ Center line markings shall also be placed on all paved two-way streets or highways that have
45 three or more lanes for moving motor vehicle traffic.

46 Guidance:

47 ~~Centerline~~ Center line markings should be placed on paved urban arterials and collectors that have a
48 traveled way of 20 feet or more in width and an ADT of 4,000 vehicles per day or greater. ~~Centerline~~ Center
49 line markings should also be placed on all rural arterials and collectors that have a traveled way of 18 feet or
50 more in width and an ADT of 3,000 vehicles per day or greater. ~~Centerline~~ Center line markings should also
51 be placed on other traveled ways where an engineering study indicates such a need.

1 Engineering judgment should be used in determining whether to place ~~centerline~~ center line markings on
2 traveled ways that are less than 16 feet wide because of the potential for traffic encroaching on the pavement
3 edges, traffic being affected by parked vehicles, and traffic encroaching into the opposing traffic lane.

4 Option:

5 ~~Centerline~~ Center line markings may be placed on other paved two-way traveled ways that are 16 feet or
6 more in width.

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

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

10 **Standard:**

11 No-passing zones shall be marked by either the one direction no-passing zone pavement markings
12 or the two-direction no-passing zone pavement markings described ~~previously~~ in Section 3B.01 and
13 shown in Figures 3B-1 and 3B-3.

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

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

21 On roadways with ~~centerline~~ center line markings, no-passing zone markings shall be used at
22 horizontal or vertical curves where the passing sight distance is less than the minimum shown in Table
23 3B-1 necessary for reasonably safe passing at the 85th-percentile speed or the posted or statutory speed
24 limit ~~as shown in Table 3B-1~~. The passing sight distance on a vertical curve is the distance at which an
25 object 3.5 feet above the pavement surface can be seen from a point 3.5 feet above the pavement (see
26 Figure 3B-4). Similarly, the passing sight distance on a horizontal curve is the distance measured along
27 the ~~centerline~~ center line (or right-hand lane line of a three-lane roadway) between two points 3.5 feet
28 above the pavement on a line tangent to the embankment or other obstruction that cuts off the view on
29 the inside of the curve (see Figure 3B-4).

30 Support:

31 The ~~beginning~~ upstream end of a no-passing zone at point “a” in Figure 3B-4 is that point where the sight
32 distance first becomes less than that specified in Table 3B-1. The downstream end of the no-passing zone at
33 point “b” in Figure 3B-4 is that point at which the sight distance again becomes greater than the minimum
34 specified.

35 The values of the minimum passing sight distances that are shown in Table 3B-1 are for operational use in
36 marking no-passing zones and are less than the values that are suggested for geometric design by the
37 AASHTO Policy on Geometric Design of Streets and Highways (see Section 1A.11).

38 Guidance:

39 Where the distance between successive no-passing zones is less than 400 feet, no-passing markings should
40 connect the zones.

41 **Standard:**

42 Where ~~centerline~~ center line markings are used, no-passing zone markings shall be used on
43 approaches to ~~highway-rail~~ grade crossings in ~~conformance~~ compliance with Section 8B.27.

44 Option:

45 In addition to pavement markings, no-passing zone signs (see Sections 2B.28, 2B.29, and 2C.45) may be
46 used to emphasize the existence and extent of a no-passing zone.

47 Support:

48 Section 11-307 of the “Uniform Vehicle Code (UVC) ~~Revised~~” contains further information regarding
49 required road user behavior in no-passing zones. The “UVC” can be obtained from the National Committee
50 on Uniform Traffic Laws and Ordinances at the address shown on Page i.

51 **Standard:**

1 On three-lane roadways where the direction of travel in the center lane transitions from one
2 direction to the other, a no-passing buffer zone shall be provided in the center lane as shown in Figure
3 3B-5. A lane-reduction transition (see Section 3B.09) shall be provided at each end of the buffer zone.

4 The buffer zone shall be a flush median island formed by two sets of double yellow center line
5 markings that is at least 50 feet in length.

6 Option:

7 Yellow diagonal crosshatch markings (see Section 3B.24) may be placed in the flush median area between
8 the two sets of no-passing zone markings as shown in Figure 3B-5.

9 Guidance:

10 For three-lane roadways having a posted or statutory speed limit of 45 mph or greater, the lane transition
11 taper length should be computed by the formula $L = WS$. For roadways where the posted or statutory speed
12 limit is less than 45 mph, the formula $L = WS^2/60$ should be used to compute the taper length.

13 Support:

14 Under both formulas, L equals the taper length in feet, W equals the width of the center lane or offset
15 distance in feet, and S equals the 85th-percentile speed or the posted or statutory speed limit, whichever is
16 higher.

17 Standard Guidance:

18 The minimum lane transition taper length shall should be 100 feet in urban areas and 200 feet in rural
19 areas.

20 Section 3B.03 Other Yellow Longitudinal Pavement Markings

21 Standard:

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

26 Signs (see Section 2B.26), lane-use control signals (see Chapter 4M), or both shall be used to
27 supplement reversible lane pavement markings.

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

33 Option Guidance:

34 White two-way left-turn lane-use pavement marking arrows (see Figure 3B-7), may should be used in
35 conjunction with the longitudinal two-way left-turn markings as shown in Figure 3B-7 at the locations
36 described in Section 3B.20.

37 Guidance:

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

39 Standard:

40 If a continuous flush median island formed by pavement markings separating travel in opposite
41 directions is used, two sets of solid double solid yellow lines shall be used to form the island as shown in
42 Figures 3B-2 and 3B-5. Other markings in the median island area shall also be yellow, except crosswalk
43 markings which shall be white (see Section 3B.18).

44 Section 3B.04 White Lane Line Pavement Markings and Warrants paragraphs previously in 45 Section 3B.05 have been relocated to this Section

46 Standard:

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

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

50 Guidance:

1 Lane line markings should be used on all roadways that are intended to operate with two or more adjacent
2 traffic lanes ~~that have~~ in the same direction of travel, except as otherwise required for reversible lanes. Lane
3 line markings should also be used at congested locations where the roadway will accommodate more traffic
4 lanes with lane line markings than without the markings.

5 Support:

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

8 **Standard:**

9 Except as provided in Paragraph 6, where crossing the lane line markings with care is permitted,
10 the lane line markings shall consist of a normal broken white line.

11 A dotted white line marking shall be used as the lane line to separate a through lane that continues
12 beyond the interchange or intersection from an adjacent lane for any of the following conditions:

13 A. A deceleration or acceleration lane,

14 B. A through lane that becomes a mandatory exit or turn lane,

15 C. An auxiliary lane 2 miles or less in length between an entrance ramp and an exit ramp, or

16 D. An auxiliary lane 1 mile or less in length between two adjacent intersections.

17 For exit ramps with a parallel deceleration lane, a normal width dotted white lane line shall be
18 installed from the upstream end of the full-width deceleration lane to the theoretical gore or to the
19 upstream end of a solid white lane line, if used, that extends upstream from the theoretical gore as
20 shown in Drawings A and C of Figure 3B-8.

21 ~~With a parallel deceleration lane, a lane line shall be extended from the beginning of the~~
22 ~~channelizing line upstream for a distance of one-half the length of the full-width deceleration lane as~~
23 ~~shown in Figure 3B-8.~~

24 Option:

25 For exit ramps with a parallel deceleration lane, a normal width dotted white line extension may be
26 installed in the taper area upstream from the full-width deceleration lane as shown in Drawings A and C of
27 Figure 3B-8.

28 For an exit ramp with a tapered deceleration lane, a normal width dotted white line extension may be
29 installed from the theoretical gore through the taper area such that it meets the edge line at the upstream end of
30 the taper as shown in Drawing B of Figure 3B-8.

31 **Standard:**

32 ~~For entrance ramps with a parallel acceleration lane, a lane line should be extended from the end of~~
33 ~~the channelizing line for a distance of one-half the length of the full-width acceleration lane~~ normal
34 width dotted white lane line shall be installed from the theoretical gore or from the downstream end of
35 a solid white lane line, if used, that extends downstream from the theoretical gore, to a point at least
36 one-half the distance from the theoretical gore to the downstream end of the acceleration taper, as
37 shown in Drawing A of Figure 3B-9.

38 Option:

39 For entrance ramps with a parallel acceleration lane, a normal width dotted white line extension may be
40 installed from the downstream end of the dotted white lane line to the downstream end of the acceleration
41 taper, as shown in Drawing A of Figure 3B-9.

42 ~~For entrance ramps with a tapered acceleration lane, lane line markings may be placed to extend the~~
43 ~~channelizing line, but not beyond a point where the tapered lane meets the near side of the through traffic lane~~
44 a normal width dotted white line extension may be installed from the downstream end of the channelizing line
45 adjacent to the through lane to the downstream end of the acceleration taper, as shown in Drawings B and C of
46 Figure 3B-9.

47 **Standard:**

48 A wide dotted white lane line shall be used:

49 A. As a lane drop markings as shown in Figure 3B-10 may be used in advance of lane drops at exit
50 ramps to distinguish a lane drop from a normal exit ramp (see Drawings A, B, and C of Figure
51 3B-10), or from an auxiliary lane.

52 B. In advance of freeway route splits with dedicated lanes (see Drawing D of Figure 3B-10),

- 1 C. To separate a through lane that continues beyond an interchange from an adjacent auxiliary
- 2 lane between an entrance ramp and an exit ramp (see Drawing E of Figure 3B-10),
- 3 D. As a lane drop marking in advance of lane drops at intersections to distinguish a lane drop from
- 4 an intersection through lane (see Drawing A of Figure 3B-11), and
- 5 E. To separate a through lane that continues beyond an intersection from an adjacent auxiliary
- 6 lane between two intersections (see Drawing B of Figure 3B-11).

7 Guidance:

8 ~~If used,~~ Lane drop markings used in advance of lane drops at freeway and expressway exit ramps should

9 begin at least 1/2 mile in advance of the theoretical gore ~~point~~.

10 On the approach to a multi-lane exit ramp having an optional exit lane that also carries through traffic,

11 lane line markings should be used as illustrated in Drawing B of Figure 3B-10. In this case, if the right-most

12 exit lane is an added lane such as a parallel deceleration lane, the lane drop marking should begin at the

13 upstream end of the full-width deceleration lane, as shown in Drawing C of Figure 3B-8.

14 Lane drop markings used in advance of lane drops at intersections should begin a distance in advance of

15 the intersection that is determined by engineering judgment as suitable to enable drivers who do not desire to

16 make the mandatory turn to move out of the lane being dropped prior to reaching the queue of vehicles that

17 are waiting to make the turn. The lane drop marking should begin no closer to the intersection than the most

18 upstream regulatory or warning sign associated with the lane drop.

19 The dotted white lane lines that are used for lane drop markings ~~may~~ and that are used as a lane line

20 separating through lanes from auxiliary lanes should consist of ~~a wide dotted white line with~~ line segments

21 that are 3 feet in length separated by 9-foot gaps.

22 Support:

23 Section 3B.20 contains information regarding other markings that are associated with lane drops, such as

24 lane-use arrow markings and ONLY word markings.

25 Section 3B.09 contains information about the lane line markings that are to be used for transition areas

26 where the number of through lanes is reduced.

27 Standard:

28 **Where crossing the lane line markings is discouraged, the lane line markings shall consist of a**

29 **normal or wide solid white line.**

30 Option:

31 Where it is intended to discourage lane changes ~~might cause conflicts~~ on the approach to an exit ramp,

32 a wide solid white ~~channelizing~~ lane line may extend upstream from the theoretical gore ~~point~~ or, for multi-

33 lane exits, as shown in Drawing B of Figure 3B-10, for a distance that is determined by engineering

34 judgment.

35 Where lane changes might cause conflicts, a wide or normal solid white lane line may extend upstream

36 from an intersection.

37 In the case of a lane drop at an exit ramp or intersection, such a solid white line may replace a portion, but

38 not all of the length of the wide dotted white lane line.

39 Support:

40 Section 3B.09 contains information about the lane line markings that are to be used for transition areas

41 where the number of through lanes is reduced.

42 Guidance:

43 On approaches to intersections, a solid white lane line marking should be used to separate a through lane

44 from an added mandatory turn lane.

45 Option:

46 ~~They~~ On approaches to intersections, solid white lane line markings may ~~also~~ be used to separate ~~traffic~~

47 adjacent through lanes or adjacent mandatory turn lanes from each other ~~approaching an intersection~~.

48 Where the median width allows the left-turn lanes to be separated from the through lanes to give drivers

49 on opposing approaches a less obstructed view of opposing through traffic, white pavement markings may be

50 used to form channelizing islands as shown in Figure 2B-17.

51 Solid white lane line markings may be used to separate through traffic lanes from auxiliary lanes, such as

52 an added uphill truck lanes, ~~left- or right-turn lanes, and~~ or a preferential lanes (see Section 3D.02).

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

2 **Standard:**

3 Where crossing the lane line markings is prohibited, the lane line markings shall consist of ~~two-~~
4 ~~normal~~ a solid double white lines (see Figure 3B-12).

5 **Section 3B.05 Other White Longitudinal Pavement Markings** paragraphs previously in this Section
6 have been relocated to Section 3B.04

7 **Standard:**

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

9 Option:

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

12 **Standard:**

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

14 Support:

15 Examples of channelizing line applications are shown in Figures 3B-8, 3B-9, and 3B-10, and in Drawing
16 C of Figure 3B-15.

17 Channelizing lines at exit ramps as shown in Figures 3B-8 and 3B-10 define the neutral area, direct
18 exiting traffic at the proper angle for smooth divergence from the main lanes into the ramp, and reduce the
19 probability of colliding with objects adjacent to the roadway.

20 Channelizing lines at entrance ramps as shown in Figures 3B-9 and 3B-10 promote ~~reasonably safe~~
21 orderly and efficient merging with the through traffic.

22 **Standard:**

23 For all exit ramps and for entrance ramps with parallel acceleration lanes, channelizing lines shall
24 be placed ~~along the~~ on both sides of the neutral area (see Figures 3B-8 and 3B-10 and Drawing A of
25 Figure 3B-9) ~~adjacent to the through traffic lane and the ramp lane.~~

26 For entrance ramps with tapered acceleration lanes, channelizing lines shall be placed along both
27 sides of the neutral area to a point at least one-half of the distance to the theoretical gore (see Drawing
28 C of Figure 3B-9).

29 Option:

30 For entrance ramps with tapered acceleration lanes, the channelizing lines may extend to the theoretical
31 gore as shown in Drawing B of Figure 3B-9.

32 White chevron crosshatch markings (see Section 3B.24) may be placed in the neutral area of exit ramp
33 and entrance ramp gores for special emphasis as shown in Figures 3B-8 and 3B-10 and Drawing A of Figure
34 3B-9. The channelizing lines and the optional chevron crosshatch markings at exit ramp and entrance ramp
35 gores may be supplemented with white retroreflective or internally illuminated raised pavement markers (see
36 Sections 3B.11 and 3B.13) for enhanced nighttime visibility.

37 ~~Guidance:~~

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

40 **Section 3B.06 Edge Line Pavement Markings**

41 **Standard:**

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

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

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

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

1 Guidance:

2 Edge line markings should not be broken for minor driveways.

3 Support:

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

6 Option:

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

8 **Section 3B.07 Warrants for Use of Edge Lines**

9 **Standard:**

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

11 **A. Freeways,**

12 **B. Expressways, and**

13 **C. Rural arterials with a traveled way of 20 feet or more in width and an ADT of 6,000 vehicles per**
14 **day or greater.**

15 Guidance:

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

17 A. Rural arterials and collectors with a traveled way of 20 feet or more in width and an ADT of 3,000
18 vehicles per day or greater.

19 B. At other paved streets and highways where an engineering study indicates a need for edge line
20 markings.

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

23 Option:

24 Edge line markings may be placed on streets and highways with or without ~~centerline~~ [center line](#)
25 markings.

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

28 [If a bicycle lane is marked on the outside portion of the traveled way, the edge line that would mark the](#)
29 [outside edge of the bicycle lane may be omitted.](#)

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

32 **Section 3B.08 Extensions Through Intersections or Interchanges**

33 **Standard:**

34 [Except as provided in Paragraph 2](#), pavement markings extended into or continued through an
35 intersection or interchange area shall be the same color and at least the same width as the line markings
36 they extend (see Figure 3B-13).

37 Option:

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

39 Guidance:

40 Where highway design or reduced visibility conditions make it desirable to provide control or to guide
41 vehicles through an intersection or interchange, such as at offset, skewed, complex, or multi-legged
42 intersections, on curved roadways, ~~or~~ where multiple turn lanes are used, [or where offset left turn lanes might](#)
43 [cause driver confusion](#), dotted line [extension](#) markings [consisting of 2-foot line segments and 2- to 6-foot gaps](#)
44 should be used to extend longitudinal line markings through an intersection or interchange area.

45 Option:

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

47 Guidance:

48 Where greater restriction is required, solid lane lines or channelizing lines should be extended into or
49 continued through intersections or major driveways.

1 **Standard:**

2 ~~However, Solid lines shall not be used to extend~~ edge lines ~~should not be extended~~ into or ~~continued~~
3 through intersections or major driveways ~~as solid lines~~.

4 Guidance:

5 ~~A single line of equal width to one of the lines of the double line should be used to extend~~ Where a double
6 line is extended through an intersection, a single line of equal width to one of the lines of the double line
7 should be used.

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

10 **Section 3B.09 Lane-Reduction Transition Markings**

11 **Support:**

12 Lane-reduction transition markings are used where the number of through lanes is reduced because of
13 narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through
14 lane. Lane-reduction transition markings are not used for lane drops.

15 **Standard:**

16 Except as provided in Paragraph 3, where pavement markings are used, lane-reduction transition
17 markings shall be used to guide traffic through transition areas where the number of through lanes is
18 reduced, as shown in Figure 3B-14. On two-way roadways, no-passing zone markings shall be used to
19 prohibit passing in the direction of the convergence, and shall continue through the transition area.

20 **Option:**

21 On low-speed urban roadways where curbs clearly define the roadway edge in the lane-reduction
22 transition, or where a through lane becomes a parking lane, the edge line and/or delineators shown in Figure
23 3B-14 may be omitted as determined by engineering judgment.

24 Guidance:

25 For roadways having a posted or statutory speed limit of 45 mph or greater, the transition taper length for
26 a lane-reduction transition should be computed by the formula $L = WS$. For roadways where the posted or
27 statutory speed limit is less than 45 mph, the formula $L = WS^2/60$ should be used to compute the taper length.

28 **Support:**

29 Under both formulas, L equals the taper length in feet, W equals the width of the offset distance in feet,
30 and S equals the 85th-percentile speed or the posted or statutory speed limit, whichever is higher.

31 **Guidance:**

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

33 **Option:**

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

36 Guidance:

37 Lane line markings should be discontinued one-quarter of the distance between the Lane Ends sign (see
38 Section 2C.42) and the point where the transition taper begins.

39 Except as provided in Paragraph 3 for low-speed urban roadways, the edge line markings shown in Figure
40 3B-14 should be installed from the location of the Lane Ends warning sign to beyond the beginning of the
41 narrower roadway.

42 **Support:**

43 Pavement markings at lane-reduction transitions supplement the standard signs. See Section 3B.20 for
44 provisions regarding use of lane-reduction arrows.

45 **Section 3B.10 Approach Markings for Obstructions**

46 **Standard:**

47 Pavement markings shall be used to guide traffic away from fixed obstructions within a paved
48 roadway. Approach markings for bridge supports, refuge islands, median islands, toll plaza islands,
49 and raised channelization islands shall consist of a tapered line or lines extending from the ~~centerline~~

1 [center line](#) or the lane line to a point 1 to 2 feet to the [right-hand](#) side, or to both sides, of the approach
2 end of the obstruction (see Figure 3B-15).

3 [Support:](#)

4 [See Chapter 3E for additional information on approach markings for toll plaza islands.](#)

5 [Guidance:](#)

6 For roadways having a posted or statutory speed limit of 45 mph or greater, the taper length of the tapered
7 line markings should be computed by the formula $L = WS$. For roadways where the posted or statutory speed
8 limit is less than 45 mph, the formula $L = WS^2/60$ should be used to compute the taper length.

9 [Support:](#)

10 Under both formulas, L equals the taper length in feet, W equals the width of the offset distance in feet,
11 and S equals the 85th-percentile speed or the posted or statutory speed limit, whichever is higher.

12 ~~Standard~~ [Guidance:](#)

13 The minimum taper length ~~shall~~ [should](#) be 100 feet in urban areas and 200 feet in rural areas.

14 [Support:](#)

15 Examples of approach markings for obstructions in the roadway are shown in Figure 3B-15.

16 ~~Option:~~

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

18 [Standard:](#)

19 **If traffic is required to pass only to the right of the obstruction, the markings shall consist of a two-**
20 **direction no-passing zone marking at least twice the length of the diagonal portion as determined by the**
21 **appropriate taper formula (see [Drawing A](#) of Figure 3B-15).**

22 [Option:](#)

23 If traffic is required to pass only to the right of the obstruction, yellow diagonal ~~approach~~ [crosshatch](#)
24 markings (see [Section 3B.24](#)) may be placed in the ~~neutral~~ [flush median](#) area between the no-passing zone
25 markings as shown in [Drawings A and B](#) of Figure 3B-15. Other markings, such as yellow delineators,
26 [yellow channelizing devices](#), [yellow](#) raised pavement markers, and white crosswalk pavement markings, may
27 also be placed in the ~~neutral~~ [flush median](#) area.

28 [Standard:](#)

29 **If traffic can pass either to the right or left of the obstruction, the markings shall consist of two**
30 **channelizing lines diverging from the lane line, one to each side of the obstruction. In advance of the**
31 **point of divergence, a [wide](#) solid ~~wide~~ white line or [normal](#) solid double ~~normal~~ white line shall be**
32 **extended in place of the broken lane line for a distance equal to the length of the diverging lines (see**
33 **[Drawing C](#) of Figure 3B-15).**

34 [Option:](#)

35 If traffic can pass either to the right or left of the obstruction, additional white [chevron crosshatch](#)
36 markings (see [Section 3B.24](#)) may be placed in the ~~neutral~~ [flush median](#) area between the channelizing lines
37 as shown in [Drawing C](#) of Figure 3B-15. [Other markings, such as white delineators, white channelizing](#)
38 [devices, white raised pavement markers, and white crosswalk markings may also be placed in the flush](#)
39 [median area.](#)

40 **Section 3B.11 Raised Pavement Markers – General**

41 [Standard:](#)

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

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

48 [Option:](#)

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

1 [The side of a raised pavement marker that is visible to traffic proceeding in the wrong direction may be](#)
2 [red \(see Section 3A.05\).](#) ~~relocated from Section 3B.14~~

3 [Retroreflective or internally illuminated raised pavement markers may be used in the roadway](#)
4 [immediately adjacent to curbed approach ends of raised medians and curbs of islands, or on top of such curbs](#)
5 [\(see Section 3B.23\).](#)

6 Support:

7 Retroreflective and internally illuminated raised pavement markers are available in mono-directional and
8 bidirectional configurations. The bidirectional marker is capable of displaying the applicable color for each
9 direction of travel.

10 [Blue raised pavement markers are sometimes used in the roadway to help emergency personnel locate fire](#)
11 [hydrants.](#)

12 **Standard:**

13 [When used, internally illuminated raised pavement markers shall be steadily illuminated and shall](#)
14 [not be flashed.](#)

15 **Support:**

16 [Flashing raised pavement markers are considered to be In-Roadway Lights \(see Chapter 4N\).](#)

17 Guidance:

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

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

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

25 **Standard:**

26 **The value of N [cited in Sections 3B.12 through 3B.14](#) for the spacing of raised pavement markers**
27 **~~for a broken or dotted line~~ shall equal the length of one line segment plus one gap [of the broken lines](#)**
28 **~~used on the highway.~~ [The value of N referenced for solid lines shall equal the N for the broken or](#)**
29 **~~dotted lines that might be adjacent to or might extend the solid lines (see Sections 3B.13 and 3B.14).~~**

30 **Option:**

31 [For additional emphasis, retroreflective raised pavement markers may be spaced closer than described in](#)
32 [Sections 3B.12 through 3B.14, as determined by engineering judgment or engineering study.](#)

33 Support:

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

36 **Section 3B.12 Raised Pavement Markers as Vehicle Positioning Guides with Other** 37 **Longitudinal Markings**

38 Option:

39 [Retroreflective or internally illuminated](#) raised pavement markers may be used as positioning guides with
40 longitudinal line markings without necessarily conveying information to the road user about passing or lane-
41 use restrictions. In such applications, markers may be positioned [in line with or immediately adjacent to a](#)
42 [single line marking, or positioned](#) between the two lines of a ~~one-way or two-way no-passing zone marking or~~
43 ~~positioned in line with or immediately adjacent to single solid or broken centerline~~ [double center line or](#)
44 [double](#) lane line marking*.

45 ~~Support~~ **Guidance:**

46 ~~A typical~~ **The** spacing for such applications ~~is~~ [should be](#) 2N, where N equals the length of one line
47 segment plus one gap (see Section 3B.11).

48 Option:

49 Where it is desired to alert the road user to changes in the travel path, such as on sharp curves or on
50 transitions that reduce the number of lanes or that shift traffic laterally, the spacing may be reduced to N or
51 less.

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

4 **Section 3B.13 Raised Pavement Markers Supplementing Other Markings**

5 Guidance:

6 The use of [retroreflective or internally illuminated](#) raised pavement markers for supplementing
7 longitudinal line markings should ~~conform to~~ [comply with](#) the following:

8 A. Lateral Positioning

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

13 B. Longitudinal Spacing

- 14 1. When supplementing solid line markings, raised pavement markers at a spacing no greater than N
15 (see Section 3B.11) should be used, except [that](#) when supplementing [channelizing lines or left](#)
16 [edge line markings](#), a spacing of no greater than N/2 should be used. ~~Raised markers should not~~
17 ~~supplement right edge line markings.~~
- 18 2. When supplementing broken line markings, a spacing no greater than 3N should be used.
19 However, when supplementing broken line markings identifying reversible lanes, a spacing of no
20 greater than N should be used.
- 21 3. When supplementing dotted [lane](#) line markings, a spacing appropriate for the application should
22 be used.
- 23 4. When supplementing longitudinal line [extension](#) markings through at-grade intersections, one
24 raised pavement marker for each short line segment should be used.
- 25 5. When supplementing ~~edge~~ line extensions through freeway interchanges, a spacing of no greater
26 than N should be used.

27 [Raised pavement markers should not supplement right-hand edge lines unless an engineering study or](#)
28 [engineering judgment indicates the benefits of enhanced delineation of a curve or other location would](#)
29 [outweigh possible impacts on bicycles using the shoulder, and the spacing of raised pavement markers on the](#)
30 [right-hand edge is close enough to avoid misinterpretation as a broken line during wet night conditions.](#)

31 Option:

32 Raised pavement markers also may be used to supplement other markings ~~for~~ [such as](#) channelizing
33 islands, [gore areas](#), ~~or~~ approaches to obstructions, [or wrong-way arrows](#).

34 [To improve the visibility of horizontal curves, center lines may be supplemented with retroreflective or](#)
35 [internally illuminated raised pavement markers for the entire curved section as well as for a distance in](#)
36 [advance of the curve that approximates 5 seconds of travel time.](#)

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

38 Option:

39 Retroreflective or internally illuminated raised pavement markers, or non-retroreflective raised pavement
40 markers supplemented by retroreflective or internally illuminated markers, may be substituted for markings of
41 other types.

42 Guidance:

43 If used, the pattern ~~and color~~ of the raised pavement markers should simulate the pattern ~~and color~~ of the
44 markings for which they substitute. [color moved to previous paragraph and revised to Standard](#)

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

47 ~~Option:~~

48 ~~The side of a raised pavement marker that is visible to traffic proceeding in the wrong direction may be~~
49 ~~red.~~ [relocated to Section 3B.11](#)

50 **Standard:**

1 If raised pavement markers are used to substitute for broken line markings, a group of three to five
2 markers equally spaced at a distance no greater than N/8 (see Section 3B.11) shall be used. If N is other
3 than 40 feet, the markers shall be equally spaced over the line segment length (at 1/2 points for three
4 markers, at 1/3 points for four markers, and at 1/4 points for five markers). At least one retroreflective
5 or internally illuminated marker per group shall be used or a retroreflective or internally illuminated
6 marker shall be installed midway in each gap between successive groups of non-retroreflective markers.

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

10 Guidance:

11 Raised pavement markers should not substitute for right-hand edge line markings unless an engineering
12 study or engineering judgment indicates the benefits of enhanced delineation of a curve or other location
13 would outweigh possible impacts on bicycles using the shoulder, and the spacing of raised pavement markers
14 on the right-hand edge line is close enough to avoid misinterpretation as a broken line during wet night
15 conditions.

16 **Standard:**

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

20 Option:

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

23 **Section 3B.15 Transverse Markings**

24 **Standard:**

25 Transverse markings, which include shoulder markings, word and symbol markings, arrows, stop
26 lines, yield lines, crosswalk lines, speed measurement markings, speed reduction markings, speed hump
27 markings, parking space markings, and others, shall be white unless otherwise ~~specified~~ provided
28 ~~herein~~ in this Manual.

29 Guidance:

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

32 ~~Standard:~~

33 ~~Pavement marking letters, numerals, and symbols shall be installed in accordance with the~~
34 ~~Pavement Markings chapter of the "Standard Highway Signs" book (see Section 1A.11),~~ relocated to
35 Section 3B.20

36 **Section 3B.16 Stop and Yield Lines**

37 Guidance:

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

41 Option:

42 Stop lines may be used to indicate the point behind which vehicles are required to stop in compliance with
43 a STOP (R1-1) sign, a Stop Here For Pedestrians (R1-5b or R1-5c) sign, or some other traffic control device
44 that requires vehicles to stop, except YIELD signs that are not associated with passive grade crossings. phrase
45 at end of sentence relocated from previous paragraph

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

48 **Standard:**

49 Except as provided in Section 8B.28, stop lines shall not be used at locations where drivers are
50 required to yield in compliance with a YIELD (R1-2) sign or a Yield Here To Pedestrians (R1-5 or R1-

1 5a) sign or at locations on uncontrolled approaches where drivers are required by State law to yield to
2 pedestrians.

3 Yield lines shall not be used at locations where drivers are required to stop in compliance with a
4 STOP (R1-1) sign, a Stop Here For Pedestrians (R1-5b or R1-5c) sign, a traffic control signal, or some
5 other traffic control device.

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

8 ~~If used,~~ Yield lines (see Figure 3B-16) shall consist of a row of solid white isosceles triangles pointing
9 toward approaching vehicles extending across approach lanes to indicate the point at which the yield is
10 intended or required to be made.

11 Guidance:

12 Stop lines should be 12 to 24 inches wide.

13 The individual triangles comprising the yield line should have a base of 12 to 24 inches wide and a height
14 equal to 1.5 times the base. The space between the triangles should be 3 to 12 inches.

15 If used, stop and yield lines should be placed a minimum of 4 feet in advance of the nearest crosswalk line
16 at controlled intersections, except for yield lines at roundabouts ~~intersections~~ as provided for in Section 3C.04
17 and at midblock crosswalks. In the absence of a marked crosswalk, the stop line or yield line should be placed
18 at the desired stopping or yielding point, but should not be placed ~~no~~ more than 30 feet or less than 4 feet from
19 the nearest edge of the intersecting traveled way. ~~Stop lines should be placed to allow sufficient sight distance~~
20 ~~to all other approaches to an intersection.~~

21 Stop lines at midblock signalized locations should be placed at least 40 feet in advance of the nearest
22 signal indication (see Section 4D.14).

23 If yield or stop lines are used at ~~an unsignalized midblock a~~ crosswalk that crosses an uncontrolled multi-
24 lane approach, the yield lines or stop lines should be placed ~~adjacent to the Yield Here to Pedestrians sign-~~
25 ~~located~~ 20 to 50 feet in advance of the nearest crosswalk line, and parking should be prohibited in the area
26 between the yield or stop line and the crosswalk (see Figure 3B-17).

27 **Standard:**

28 If yield (stop) lines are used at a crosswalk that crosses an uncontrolled multi-lane approach, Yield
29 Here To (Stop Here For) Pedestrians (R1-5 series) signs (see Section 2B.11) shall be used.

30 Guidance:

31 Yield (stop) lines and Yield Here To (Stop Here For) Pedestrians signs should not be used in advance of
32 crosswalks that cross an approach to or departure from a roundabout.

33 Support:

34 When drivers ~~who~~ yield or stop too close to crosswalks ~~on~~ that cross uncontrolled multi-lane approaches,
35 they place pedestrians at risk by blocking other drivers' views of pedestrians and by blocking pedestrians'
36 views of vehicles approaching in the other lanes.

37 Option:

38 Stop and yield lines may be staggered longitudinally on a lane-by-lane basis (see Drawing D of Figure
39 3B-13).

40 Support:

41 Staggered stop lines and staggered yield lines can improve the driver's view of pedestrians, provide better
42 sight distance for turning vehicles, and increase the turning radius for left-turning vehicles.

43 Section 8B.28 contains information regarding the use of stop lines and yield lines at grade crossings.

44 **Section 3B.17 Do Not Block Intersection Markings**

45 Option:

46 Do Not Block Intersection markings may be used to mark the edges of an intersection area that is in close
47 proximity to a signalized intersection, railroad crossing, or other nearby traffic control that might cause
48 vehicles to stop within the intersection and impede other traffic entering the intersection. If authorized by law,
49 Do Not Block Intersection markings with appropriate signs may also be used at other locations.

50 **Standard:**

1 If used, Do Not Block Intersection markings (see Figure 3B-18) shall consist of one of the following
2 alternatives:

- 3 A. Wide solid white lines that outline the intersection area that vehicles must not block;
- 4 B. Wide solid white lines that outline the intersection area that vehicles must not block and a white
5 word message such as DO NOT BLOCK or KEEP CLEAR;
- 6 C. Wide solid white lines that outline the intersection area that vehicles must not block and white
7 cross-hatching within the intersection area; or
- 8 D. A white word message, such as DO NOT BLOCK or KEEP CLEAR, within the intersection
9 area that vehicles must not block.

10 Do Not Block Intersection markings shall be accompanied by one or more DO NOT BLOCK
11 INTERSECTION (DRIVEWAY) (CROSSING) (R10-7) signs (see Section 2B.53), one or more DO NOT
12 STOP ON TRACKS (R8-8) signs (see Section 8B.09), or one or more similar signs.

13 ~~Section 3B.17~~ **3B.18 Crosswalk Markings**

14 Support:

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

18 In conjunction with signs and other measures, crosswalk markings ~~also serve help~~ to alert road users of a
19 designated pedestrian crossing point across roadways at locations that are not controlled by ~~highway~~ traffic
20 control signals or STOP or YIELD signs.

21 At non-intersection locations, crosswalk markings legally establish the crosswalk.

22 **Standard:**

23 **When crosswalk lines are used, they shall consist of solid white lines that mark the crosswalk. They**
24 **shall not be less than 6 inches or greater than 24 inches in width.**

25 Guidance:

26 If transverse lines are used to mark a crosswalk, the gap between the lines should not be less than 6 feet.
27 If diagonal or longitudinal lines are used without transverse lines to mark a crosswalk, the crosswalk should
28 be not less than 6 feet wide.

29 Crosswalk lines, if used on both sides of the crosswalk, should extend across the full width of pavement or
30 to the edge of the intersecting crosswalk to discourage diagonal walking between crosswalks (see Figures 3B-
31 17 and 3B-19).

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

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

37 At locations controlled by traffic control signals or on approaches controlled by STOP or YIELD signs,
38 crosswalk lines should be installed where engineering judgment indicates they are needed to direct pedestrians
39 to the proper crossing path(s).

40 Crosswalk lines should not be used indiscriminately. An engineering study should be performed before
41 ~~they are~~ a marked crosswalk is installed at a locations ~~away from a~~ highway traffic control signals ~~or an~~
42 approach controlled by a STOP or YIELD signs. The engineering study should consider the number of lanes,
43 the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and
44 delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the
45 geometry of the location, the possible consolidation of multiple crossing points, the availability of street
46 lighting, and other appropriate factors.

47 New marked crosswalks alone, without other measures designed to reduce traffic speeds, shorten crossing
48 distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence,
49 should not be installed across uncontrolled roadways where the speed limit exceeds 40 mph and either:

- 50 A. The roadway has four or more lanes of travel without a raised median or pedestrian refuge island and
51 an ADT of 12,000 vehicles per day or greater; or

1 B. The roadway has four or more lanes of travel with a raised median or pedestrian refuge island and an
2 ADT of 15,000 vehicles per day or greater.

3 Support:

4 Chapter 4F contains information on Pedestrian Hybrid Beacons. Section 4L.03 contains information
5 regarding Warning Beacons to provide active warning of a pedestrian’s presence. Section 4N.02 contains
6 information regarding In-Roadway Warning Lights at crosswalks. Chapter 7D contains information regarding
7 school crossing supervision.

8 Guidance:

9 Because non-intersection pedestrian crossings are generally unexpected by the road user, warning signs
10 (see Section 2C.50) should be installed for all marked crosswalks at non-intersection locations and adequate
11 visibility should be provided by parking prohibitions.

12 Support:

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

14 Option:

15 For added visibility, the area of the crosswalk may be marked with white diagonal lines at a 45-degree
16 angle to the line of the crosswalk or with white longitudinal lines parallel to traffic flow as shown in Figure
17 3B-19.

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

22 Guidance:

23 If used, the diagonal or longitudinal lines should be 12 to 24 inches wide and ~~spaced~~ separated by gaps of
24 12 to 60 inches apart. The ~~marking~~ design of the lines and gaps should avoid the wheel paths if possible, and
25 the ~~spacing gap between the lines~~ should not exceed 2.5 times the ~~line~~ width of the diagonal or longitudinal
26 lines.

27 Option:

28 When an exclusive pedestrian phase that permits diagonal crossing of an intersection is provided at a
29 traffic control signal, a marking as shown in Figure 3B-20 may be used for the crosswalk.

30 Guidance:

31 Crosswalk markings should be located so that the curb ramps are within the extension of the crosswalk
32 markings.

33 Support:

34 Detectable warning surfaces mark boundaries between pedestrian and vehicular ways where there is no
35 raised curb. Detectable warning surfaces are required by 49 CFR, Part 37 and by the Americans with
36 Disabilities Act (ADA) where curb ramps are constructed at the junction of sidewalks and the roadway, for
37 marked and unmarked crosswalks. Detectable warning surfaces contrast visually with adjacent walking
38 surfaces, either light-on-dark, or dark-on-light. The “Americans with Disabilities Act Accessibility
39 Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11) contains specifications for design and
40 placement of detectable warning surfaces.

41 **Section ~~3B.18~~ 3B.19 Parking Space Markings**

42 Support:

43 Marking of parking space boundaries encourages more orderly and efficient use of parking spaces where
44 parking turnover is substantial. Parking space markings tend to prevent encroachment into fire hydrant zones,
45 bus stops, loading zones, approaches to intersections, curb ramps, and clearance spaces for islands and other
46 zones where parking is restricted. Examples of parking space markings are shown in Figure 3B-21.

47 **Standard:**

48 **Parking space markings shall be white.**

49 Option:

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

1 Support:

2 Additional parking space markings for the purpose of designating spaces for use only by persons with
3 disabilities are discussed in Section 3B.20 and illustrated in Figure 3B-22. [The design and layout of](#)
4 [accessible parking spaces for persons with disabilities is provided in the “Americans with Disabilities Act](#)
5 [Accessibility Guidelines \(ADAAG\)” \(see Section 1A.11\).](#)

6 **Section ~~3B.19~~ 3B.20 Pavement Word, ~~and~~ Symbol, and Arrow Markings**

7 Support:

8 Word, ~~and~~ symbol, [and arrow](#) markings on the pavement are used for the purpose of guiding, warning, or
9 regulating traffic. [These pavement markings can be helpful to road users in some locations by supplementing](#)
10 [signs and providing additional emphasis for important regulatory, warning, or guidance messages, because the](#)
11 [markings do not require diversion of the road user’s attention from the roadway surface.](#) Symbol messages
12 are preferable to word messages. Examples of standard word and arrow pavement markings are shown in
13 Figures 3B-23 and 3B-24.

14 [Option:](#)

15 [Word, symbol, and arrow markings, including those contained in the “Standard Highway Signs and](#)
16 [Markings” book \(see Section 1A.11\), may be used as determined by engineering judgment to supplement](#)
17 [signs and/or to provide additional emphasis for regulatory, warning, or guidance messages. Among the word,](#)
18 ~~and~~ symbol, [and arrow](#) markings [that may ~~include, but~~ be used](#) are ~~not limited to,~~ the following: ~~Other words~~
19 ~~or symbols may also be used under certain conditions.~~

20 A. Regulatory:

- 21 1. STOP
- 22 2. [YIELD](#)
- 23 3. RIGHT (LEFT) TURN ONLY
- 24 4. 25 MPH
- 25 5. [Lane-use and wrong-way](#) arrows ~~symbols~~
- 26 6. [Diamond symbol for HOV lanes](#)
- 27 7. [Other preferential lane word markings](#)

28 B. Warning:

- 29 1. STOP AHEAD
- 30 2. YIELD AHEAD
- 31 3. YIELD AHEAD triangle symbol
- 32 4. SCHOOL XING
- 33 5. SIGNAL AHEAD
- 34 6. PED XING
- 35 7. SCHOOL
- 36 8. R X R
- 37 9. BUMP
- 38 10. HUMP
- 39 11. [Lane-reduction arrows](#)

40 C. Guide:

- 41 1. [Route numbers \(route shield pavement marking symbols and/or words such as I-81, US 40,](#)
42 [STATE 135, or ROUTE 10\)](#)
- 43 2. ~~STATE 135~~ [Cardinal directions \(NORTH, SOUTH, EAST, or WEST\)](#)
- 44 3. ~~ROUTE 40 TO~~
- 45 4. [Destination names or abbreviations thereof](#)

46 **Standard:**

47 Word, ~~and~~ symbol, [and arrow](#) markings shall be white, except as otherwise ~~noted~~ [provided](#) in this
48 Section.

49 Pavement marking letters, numerals, ~~and~~ symbols, [and arrows](#) shall be installed in accordance with
50 the [design details in the Pavement Markings chapter of the “Standard Highway Signs \[and Markings\]\(#\)”](#)
51 [book \(see Section 1A.11\).](#) [relocated from Section 3B.15](#)

52 Guidance:

53 Letters and numerals should be 6 feet or more in height.

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

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

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

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

10 Except ~~as noted in the Option~~ for the [SCHOOL word marking \(see Section 7C.03\)](#), pavement word, ~~and~~
11 symbol, [and arrow](#) markings should be no more than one lane in width.

12 ~~Option:~~

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

14 ~~Guidance:~~

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

17 Pavement word, ~~and~~ symbol, [and arrow](#) markings should be proportionally scaled to fit within the width
18 of the facility upon which they are applied.

19 Option:

20 On narrow, low-speed shared-use paths, the pavement words, ~~and~~ symbols, [and arrows](#) may be smaller
21 than suggested, but to the relative scale.

22 [Pavement markings simulating Interstate, U.S., State, and other official highway route shield signs \(see](#)
23 [Figure 2D-3\) with appropriate route numbers, but elongated for proper proportioning when viewed as a](#)
24 [marking, may be used to guide road users to their destinations \(see Figure 3B-25\).](#)

25 **Standard:**

26 **Except at the ends of aisles in parking lots, the word STOP shall not be used on the pavement unless**
27 **accompanied by a stop line (see Section 3B.16) and STOP sign (see Section 2B.05). At the ends of aisles**
28 **in parking lots, the word STOP shall not be used on the pavement unless accompanied by a stop line.**

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

31 Option:

32 A yield-ahead triangle symbol (see [Figure 3B-26](#)) or YIELD AHEAD word pavement marking may be
33 used on approaches to intersections where the approaching traffic will encounter a YIELD sign at the
34 intersection (~~see Figure 3B-25~~).

35 **Standard:**

36 **The yield-ahead triangle symbol or YIELD AHEAD word pavement marking shall not be used**
37 **unless a YIELD sign (see Section 2B.08) is in place at the intersection. The yield-ahead symbol marking**
38 **shall be as shown in Figure 3B-26.**

39 [Guidance:](#)

40 The International Symbol of Accessibility parking space markings (see [Figure 3B-22](#)) ~~may~~ [should](#) be
41 placed in each parking space designated for use by persons with disabilities.

42 Option:

43 A blue background with white border may supplement the wheelchair symbol as shown in Figure 3B-22.
44 Support:

45 Lane-use arrow markings (see [Figure 3B-24](#)) are ~~often~~ used to ~~provide guidance in turn bays~~ [indicate the](#)
46 [mandatory or permissible movements in certain lanes](#) (see Figure 3B-27), ~~where turns may or may not be~~
47 ~~mandatory~~, and in two-way left-turn lanes (see Figure 3B-7).

48 [Guidance:](#)

49 [Lane-use arrow markings \(see Figure 3B-24\) should be used in lanes designated for the exclusive use of a](#)
50 [turning movement, including turn bays, except where engineering judgment determines that physical](#)
51 [conditions or other markings \(such as a dotted extension of the lane line through the taper into the turn bay\)](#)

1 clearly discourage unintentional use of a turn bay by through vehicles. Lane-use arrow markings should also
2 be used in lanes from which movements are allowed that are contrary to the normal rules of the road (see
3 Drawing B of Figure 3B-13). When used in turn lanes, at least two arrows should be used, one at or near the
4 upstream end of the full-width turn lane and one an appropriate distance upstream from the stop line or
5 intersection (see Drawing A of Figure 3B-11).

6 Option:

7 An additional arrow or arrows may be used in a turn lane. When arrows are used for a short turn lane, the
8 second (downstream) arrow may be omitted based on engineering judgment.

9 Guidance:

10 Where opposing offset channelized left-turn lanes exist, lane-use arrow markings should be placed near
11 the downstream terminus of the offset left-turn lanes to reduce wrong-way movements (see Figure 2B-17).

12 Support:

13 An arrow at the downstream end of a turn lane can help to prevent wrong way movements.

14 **Standard:**

15 **Where through ~~traffic~~ lanes approaching an intersection become mandatory turn lanes, lane-use**
16 **arrow markings (see Figure 3B-24) shall be used and shall be accompanied by standard signs.**

17 Guidance:

18 Where through lanes approaching an intersection become mandatory turn lanes, ONLY word markings
19 (see Figure 3B-23) should be used in addition to the required lane-use arrow markings and signs (see Sections
20 2B.19 and 2B.20). ~~Where through lanes become mandatory turn lanes, signs or~~ These markings and signs
21 should be placed well in advance of the turn and should be repeated as necessary to prevent entrapment and to
22 help the road user select the appropriate lane in advance of reaching a queue of waiting vehicles (see Drawing
23 A of Figure 3B-11).

24 Option:

25 On freeways or expressways where a through lane becomes a mandatory exit lane, lane-use arrow
26 markings may be used on the approach to the exit in the dropped lane and in an adjacent optional through-or-
27 exit lane if one exists.

28 Guidance:

29 A two-way left-turn lane-use arrow pavement marking, with opposing arrows spaced as shown in Figure
30 3B-7, should be used at or just downstream from the beginning of a two-way left-turn lane.

31 Option:

32 Additional two-way left-turn lane-use arrow markings may be used at other locations along a two-way
33 left-turn lane where engineering judgment determines that such additional markings are needed to emphasize
34 the proper use of the lane.

35 **Standard:**

36 **A single-direction lane-use arrow shall not be used in a lane bordered on both sides by yellow two-**
37 **way left-turn lane longitudinal markings.**

38 **Lane-use, lane-reduction, and wrong-way arrow markings shall be designed as shown in Figure 3B-**
39 **24 and in the “Standard Highway Signs and Markings” book (see Section 1A.11).**

40 Option:

41 ~~Lane-use arrow markings (see Figure 3B-21) may be used to convey either guidance or mandatory~~
42 ~~messages.~~

43 The ONLY word marking (see Figure 3B-23) may be used to supplement the lane-use arrow markings in
44 lanes that are designated for the exclusive use of a single movement (see Figure 3B-27) or to supplement a
45 preferential lane word or symbol marking (see Section 3D.01).

46 **Standard:**

47 **The ONLY word marking shall not be used in a lane that is shared by more than one movement.**

48 Guidance:

49 ~~In situations~~ Where a lane-reduction transition occurs on a roadway with a speed limit of 45 mph or more,
50 the lane-reduction arrow markings shown in Drawing F in Figure 3B-24 ~~may~~ should be used (see Figure 3B-
51 14). Except for acceleration lanes, where a lane-reduction transition occurs on a roadway with a speed limit

1 [of less than 45 mph, the lane-reduction arrow markings shown in Drawing F in Figure 3B-24 should be used if](#)
2 [determined to be appropriate based on engineering judgment.](#)

3 **Option:**

4 [Lane-reduction arrow markings may be used in long acceleration lanes based on engineering judgment.](#)

5 **Guidance:**

6 Where crossroad channelization or ramp geometrics do not make wrong-way movements difficult, ~~a~~ [the](#)
7 [appropriate](#) lane-use arrow should be placed in each lane of an exit ramp near the crossroad terminal where it
8 will be clearly visible to a potential wrong-way road user (see Figure 2B-18).

9 **Option:**

10 The wrong-way arrow markings shown in [Drawing D in](#) Figure 3B-24 may be placed near the
11 downstream terminus of a ramp as shown in Figures 2B-18 and 2B-19, [or at other locations where lane-use](#)
12 [arrows are not appropriate](#), to indicate the correct direction of traffic flow and to discourage drivers from
13 traveling in the wrong direction.

14 **Section ~~3B.20~~ 3B.21 Speed Measurement Markings**

15 **Support:**

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

18 **Standard:**

19 **Speed measurement markings, if used, shall be white, and shall not be greater than 24 inches in**
20 **width.**

21 **Option:**

22 Speed measurement markings may extend 24 inches on either side of the ~~centerline~~ [center line](#) or 24
23 inches on either side of edge line markings at 1/4-mile intervals over a 1-mile length of roadway. When
24 paved shoulders of sufficient width are available, the speed measurement ~~o~~ markings may be placed entirely on
25 these shoulders ([see Drawing A of Figure 3B-10](#)). Advisory signs may be used in conjunction with these
26 markings (~~see Figure 3B-10~~).

27 **Section 3B.22 Speed Reduction Markings**

28 **Support:**

29 [Speed reduction markings \(see Figure 3B-28\) are transverse markings that are placed on the roadway](#)
30 [within a lane \(along both edges of the lane\) in a pattern of progressively reduced spacing to give drivers the](#)
31 [impression that their speed is increasing. These markings might be placed in advance of an unexpectedly](#)
32 [severe horizontal or vertical curve or other roadway feature where drivers need to decelerate prior to reaching](#)
33 [the feature and where the desired reduction in speeds has not been achieved by the installation of warning](#)
34 [signs and/or other traffic control devices.](#)

35 **Guidance:**

36 [If used, speed reduction markings should be reserved for unexpected curves and should not be used on](#)
37 [long tangent sections of roadway or in areas frequented mainly by local or familiar drivers, \(e.g., school](#)
38 [zones\). If used, speed reduction markings should supplement the appropriate warning signs and other traffic](#)
39 [control devices and should not substitute for these devices.](#)

40 **Standard:**

41 [If used, speed reduction markings shall be a series of white transverse lines on both sides of the lane](#)
42 [that are perpendicular to the center line, edge line, or lane line. The longitudinal spacing between the](#)
43 [markings shall be progressively reduced from the upstream to the downstream end of the marked](#)
44 [portion of the lane.](#)

45 **Guidance:**

46 [Speed reduction markings should not be greater than 12 inches in width, and should not extend more than](#)
47 [18 inches into the lane.](#)

48 **Standard:**

49 [Speed reduction markings shall not be used in lanes that do not have a longitudinal line \(center line,](#)
50 [edge line, or lane line\) on both sides of the lane.](#)

1 **Section ~~3B.21~~ 3B.23 Curb Markings**

2 Support:

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

4 **Standard:**

5 ~~Signs shall be used with curb markings~~ Where curbs are marked to convey parking regulations in
6 ~~those areas where curb markings are frequently obliterated obscured~~ by snow and ice accumulation,
7 signs shall be used with the curb markings except as provided in Paragraph 4 ~~unless the no-parking~~
8 ~~zone is controlled by statute or local ordinance.~~

9 Guidance:

10 Except as ~~noted~~ provided in ~~the Option Paragraph 4~~, when curb markings are used without signs to
11 convey parking regulations, a legible word marking regarding the regulation (such as “No Parking” or “No
12 Standing”) should be placed on the curb.

13 Option:

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

16 Local highway agencies may prescribe special colors for curb markings to supplement standard signs for
17 parking regulation.

18 Support:

19 Since yellow and white curb markings are frequently used for curb delineation and visibility, it is
20 advisable to establish parking regulations through the installation of standard signs (see Sections 2B.46
21 through 2B.48).

22 **Standard:**

23 Where curbs are marked for delineation or visibility purposes, the colors shall ~~conform to~~ comply
24 with the general principles of markings (see Section 3A.05).

25 Guidance:

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

29 Retroreflective solid white markings should be used when traffic ~~may~~ is permitted to pass on either side of
30 the island.

31 Support:

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

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

36 Option:

37 Retroreflective or internally illuminated raised pavement markers of the appropriate color may be placed
38 on the pavement in front of the curb and/or on the top of curbed as of raised medians and curbs of islands, as a
39 supplement to or substitute for retroreflective curb markings used for delineation.

40 ~~Section 3B.22 Preferential Lane Word and Symbol Markings~~ text relocated to Chapter 3D

41 ~~Section 3B.23 Preferential Lane Longitudinal Markings for Motor Vehicles~~ text relocated to
42 Chapter 3D

43 **Section 3B.24 Chevron and Diagonal Crosshatch Markings**

44 Option:

45 Chevron and diagonal crosshatch markings may be used to discourage travel on certain paved areas, such
46 as shoulders, gore areas, flush median areas between solid double yellow center line markings or between
47 white channelizing lines approaching obstructions in the roadway (see Section 3B.10 and Figure 3B-15),
48 between solid double yellow center line markings forming flush medians or channelized travel paths at

1 intersections (see Figures 3B-2 and 3B-5), buffer spaces between preferential lanes and general-purpose lanes
2 (see Figures 3D-2 and 3D-4), and at grade crossings (see Part 8).

3 **Standard:**

4 When crosshatch markings are used in paved areas that separate traffic flows in the same general
5 direction, they shall be white and they shall be shaped as chevron markings, with the point of each
6 chevron facing toward approaching traffic, as shown in Figure 3B-8, Drawing A of Figure 3B-9, Figure
7 3B-10, and Drawing C of Figure 3B-15.

8 When crosshatch markings are used in paved areas that separate opposing directions of traffic, they
9 shall be yellow diagonal markings that slant away from traffic in the adjacent travel lanes, as shown in
10 Figures 3B-2 and 3B-5 and Drawings A and B of Figure 3B-15.

11 When crosshatch markings are used on paved shoulders, they shall be diagonal markings that slant
12 away from traffic in the adjacent travel lane. The diagonal markings shall be yellow when used on the
13 left-hand shoulders of the roadways of divided highways and on the left-hand shoulders of one-way
14 streets or ramps. The diagonal markings shall be white when used on right-hand shoulders.

15 **Guidance:**

16 The chevrons and diagonal lines used for crosshatch markings should be at least 12 inches wide for
17 roadways having a posted or statutory speed limit of 45 mph or greater, and at least 8 inches wide for
18 roadways having posted or statutory speed limit of less than 45 mph. The longitudinal spacing of the
19 chevrons or diagonal lines should be determined by engineering judgment considering factors such as speeds
20 and desired visual impacts. The chevrons and diagonal lines should form an angle of approximately 30 to 45
21 degrees with the longitudinal lines that they intersect.

22 ~~Section 3B.24 Markings for Roundabout Intersections~~ text relocated to Chapter 3C

23 ~~Section 3B.25 Markings for Other Circular Intersections~~ text relocated to Chapter 3C

24 **Section ~~3B.26~~ 3B.25 Speed Hump Markings**

25 ~~Option:~~

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

29 **Standard:**

30 ~~If used,~~ speed hump markings are used, they shall be a series of white markings placed on a speed
31 hump to identify its location. If markings are used for a speed hump that does not also function as a
32 crosswalk or speed table, the markings shall comply with Option A, B, or C shown in Figure 3B-29. If
33 markings are used for a speed hump that also functions as a crosswalk or speed table, the markings
34 shall comply with Option A or B shown in Figure 3B-30.

35 **Section ~~3B.27~~ 3B.26 Advance Speed Hump Markings**

36 **Option:**

37 Advance speed hump markings (see Figure 3B-31) may be used in advance of ~~an~~ speed humps or other
38 engineered vertical roadway deflections such as dips where added visibility is desired or where such
39 deflection is not expected.

40 Advance pavement wording such as BUMP or HUMP (see Section 3B.20) may be used on the approach
41 to a speed hump either alone or in conjunction with advance speed hump markings. Appropriate advance
42 warning signs may be used in ~~conformance~~ compliance with Section 2C.29.

43 **Standard:**

44 ~~If used,~~ advance speed hump markings are used, they shall be a ~~special~~ series of eight white
45 marking 12-inch transverse lines that become longer and are spaced closer together as the vehicle
46 approaches the ~~placed in advance of~~ speed humps or other ~~engineered vertical roadway deflections such~~
47 ~~as dips.~~ If advance markings are used, they shall comply with the detailed design shown in Figure 3B-
48 31.

49 **Guidance:**

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

CHAPTER 3C. ROUNDABOUT MARKINGS edited from Sections 3B.24 and 3B.25

Section ~~3B.24~~ 3C.01 Markings for Roundabout Intersections General

~~Support:~~

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

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

Support:

A roundabout (see definition in Section 1A.13) is a specific type of circular intersection designed to control speeds and having specific traffic control features.

Guidance:

Pavement markings and signing for a roundabout should be integrally designed to correspond to the geometric design and intended lane use of a roundabout.

Markings on the approaches to a roundabout and on the circular roadway should be compatible with each other to provide a consistent message to road users and should facilitate movement through the roundabout such that vehicles do not have to change lanes within the circulatory roadway in order to exit the roundabout in a given direction.

Support:

Figure 3C-1 provides an example of the pavement markings for approach and circulatory roadways at a roundabout. Figure 3C-2 shows the options that are available for lane-use pavement marking arrows on approaches to roundabouts. Figures 3C-3 through 3C-14 illustrate examples of markings for roundabouts
~~intersections are shown in Figures 3B-27 and 3B-28 of various geometric and lane-use configurations.~~

Traffic control signals or pedestrian hybrid beacons (see Part 4) are sometimes used at roundabouts to facilitate the crossing of pedestrians or to meter traffic.

Section 8C.12 contains information about roundabouts that contain or are in close proximity to grade crossings.

Section 3C.02 White Lane Line Pavement Markings for Roundabouts

Standard:

Multi-lane approaches to roundabouts shall have lane lines.

A through lane on a roadway that becomes a dropped lane (mandatory turn lane) at a roundabout shall be marked with a dotted white lane line in accordance with Section 3B.04.

Guidance:

~~Lane lines may be used on the circular roadway if there is more than one lane.~~ Multi-lane roundabouts should have lane line markings within the circulatory roadway to channelize traffic to the appropriate exit lane.

Standard:

Continuous concentric lane lines shall not be used within the circulatory roadway of roundabouts.

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

Support:

Section 9C.04 contains information regarding bicycle lane markings at roundabouts.

Section 3C.03 Edge Line Pavement Markings for Roundabout Circulatory Roadways

Guidance:

A white edge line should be used on the outer (right-hand) side of the ~~circular~~ circulatory roadway.

Where a white edge line is used for the circulatory roadway, it should be as follows (see Figure 3C-1):

- A. A solid line ~~along~~ adjacent to the splitter island, and

1 B. A wide dotted line across the lane(s) entering the roundabout ~~intersection~~.

2 **Standard:**

3 Edge lines and edge line extensions ~~should~~ shall not be placed across the exits from the ~~circular~~
4 circulatory roadway at roundabouts.

5 **Option:**

6 A yellow edge line may be placed around the inner (left-hand) edge of the ~~circular~~ circulatory roadway
7 (see Figure 3C-1) and may be used to channelize traffic (see Drawing B of Figure 3C-4).

8 **Section 3C.04 Yield Lines for Roundabouts**

9 **Option:**

10 A yield line (see Section 3B.16) may be used to indicate the point behind which vehicles are required to
11 yield at the entrance to a roundabout ~~intersection~~ (see Figure 3C-1).

12 **Section 3C.05 Crosswalk Markings at Roundabouts**

13 **Standard:**

14 Pedestrian crosswalks shall not be marked to or from the central island of roundabouts.

15 **Guidance:**

16 If pedestrian facilities are provided, crosswalks (see Section 3B.18) should be marked across roundabout
17 entrances and exits to indicate where pedestrians are intended to cross.

18 ~~Where crosswalk markings are used, these markings should be located a minimum of 25 feet upstream~~
19 ~~from the yield line, or, if none, from the dotted white line.~~ Crosswalks should be a minimum of 20 feet from
20 the edge of the circulatory roadway.

21 **Support:**

22 Various arrangements of crosswalks at roundabouts are illustrated in the figures in this Chapter.

23 **Section 3C.06 Word, Symbol, and Arrow Pavement Markings for Roundabouts**

24 **Option:**

25 Lane-use arrows may be used on any approach to and within the circulatory roadway of any roundabout.

26 YIELD (word) and YIELD AHEAD (symbol or word) pavement markings (see Figure 3C-1) may be used
27 on approaches to roundabouts.

28 Word and/or route shield pavement markings may be used on an approach to or within the circulatory
29 roadway of a roundabout to provide route and/or destination guidance information to road users (see Figure
30 3C-14).

31 **Guidance:**

32 Within the circulatory roadway of multi-lane roundabouts, normal lane-use arrows (see Section 3B.20 and
33 Figure 3B-24) should be used.

34 On multi-lane approaches with double left-turn and/or double right-turn lanes, lane-use arrows as shown
35 in Figures 3C-7 and 3C-8 should be used.

36 **Option:**

37 If used on approaches to a roundabout, lane-use arrows may be either normal or fish-hook arrows, either
38 with or without an oval symbolizing the central island, as shown in Figure 3C-2.

39 **~~3B.25~~ 3C.07 Markings for Other Circular Intersections**

40 **Support:**

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

43 **Option:**

44 The markings shown in ~~Figures 3B-27 and 3B-28~~ this Chapter may be used at other circular intersections
45 ~~when~~ if engineering judgment indicates that their presence will benefit drivers, ~~or~~ or pedestrians, or other road
46 users.

CHAPTER 3D. MARKINGS FOR PREFERENTIAL LANES

Section ~~3B.22~~ 3D.01 Preferential Lane Word and Symbol Markings

Support:

Preferential lanes ~~identify~~ are established for one or more of a wide variety of special uses, including, but not limited to, high-occupancy vehicle (HOV) lanes, ETC lanes, high-occupancy toll (HOT) lanes, bicycle lanes, bus only lanes, taxi only lanes, and light rail transit only lanes.

Standard:

When a lane is assigned full or part time to a particular class or classes of vehicles, the preferential lane word and symbol markings described in this Section and the preferential lane longitudinal markings described in Section 3D.02 shall be used.

All longitudinal pavement markings, as well as word and symbol pavement markings, associated with a preferential lane shall end where the Preferential Lane Ends (R3-12a or R3-12c) sign (see Section 2G.07) designating the downstream end of the preferential only lane restriction is installed.

Static or changeable message regulatory signs (see Sections 2G.03 to 2G.07) ~~or signals~~ shall be used with preferential lane word or symbol markings.

All preferential lane word and symbol markings shall be white and all preferential lane word and symbol markings shall be positioned laterally in the center of the ~~preferred-use~~ preferential lane. two paragraphs combined into one

Where a preferential lane use ~~is established~~ exists contiguous to a general-purpose lane or is separated from a general-purpose lane by a flush buffered space that can be traversed by motor vehicles, the preferential lane shall be marked with one or more of the following symbol or word markings for the preferential lane use specified:

- A. HOV lane—the preferential lane-use marking for high-occupancy vehicle lanes shall consist of white lines formed in a diamond shape symbol or the word message HOV. The diamond shall be at least 2.5 feet wide and 12 feet in length. The lines shall be at least 6 inches in width.
- B. HOT lane or ETC Account-Only lane—except as provided in Paragraph 8, the preferential lane-use marking for a HOT lane or an ETC Account-Only lane shall consist of a word marking using the name of the ETC payment system required for use of the lane, such as E-Z PASS ONLY.
- C. Bicycle lane—the preferential lane-use marking for a bicycle lane shall consist of a bicycle symbol or the word marking BIKE LANE (see Chapter 9C and Figures 9C-1 and 9C-3 through 9C-6).
- D. Bus only lane—the preferential lane-use marking for a bus only lane shall consist of the word marking BUS ONLY.
- E. Taxi only lane—the preferential lane-use marking for a taxi only lane shall consist of the word marking TAXI ONLY.
- F. Light rail transit lane—the preferential lane-use marking for a light rail transit lane shall consist of ~~the letter T~~ the word marking LRT ONLY.
- G. Other type of preferential lane—the preferential lane-use markings shall be identified in accordance with Section 3B.23 consist of a word marking appropriate to the restriction.

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

Option:

Preferential lane-use symbol or word markings may be omitted at toll plazas where physical conditions preclude the use of the markings (see Section 3E.01).

Support Guidance:

The spacing of the markings ~~is an~~ should be based on engineering judgment that ~~is based on~~ considers the prevailing speed, block lengths, distance from intersections, and other factors that affect clear communication to the road user.

Support:

Markings spaced as close as 80 feet apart might be appropriate on city streets, while markings spaced as far as 1,000 feet apart might be appropriate for freeways.

1 Guidance:

2 In addition to a regular spacing interval, the preferential lane marking should be placed at strategic
3 locations such as major decision points, direct exit ramp departures from the preferential lane, and along
4 access openings to and from adjacent general-purpose lanes. At decision points, the preferential lane marking
5 should be placed on all applicable lanes and should be visible to approaching traffic for all available
6 departures. At direct exits from preferential lanes where extra emphasis is needed, the use of word markings
7 (such as “EXIT” or “EXIT ONLY”) in the deceleration lane for the direct exit and/or on the direct exit ramp
8 itself just beyond the exit gore should be considered.

9 Option:

10 A numeral indicating the vehicle occupancy requirements established for a high-occupancy vehicle lane
11 may be included in sequence after the diamond symbol or HOV word message.

12 Guidance:

13 Engineering judgment should determine the need for supplemental devices such as tubular markers, traffic
14 cones, or ~~flashing lights~~ other channelizing devices (see Chapter 3H).

15 **Section ~~3B.23~~ 3D.02 Preferential Lane Longitudinal Markings for Motor Vehicles**

16 Support:

17 Preferential lanes can take many forms depending on the level of usage and the design of the facility.
18 They might be barrier-separated or physically buffer-separated from the ~~other travel~~ adjacent general-purpose
19 lanes by a barrier, median, or painted neutral area, or they might be concurrent contiguous with ~~other travel~~
20 the adjacent general-purpose lanes ~~and be separated only by longitudinal pavement markings. Further,~~
21 Physically Barrier-separated preferential lanes might be operated in ~~the same~~ a constant direction or be
22 operated as reversible lanes. Some reversible preferential lanes on a divided highway might be operated
23 counter-flow to the direction of traffic on the immediately adjacent general-purpose lanes. See Section 1A.13
24 for definitions of terms.

25 ~~Option:~~

26 Preferential lanes ~~may~~ might be operated ~~either~~ full-time (24 hours per day on all days), for extended
27 periods of the day, ~~or~~ part-time (restricted usage during specific hours on specified days), or on a variable
28 basis (such as a strategy for a managed lane).

29 Standard:

30 The following four items Longitudinal pavement markings for preferential lanes shall be as follows
31 (these same requirements are presented in tabular form in Table 3D-1):

- 32 A. Physically Barrier-separated, non-reversible preferential lane—the longitudinal pavement
33 markings for preferential lanes that are physically separated from the other travel lanes by a
34 barrier, or median, or painted neutral area shall consist of a single normal solid single yellow
35 line at the left-hand edge of the travel lane(s), and a single normal solid single white line at the
36 right-hand edge of the travel lane(s), and if there are two or more preferential lanes, the
37 preferential travel lanes shall be separated with a normal broken white line (see Drawing A in
38 Figure 3D-1).
- 39 B. Physically Barrier-separated, reversible preferential lane—the longitudinal pavement markings
40 for reversible preferential lanes that are physically separated from the other travel lanes by a
41 barrier, or median, or painted neutral area shall consist of a single normal solid single white line
42 at both edges of the travel lane(s), and if there are two or more preferential lanes, the
43 preferential travel lanes shall be separated with a normal broken white line (see Drawing B in
44 Figure 3D-1).
- 45 C. Buffer-separated (left-hand side) preferential lane—the longitudinal pavement markings for a
46 full-time or part-time preferential lane on the left-hand side of and separated from the other
47 travel lanes by a neutral buffer space shall consist of a normal solid single yellow line at the left-
48 hand edge of the preferential travel lane(s) and one of the following at the right-hand edge of the
49 preferential travel lane(s):
- 50 1. A wide solid double white line along both edges of the buffer space where crossing the buffer
51 space is prohibited (see Drawing A in Figure 3D-2).
 - 52 2. A wide solid single white line along both edges of the buffer space where crossing the buffer
53 space is discouraged (see Drawing B in Figure 3D-2).

1 3. A wide broken single white line along both edges of the buffer space, or a wide broken single
2 white lane line within the allocated buffer space (resulting in wider lanes), where crossing
3 the buffer space is permitted (see Drawing C in Figure 3D-2).

4 **D. Buffer-separated (right-hand side) preferential lane**—the longitudinal pavement markings for a
5 full-time or part-time preferential lane on the right-hand side of and separated from the other
6 travel lanes by a neutral buffer space shall consist of a normal solid single white line at the
7 right-hand edge of the preferential travel lane(s) if warranted (see Section 3B.07) and one of the
8 following at the left-hand edge of the preferential travel lane(s) (see Drawing D in Figure 3D-2):

9 1. A wide solid double white line along both edges of the buffer space where crossing the buffer
10 space is prohibited.

11 2. A wide solid single white line along both edges of the buffer space where crossing of the
12 buffer space is discouraged.

13 3. A wide broken single white line along both edges of the buffer space, or a wide broken single
14 white line within the allocated buffer space (resulting in wider lanes), where crossing the
15 buffer space is permitted.

16 4. A wide dotted single white lane line within the allocated buffer space (resulting in wider
17 lanes) where crossing the buffer space is permitted for any vehicle to perform a right-turn
18 maneuver.

19 **E. ~~Concurrent flow~~ Contiguous (left-hand side) preferential lane**—the longitudinal pavement
20 markings for a full-time or part-time preferential lane on the left-hand side of and contiguous to
21 the other travel lanes shall consist of a ~~single~~ normal solid single yellow line at the left-hand edge
22 of the preferential travel lane(s) and one of the following at the right-hand edge of the
23 preferential travel lane(s):

24 1. A wide solid double ~~solid-wide~~ white lane line where crossing is prohibited (see Drawing A
25 in Figure 3D-3).

26 2. A ~~single-solid~~ wide solid single white lane line where crossing is discouraged (see Drawing B
27 in Figure 3D-3).

28 3. A ~~single-broken~~ wide solid single white lane line where crossing is permitted (see Drawing C
29 in Figure 3D-3).

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

32 **F. ~~Concurrent flow~~ Contiguous (right-hand side) preferential lane**—the longitudinal pavement
33 markings for a full-time or part-time preferential lane on the right-hand side of and contiguous
34 to the other travel lanes shall consist of a ~~single~~ normal solid single white line at the right-hand
35 edge of the preferential travel lane(s) if warranted (see Section 3B.07) and one of the following
36 at the left-hand edge of the preferential travel lane(s) (see Drawing D in Figure 3D-3):

37 1. A ~~double-solid~~ wide solid double white lane line where crossing is prohibited.

38 2. A ~~single-solid~~ wide solid single white lane line where crossing is discouraged.

39 3. A ~~single-broken~~ wide broken single white lane line where crossing is permitted.

40 4. A ~~single-dotted normal~~ wide dotted single white lane line where crossing is permitted for any
41 vehicle to perform a right-turn maneuver.

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

44 Guidance:

45 ~~When concurrent flow~~ Where preferential lanes and other travel lanes are separated by ~~more a buffer~~
46 space wider than 4 feet and crossing the buffer space is prohibited, chevron markings (see Section 3B.24)
47 should be placed in the ~~neutral~~ buffer area (see Drawing A in Figure 3D-2). The chevron spacing should be
48 100 feet or greater.

49 Option:

50 ~~For~~ If a full-time or part-time ~~concurrent flow~~ contiguous preferential lanes, ~~the spacing or skip pattern of~~
51 ~~the~~ is separated from the other travel lanes by a ~~single-broken~~ wide broken single white line (see Drawing C in
52 Figure 3D-3), the spacing or skip pattern of the line may be reduced, and the width of the ~~single-broken-wide~~
53 white line may be increased.

54 **Standard:**

1 If there are two or more preferential lanes for traffic moving in the same direction, the lane lines
2 between the preferential lanes shall be normal broken white lines.

3 Preferential lanes ~~longitudinal markings~~ for motor vehicles shall also be marked with the
4 appropriate word or symbol pavement markings in accordance with Section 3D.01 and shall have
5 appropriate regulatory signs in accordance with Sections 2G.03 through 2G.07.

6 Guidance:

7 At direct exits from a preferential lane, dotted white line markings should be used to separate the tapered
8 or parallel deceleration lane for the direct exit (including the taper) from the adjacent continuing preferential
9 through lane, to reduce the chance of unintended exit maneuvers.

10 Standard:

11 On a divided highway, a part-time counter-flow preferential lane that is contiguous to the travel
12 lanes in the opposing direction shall be separated from the opposing direction lanes by the standard
13 reversible lane longitudinal marking, a normal width broken double yellow line (see Section 3B.03 and
14 Drawing A of Figure 3D-4). If a buffer space is provided between the part-time counter-flow
15 preferential lane and the opposing direction lanes, a normal width broken double yellow line shall be
16 placed along both edges of the buffer space (see Drawing B of Figure 3D-4). Signs (see Section 2B.26),
17 lane-use control signals (see Chapter 4M), or both shall be used to supplement the reversible lane
18 markings.

19 On a divided highway, a full-time counter-flow preferential lane that is contiguous to the travel
20 lanes in the opposing direction shall be separated from the opposing direction lanes by a solid double
21 yellow center line marking (see Drawing C of Figure 3D-4). If a buffer space is provided between the
22 full-time counter-flow preferential lane and the opposing direction lanes, a normal width solid double
23 yellow line shall be placed along both edges of the buffer space (see Drawing D of Figure 3D-4).

24 Option:

25 Cones, tubular markers, or other channelizing devices (see Chapter 3H) may also be used to separate the
26 opposing lanes when a counter-flow preferential lane operation is in effect.

CHAPTER 3E. MARKINGS FOR TOLL PLAZAS

Section 3E.01 Markings for Toll Plazas

Support:

At toll plazas, pavement markings help road users identify the proper lane(s) to use for the type of toll payment they plan to use, to channelize movements into the various lanes, and to delineate obstructions in the roadway.

Standard:

When a lane on the approach to a toll plaza is restricted to use only by vehicles with registered ETC accounts, the ETC Account-Only lane word markings described in Section 3D.01 and the preferential lane longitudinal markings described in Section 3D.02 shall be used. When one or more ORT lanes that are restricted to use only by vehicles with registered ETC accounts bypass a mainline toll plaza on a separate alignment, these word markings and longitudinal markings shall be used on the approach to the point where the ORT lanes diverge from the lanes destined for the mainline toll plaza.

Option:

Preferential lane-use symbol or word markings may be omitted at toll plazas where physical conditions preclude the use of the markings.

Guidance:

If an ORT lane that is immediately adjacent to a mainline toll plaza is not separated from adjacent cash payment toll plaza lanes by a curb or barrier, then channelizing devices (see Section 3H.01), and/or longitudinal pavement markings that discourage or prohibit lane changing should be used to separate the ORT lane from the adjacent cash payment lane. This separation should begin on the approach to the mainline toll plaza at approximately the point where the vehicle speeds in the adjacent cash lanes drop below 30 mph during off-peak periods and should extend downstream beyond the toll plaza approximately to the point where the vehicles departing the toll plaza in the adjacent cash lanes have accelerated to 30 mph.

Option:

For a toll plaza approach lane that is restricted to use only by vehicles with registered ETC accounts, the solid white lane line or edge line on the right-hand side of the ETC Account-Only lane and the solid white lane line or solid yellow edge line on the left-hand side of the ETC Account-Only lane may be supplemented with purple solid longitudinal markings placed contiguous to the inside edges of the lines defining the lane.

Standard:

If used, the purple solid longitudinal marking described in the previous paragraph shall be a minimum of 3 inches in width and a maximum width equal to the width of the line it supplements, and ETC Account-Only preferential lane word markings (see Section 3D.01) shall be installed within the lane.

Toll booths and the islands on which they are located are considered to be obstructions in the roadway and they shall be provided with markings that comply with the provisions of Section 3B.10 and Chapter 3G.

Option:

Longitudinal pavement markings may be omitted alongside toll booth islands between the approach markings and any departure markings.

CHAPTER ~~3D~~ 3F. DELINEATORS

Section ~~3D.01~~ 3F.01 Delineators

Support:

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

Delineators are considered guidance devices rather than warning devices.

Option:

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

Section ~~3D.02~~ 3F.02 Delineator Design

Standard:

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

Retroreflective elements for delineators shall have a minimum dimension of 3 inches.

Support:

Within a series of delineators along a roadway, delineators for a given direction of travel at a specific location are referred to as single delineators if they have one retroreflective element for that direction, double delineators if they have two identical retroreflective elements for that direction mounted together, or vertically elongated delineators if they have a single retroreflective element with an elongated vertical dimension to approximate the vertical dimension of two separate single delineators.

Option:

A vertically elongated ~~retroreflective units~~ delineator of appropriate size may be used in place of ~~two retroreflectors mounted as a unit~~ a double delineator.

Section ~~3D.03~~ 3F.03 Delineator Application

Standard:

The color of delineators shall ~~conform to~~ comply with the color of edge lines stipulated in Section 3B.06.

A series of single delineators shall be provided on the right-hand side of freeways and expressways and on at least one side of interchange ramps, except ~~in the following cases~~ when either Condition A or Condition B is met, as follows:

- A. On tangent sections of freeways and expressways when ~~all~~ both of the following conditions are met:
 1. Raised pavement markers are used continuously on lane lines throughout all curves and on all tangents to supplement pavement markings, and
 2. ~~Where whole routes or substantial portions of routes have large sections of tangent alignment.~~
- ~~3.~~ Roadside delineators are used to lead into all curves.
- B. On sections of roadways where continuous lighting is in operation between interchanges.

Option:

Delineators may be provided on other classes of roads. A series of single delineators may be provided on the left-hand side of roadways.

Standard:

Delineators on the left-hand side of a two-way roadway shall be white (see Figure 3F-1).

Guidance:

1 [A series of](#) single delineators should be provided on the outside of curves on interchange ramps.

2 Where median crossovers are provided for official or emergency use on divided highways and where
3 these crossovers are to be marked, a double yellow delineator should be placed on the left-[hand](#) side of the
4 through roadway on the far side of the crossover for each roadway.

5 Double or vertically elongated delineators should be installed at 100-foot intervals along acceleration and
6 deceleration lanes.

7 [A series of delineators should be used wherever guardrail or other longitudinal barriers are present along a](#)
8 [roadway or ramp.](#)

9 Option:

10 Red delineators may be used on the reverse side of any delineator where it would be viewed by a road
11 user traveling in the wrong direction on that particular ramp or roadway.

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

14 Guidance:

15 [When used](#) for lane-reduction transitions, the delineators should be ~~used~~ [installed](#) adjacent to the lane or
16 lanes reduced for the full length of the transition and should be so placed and spaced to show the reduction
17 (see Figure 3B-14).

18 Support:

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

21 Guidance:

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

24 Option:

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

27 **Standard:**

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

29 Guidance:

30 Red delineators should be placed on both sides of truck escape ramps. The delineators should be spaced
31 at 50-foot intervals for a distance sufficient to identify the ramp entrance. Delineator spacing beyond the
32 ramp entrance should be adequate for guidance according to the length and design of the escape ramp.

33 **Section ~~3D.04~~ [3F.04](#) Delineator Placement and Spacing**

34 Guidance:

35 Delineators should be mounted on suitable supports ~~so that~~ [at a mounting height, measured vertically from](#)
36 [the top bottom](#) of the ~~highest lowest retroreflector~~ [retroreflective device to the elevation of the near edge of](#)
37 [the roadway, is of approximately](#) 4 feet ~~above the near roadway edge.~~

38 [Option:](#)

39 [When mounted on the face of or on top of guardrails or other longitudinal barriers, delineators may be](#)
40 [mounted at a lower elevation than the normal delineator height recommended in Paragraph 1.](#)

41 [Guidance:](#)

42 ~~They~~ [Delineators](#) should be placed 2 to 8 feet outside the outer edge of the shoulder, or if appropriate, in
43 line with the roadside barrier that is 8 feet or less outside the outer edge of the shoulder.

44 Delineators should be placed at a constant distance from the edge of the roadway, except that where an
45 obstruction intrudes into the space between the pavement edge and the extension of the line of the delineators,
46 the delineators should be transitioned to be in line with or inside the innermost edge of the obstruction. If the
47 obstruction is a guardrail [or other longitudinal barrier](#), the delineators should be transitioned to be ~~either~~ just
48 behind, directly above (in line with), or on the innermost edge of the guardrail [or longitudinal barrier](#).

49 Delineators should be spaced 200 to 530 feet apart on mainline tangent sections. Delineators should be
50 spaced 100 feet apart on ramp tangent sections.

1 Support:

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

3 Option:

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

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

9 Guidance:

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

13 Option:

14 When needed for special conditions, delineators of the appropriate color may be mounted in a closely-
15 spaced manner on the face of or on top of guardrails or other longitudinal barriers to form a continuous or
16 nearly continuous “ribbon” of delineation.

1 CHAPTER ~~3E~~ 3G. COLORED PAVEMENTS

2 Section ~~3E.01~~ 3G.01 General

3 Support:

4 Colored pavements consist of differently colored road paving materials, such as colored asphalt or
5 concrete, or paint or other marking materials applied to the surface of a road or island to simulate a colored
6 pavement.

7 ~~When used for guidance or regulation of traffic, colored pavements are traffic control devices. If non-~~
8 ~~retroreflective colored pavements, including bricks and other types of patterned surfaces, also are sometimes~~
9 ~~is used to supplement other traffic control devices as a purely aesthetic treatment and is not intended to~~
10 ~~communicate a regulatory, warning, or guidance message to road users, the colored pavement is not~~
11 ~~considered to be a traffic control device, even if it is located between the lines of a crosswalk.~~

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

14 Standard:

15 If colored pavements is used as within the traveled way, on flush or raised islands, or on shoulders
16 to regulate, warn, or guide traffic or if retroreflective colored pavement is used, the colored pavement is
17 considered to be a traffic control devices and shall be limited to the following colors and applications:

- 18 A. Yellow pavement color shall be used only for flush or raised median islands separating traffic
19 flows in opposite directions or for left-hand shoulders of roadways of divided highways or one-
20 way streets or ramps.
21 B. White pavement color shall be used for ~~delineation on shoulders, and for~~ flushed or raised
22 channelizing islands where traffic passes on both sides in the same general direction or for
23 right-hand shoulders.

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

26 Guidance:

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

29 Colored pavement located between crosswalk lines should not use colors or patterns that degrade the
30 contrast of white crosswalk lines, or that might be mistaken by road users as a traffic control application=
31 ~~should not be used for colored pavement located between crosswalk lines.~~

1 CHAPTER ~~3F 3H~~. ~~BARRICADES AND~~ barricades relocated to Section 2B.67 CHANNELIZING
2 DEVICES USED FOR EMPHASIS OF PAVEMENT MARKING PATTERNS

3 Section ~~3F.02~~ 3H.01 Channelizing Devices

4 Option:

5 Channelizing devices, as described in Sections 6F.63 through 6F.73, and 6F.75, and as shown in Figure
6 6F-7, such as ~~traffic~~ cones, ~~and~~ tubular markers, vertical panels, drums, lane separators, and raised islands,
7 may be used for general traffic control purposes such as adding emphasis to reversible lane delineation,
8 channelizing lines, or islands. Channelizing devices may also be used along a center line to preclude turns or
9 along lane lines to preclude lane changing, as determined by engineering judgment.

10 Standard:

11 Except for color, the design of channelizing devices, including but not limited to retroreflectivity,
12 minimum dimensions, and mounting height, shall ~~conform to~~ comply with the provisions of ~~Section-~~
13 ~~6F.58 Chapter 6F and shall be a minimum of 18 inches in height.~~

14 ~~The minimum height of cones shall be 28 inches for use on freeways and other high-speed~~
15 ~~roadways, and on all facilities when used during hours of darkness or whenever more conspicuous~~
16 ~~guidance is needed.~~

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

20 For nighttime use, channelizing devices shall be retroreflective (as described in Part 6) or internally
21 illuminated. On channelizing devices used outside of temporary traffic control zones, retroreflective
22 sheeting or bands shall be white if the devices separate traffic flows in the same direction and shall be
23 yellow if the devices separate traffic flows in the opposite direction or are placed along the left-hand
24 edge line of a one-way roadway or ramp.

25 ~~Retroreflective material shall have a smooth, sealed outer surface that will display a similar color~~
26 ~~during both day and night.~~ replaced by reference to Chapter 6F in Paragraph 2

27 ~~Retroreflection of cones shall be provided by a minimum 6-inch white band placed a minimum of 3-~~
28 ~~inches but no more than 4 inches from the top.~~ replaced by reference to Chapter 6F in Paragraph 2

29 ~~When 28-inch or larger size cones are used, the standard 6-inch band shall be supplemented with an~~
30 ~~additional 4-inch white band spaced a minimum of 2 inches below the 6-inch band.~~ replaced by reference
31 to Chapter 6F in Paragraph 2

32 ~~Retroreflection of tubular markers shall be a minimum of two 3-inch white bands placed a-~~
33 ~~maximum of 2 inches from the top with a maximum of 6 inches between the bands.~~ replaced by reference
34 to Chapter 6F in Paragraph 2

35 Guidance:

36 Channelizing devices should be kept clean and bright to maximize target value.

CHAPTER ~~3G~~ 3I. ISLANDS

Section ~~3G.01~~ 3I.01 General

Support:

[This](#) Chapter ~~3I~~ addresses the characteristics of islands ([see definition in Section 1A.13](#)) as traffic-control devices. Criteria for the design of islands are set forth in “A Policy on Geometric Design of Highways and Streets” (see Section 1A.11).

~~Standard:~~

~~An island for traffic control purposes shall be the defined area between traffic lanes for control of vehicular movements or for pedestrian refuge. Within an intersection area, a median or an outer separation shall be an island.~~

Option:

An island may be designated by [curbs, pavement edges](#), pavement markings, channelizing devices, ~~curbs, pavement edges~~, or other devices.

Section ~~3G.02~~ 3I.02 Approach-End Treatment

Guidance:

The ends of islands first approached by traffic should be preceded by ~~a gradually~~ diverging [longitudinal pavement markings](#) on the roadway surface, to guide vehicles into desired paths of travel along the island edge.

~~Option~~ [Support](#):

[The neutral area between](#) approach-end markings that can be readily crossed even at considerable speed ~~may sometimes~~ contains slightly raised (usually less than 1 inch high) sections of coarse aggregate or other suitable materials to create rumble sections that provide increased visibility of the marked areas and that produce an audible warning to road users traveling across them. [For additional discouragement to driving in the neutral area, bars or buttons projecting 1 to 3 inches above the pavement surface are sometimes placed in the neutral area. These bars or buttons are designed so that any wheel encroachment within the area will be obvious to the vehicle operator, but will result in only minimal effects on control of the vehicle. Such bars or buttons are sometimes preceded by rumble sections or their height is gradually increased as approached by traffic.](#)

Guidance:

When raised bars or buttons are used in these neutral areas, they should be marked with white or yellow retroreflective materials, as determined by the direction or directions of travel they separate. [relocated from Section 3G.03](#)

Standard:

~~Rumble strips or other~~ [Channelizing](#) devices, when used in advance of islands having raised curbs, shall not be placed in such a manner as to constitute an unexpected obstacle.

~~Guidance:~~

~~Bars or buttons should not project more than 1 to 3 inches above the pavement surface and should be designed so that any wheel encroachment within the area will be obvious to the vehicle operator, but will not result in loss of control of the vehicle.~~ [incorporated into the above Support paragraph](#)

Option:

~~Bars or buttons may be preceded by rumble sections, or their height may be gradually increased as approached by traffic.~~ [incorporated into the above Support paragraph](#)

Pavement markings may be used with raised bars to better designate the island area.

Section ~~3G.03~~ 3I.03 Island Marking Application

Standard:

Markings, as related to islands, shall consist only of pavement and curb markings, ~~object markers,~~ [channelizing devices](#), and delineators.

[Guidance:](#)

1 ~~On the approach to islands, the triangular neutral area in advance of the end of the island shall include~~
2 Pavement markings as described in Section 3B.10 for the approach to an obstruction may be omitted on the
3 approach to a particular island based on engineering judgment.

4 ~~Option:~~

5 ~~As indicated in Section 3G.02, rumble sections, or other similar traffic control designs which contrast with~~
6 ~~the pavement surface, may also be applied in the triangular neutral area in advance of the end of an island.~~

7 ~~Section 3G.04~~ 3I.04 **Island Marking Colors**

8 Guidance:

9 Islands outlined by curbs or pavement markings should be marked with retroreflective white or yellow
10 material as determined by the direction or directions of travel they separate (see Section 3A.05).

11 The retroreflective area should be of sufficient length to denote the general alignment of the edge of the
12 island along which vehicles travel, including the approach ~~nose~~ end, when viewed from the approach to the
13 island.

14 Option:

15 On long islands, curb retroreflection may be discontinued such that it does not extend for the entire length
16 of the curb, especially if the island is illuminated or marked with delineators or edge lines.

17 ~~Section 3G.05~~ **Island Object Markers**

18 ~~Option:~~

19 ~~Object markers may be installed alone or in combination with signs (such as KEEP RIGHT, KEEP LEFT,~~
20 ~~double arrows, or guide signs) located within the island.~~

21 ~~Section 3G.06~~ 3I.05 **Island Delineators Delineation**

22 Standard:

23 Delineators installed on islands shall be the same colors as the related edge lines except that, when
24 facing wrong-way traffic, they shall be red (see Section 3F.03).

25 Each roadway through an intersection shall be considered separately in positioning delineators to
26 assure maximum effectiveness.

27 Option:

28 Retroreflective or internally illuminated raised pavement markers of the appropriate color may be placed
29 on the pavement in front of the curb and/or on the top of curbed approach ends of raised medians and curbs of
30 islands, as a supplement to or as a substitute for retroreflective curb markings.

31 Section 3I.06 **Pedestrian Islands and Medians**

32 Support:

33 Raised islands or medians of sufficient width that are placed in the center area of a street or highway can
34 serve as a place of refuge for pedestrians who are attempting to cross at a midblock or intersection location.
35 Center islands or medians allow pedestrians to find an adequate gap in one direction of traffic at a time, as the
36 pedestrians are able to stop, if necessary, in the center island or median area and wait for an adequate gap in
37 the other direction of traffic before crossing the second half of the street or highway. The minimum widths
38 for accessible refuge islands and for design and placement of detectable warning surfaces are provided in the
39 “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see
40 Section 1A.11).

CHAPTER 3J. RUMBLE STRIP MARKINGS

Section 3J.01 Longitudinal Rumble Strip Markings

Support:

Longitudinal rumble strips consist of a series of rough-textured or slightly raised or depressed road surfaces intended to alert inattentive drivers through vibration and sound that their vehicle has left the travel lane. Shoulder rumble strips are typically installed along the shoulder near the travel lane. On divided highways, rumble strips are sometimes installed on the median side (left-hand side) shoulder as well as on the outside (right-hand side) shoulder. On two-way roadways, rumble strips are sometimes installed along the center line.

This Manual contains no provisions regarding the design and placement of longitudinal rumble strips. The provisions in this Manual address the use of markings in combination with a longitudinal rumble strip.

Option:

An edge line or center line may be located over a longitudinal rumble strip to create a rumble stripe.

Standard:

The color of an edge line or center line associated with a longitudinal rumble stripe shall be in accordance with Section 3A.05.

An edge line shall not be used in addition to a rumble stripe that is located along a shoulder.

Support:

Figure 3J-1 illustrates markings used with or near longitudinal rumble strips.

Section 3J.02 Transverse Rumble Strip Markings

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 attention of road users to features such as unexpected changes in alignment and conditions requiring a reduction in speed or a stop.

This Manual contains no provisions regarding the design and placement of transverse rumble strips that approximate the color of the pavement. The provisions in this Manual address the use of markings in combination with a transverse rumble strip.

Standard:

Except as otherwise provided in Section 6F.87 for TTC zones, if the color of a transverse rumble strip used within a travel lane is not the color of the pavement, the color of the transverse rumble strip shall be either black or white.

Guidance:

White transverse rumble strips used in a travel lane should not be placed in locations where they could be confused with other transverse markings such as stop lines or crosswalks.

1 CHAPTER 4A. GENERAL

2 **Section 4A.01 Types**

3 Support:

4 The following types and uses of highway traffic signals are discussed in Part 4: traffic control signals;
5 pedestrian signals; [hybrid beacons](#); emergency-vehicle ~~traffic control~~ signals; traffic control signals for one-
6 lane, two-way facilities; traffic control signals for freeway entrance ramps; traffic control signals for movable
7 bridges; [toll plaza traffic signals](#); [flashing beacons](#); lane-use control signals; ~~flashing beacons~~; and in-roadway
8 lights.

9 **Section 4A.02 Definitions Relating to Highway Traffic Signals**

10 [Support:](#)

11 [Definitions and acronyms pertaining to Part 4 are provided in Sections 1A.13 and 1A.14.](#)

12 ~~Standard:~~

13 ~~The following technical terms, when used in Part 4, shall be defined as follows:~~

14 All of the definitions previously in this section were relocated to Section 1A.13, except Definitions 2, 5, 6, 8,
15 12, 19, 22, 24, 28, 31, 33, 41, 51, 52, and 73, which were already present in Section 1A.13

CHAPTER 4B. TRAFFIC CONTROL SIGNALS—GENERAL

Section 4B.01 General

~~Standard:~~

~~A traffic control signal (traffic signal) shall be defined as any highway traffic signal by which traffic is alternately directed to stop and permitted to proceed.~~

~~Traffic shall be defined as pedestrians, bicyclists, ridden or herded animals, vehicles, streetcars, and other conveyances either singularly or together while using any highway for purposes of travel.~~

Support:

Words such as pedestrians and bicyclists are used redundantly in selected Sections of Part 4 to encourage sensitivity to these elements of “traffic.”

Standards for traffic control signals are important because traffic control signals need to attract the attention of a variety of road users, including those who are older, those with impaired vision, as well as those who are fatigued or distracted, or who are not expecting to encounter a signal at a particular location.

Section 4B.02 Basis of Installation or Removal of Traffic Control Signals

Guidance:

The selection and use of traffic control signals should be based on an engineering study of roadway, traffic, and other conditions.

Support:

A careful analysis of traffic operations, pedestrian and bicyclist needs, and other factors at a large number of signalized and unsignalized locations, coupled with engineering judgment, has provided a series of signal warrants, described in Chapter 4C, that define the minimum conditions under which installing traffic control signals might be justified.

Guidance:

Engineering judgment should be applied in the review of operating traffic control signals to determine whether the type of installation and the timing program meet the current requirements of all forms of traffic.

If changes in traffic patterns eliminate the need for a traffic control signal, consideration should be given to removing it and replacing it with appropriate alternative traffic control devices, if any are needed.

~~Option:~~

If the engineering study indicates that the traffic control signal is no longer justified, [and a decision is made to remove the signal](#), removal ~~may~~ [should](#) be accomplished using the following steps:

- A. Determine the appropriate traffic control to be used after removal of the signal.
- B. Remove any sight-distance restrictions as necessary.
- C. Inform the public of the removal study, ~~for example by installing an informational sign (or signs) with the legend TRAFFIC SIGNAL UNDER STUDY FOR REMOVAL at the signalized location in a position where it is visible to all road users.~~
- D. Flash or cover the signal heads for a minimum of 90 days, and install the appropriate stop control or other traffic control devices.
- E. Remove the signal if the engineering data collected during the removal study period confirms that the signal is no longer needed.

[Option:](#)

[Because Items C, D, and E in Paragraph 5 are not relevant when a temporary traffic control signal \(see Section 4D.32\) is removed, a temporary traffic control signal may be removed immediately after Items A and B are completed.](#)

Instead of total removal of a traffic control signal, the poles, [controller cabinet](#), and cables may remain in place after removal of the signal heads for continued analysis. [relocated from Item E in the previous Guidance paragraph](#)

Section 4B.03 Advantages and Disadvantages of Traffic Control Signals

Support:

1 When properly used, traffic control signals are valuable devices for the control of vehicular and pedestrian
2 traffic. They assign the right-of-way to the various traffic movements and thereby profoundly influence
3 traffic flow.

4 Traffic control signals that are properly designed, located, operated, and maintained will have one or more
5 of the following advantages:

- 6 A. They provide for the orderly movement of traffic.
- 7 B. They increase the traffic-handling capacity of the intersection if:
 - 8 1. Proper physical layouts and control measures are used, and
 - 9 2. The signal operational parameters are reviewed and updated (if needed) on a regular basis (as
10 engineering judgment determines that significant traffic flow and/or land use changes have
11 occurred) to maximize the ability of the traffic control signal to satisfy current traffic demands.
- 12 C. They reduce the frequency and severity of certain types of crashes, especially right-angle collisions.
- 13 D. They are coordinated to provide for continuous or nearly continuous movement of traffic at a definite
14 speed along a given route under favorable conditions.
- 15 E. They are used to interrupt heavy traffic at intervals to permit other traffic, vehicular or pedestrian, to
16 cross.

17 Traffic control signals are often considered a panacea for all traffic problems at intersections. This belief
18 has led to traffic control signals being installed at many locations where they are not needed, adversely
19 affecting the safety and efficiency of vehicular, bicycle, and pedestrian traffic.

20 Traffic control signals, even when justified by traffic and roadway conditions, can be ill-designed,
21 ineffectively placed, improperly operated, or poorly maintained. Improper or unjustified traffic control
22 signals can result in one or more of the following disadvantages:

- 23 A. Excessive delay,
- 24 B. Excessive disobedience of the signal indications,
- 25 C. Increased use of less adequate routes as road users attempt to avoid the traffic control signals, and
- 26 D. Significant increases in the frequency of collisions (especially rear-end collisions).

27 **Section 4B.04 Alternatives to Traffic Control Signals**

28 Guidance:

29 Since vehicular delay and the frequency of some types of crashes are sometimes greater under traffic
30 signal control than under STOP sign control, consideration should be given to providing alternatives to traffic
31 control signals even if one or more of the signal warrants has been satisfied.

32 Option:

33 These alternatives may include, but are not limited to, the following:

- 34 A. Installing signs along the major street to warn road users approaching the intersection;
- 35 B. Relocating the stop line(s) and making other changes to improve the sight distance at the intersection;
- 36 C. Installing measures designed to reduce speeds on the approaches;
- 37 D. Installing a flashing beacon at the intersection to supplement STOP sign control;
- 38 E. Installing flashing beacons on warning signs in advance of a STOP sign controlled intersection on
39 major- and/or minor-street approaches;
- 40 F. Adding one or more lanes on a minor-street approach to reduce the number of vehicles per lane on the
41 approach;
- 42 G. Revising the geometrics at the intersection to channelize vehicular movements and reduce the time
43 required for a vehicle to complete a movement, which could also assist pedestrians;
- 44 [H. Revising the geometrics at the intersection to add pedestrian median refuge islands and/or curb
45 extensions;](#)
- 46 I. Installing roadway lighting if a disproportionate number of crashes occur at night;
- 47 J. Restricting one or more turning movements, perhaps on a time-of-day basis, if alternate routes are
48 available;
- 49 K. If the warrant is satisfied, installing multi-way STOP sign control;
- 50 [L. Installing a pedestrian hybrid beacon \(see Chapter 4F\) or In-Roadway Warning Lights \(see Chapter
51 4N\) if pedestrian safety is the major concern;](#)
- 52 M. Installing a roundabout ~~intersection~~; and
- 53 N. Employing other alternatives, depending on conditions at the intersection.

1 **Section 4B.05 Adequate Roadway Capacity**

2 Support:

3 The delays inherent in the alternating assignment of right-of-way at intersections controlled by traffic
4 control signals can frequently be reduced by widening the major roadway, the minor roadway, or both
5 roadways. Widening the minor roadway often benefits the operations on the major roadway, because it
6 reduces the green time that must be assigned to minor-roadway traffic. In urban areas, the effect of widening
7 can be achieved by eliminating parking on intersection approaches. It is desirable to have at least two lanes
8 for moving traffic on each approach to a signalized location. Additional width on the departure side of the
9 intersection, as well as on the approach side, will sometimes be needed to clear traffic through the intersection
10 effectively.

11 Guidance:

12 Adequate roadway capacity should be provided at a signalized location. Before an intersection is
13 widened, the additional green time pedestrians need to cross the widened roadways should be considered to
14 determine if it will exceed the green time saved through improved vehicular flow.

15 Other methods of increasing the roadway capacity at signalized locations that do not involve roadway
16 widening, such as revisions to the pavement markings and the careful evaluation of proper lane-use
17 assignments (including varying the lane use by time of day), should be considered where appropriate. Such
18 consideration should include evaluation of any impacts that changes to pavement markings and lane
19 assignments will have on bicycle travel.

1 CHAPTER 4C. TRAFFIC CONTROL SIGNAL NEEDS STUDIES

2 Section 4C.01 Studies and Factors for Justifying Traffic Control Signals

3 Standard:

4 An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of
5 the location shall be performed to determine whether installation of a traffic control signal is justified at
6 a particular location.

7 The investigation of the need for a traffic control signal shall include an analysis of factors related
8 to the existing operation and safety at the study location and the potential to improve these conditions,
9 and the applicable factors contained in the following traffic signal warrants ~~and other factors related to~~
10 ~~existing operation and safety at the study location:~~

- 11 Warrant 1, Eight-Hour Vehicular Volume
- 12 Warrant 2, Four-Hour Vehicular Volume
- 13 Warrant 3, Peak Hour
- 14 Warrant 4, Pedestrian Volume
- 15 Warrant 5, School Crossing
- 16 Warrant 6, Coordinated Signal System
- 17 Warrant 7, Crash Experience
- 18 Warrant 8, Roadway Network
- 19 Warrant 9, Intersection Near a Grade Crossing

20 The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a
21 traffic control signal.

22 Support:

23 Sections 8C.09 and 8C.10 contain information regarding the use of traffic control signals instead of gates
24 and/or flashing-light signals at highway-rail~~road~~ grade crossings and highway-light rail transit grade
25 crossings, respectively.

26 Guidance:

27 A traffic control signal should not be installed unless one or more of the factors described in this Chapter
28 are met.

29 A traffic control signal should not be installed unless an engineering study indicates that installing a
30 traffic control signal will improve the overall safety and/or operation of the intersection.

31 A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.

32 The study should consider the effects of the right-turn vehicles from the minor-street approaches.
33 Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted
34 from the minor-street traffic count when evaluating the count against the ~~above~~ signal warrants listed in
35 Paragraph 2.

36 Engineering judgment should also be used in applying various traffic signal warrants to cases where
37 approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics
38 should dictate whether an approach ~~should be~~ is considered as one lane or two lanes. For example, for an
39 approach with one lane for through and right-turning traffic plus a left-turn lane, if engineering judgment
40 ~~could~~ indicates that it should be considered a one-lane approach ~~if~~ because the traffic using the left-turn lane is
41 minor, ~~In such a case,~~ the total traffic volume approaching the intersection should be applied against the signal
42 warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the
43 traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn
44 vehicles.

45 Similar engineering judgment and rationale should be applied to a street approach with one through/left-
46 turn lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic
47 on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street
48 volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a
49 one-lane approach with only the traffic volume in the through/left-turn lane considered.

50 At a location that is under development or construction and where it is not possible to obtain a traffic
51 count that would represent future traffic conditions, hourly volumes should be estimated as part of an
52 engineering study for comparison with traffic signal warrants. Except for locations where the engineering
53 study uses the satisfaction of Warrant 8 to justify a signal, a traffic control signal installed under projected

1 conditions should have an engineering study done within 1 year of putting the signal into stop-and-go
2 operation to determine if the signal is justified. If not justified, the signal should be taken out of stop-and-go
3 operation or removed.

4 For signal warrant analysis, a location with a wide median, even if the median width is greater than 30
5 feet, should be considered as one intersection.

6 Option:

7 At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis
8 may be performed in a manner that considers the higher of the major-street left-turn volumes as the “minor-
9 street” volume and the corresponding single direction of opposing traffic on the major street as the “major-
10 street” volume.

11 For signal warrants requiring conditions to be present for a certain number of hours in order to be
12 satisfied, any four sequential 15-minute periods may be considered as 1 hour if the separate 1-hour periods
13 used in the warrant analysis do not overlap each other and both the major-street volume and the minor-street
14 volume are for the same specific one-hour periods.

15 For signal warrant analysis, bicyclists may be counted as either vehicles or pedestrians.

16 Support:

17 When performing a signal warrant analysis, bicyclists riding in the street with other vehicular traffic are
18 usually counted as vehicles and bicyclists who are clearly using pedestrian facilities are usually counted as
19 pedestrians.

20 Option:

21 Engineering study data may include the following:

- 22 A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of
23 an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour
24 traffic volume.
- 25 B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy
26 trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles),
27 during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which
28 total traffic entering the intersection is greatest.
- 29 C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Item
30 B ~~above~~ and during hours of highest pedestrian volume. Where young, elderly, and/or persons with
31 physical or visual disabilities need special consideration, the pedestrians and their crossing times may
32 be classified by general observation.
- 33 D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons
34 with disabilities, including requests from persons with disabilities for accessible crossing
35 improvements at the location under study. These persons might not be adequately reflected in the
36 pedestrian volume count if the absence of a signal restrains their mobility.
- 37 E. The posted or statutory speed limit or the 85th-percentile speed on the uncontrolled approaches to the
38 location.
- 39 F. A condition diagram showing details of the physical layout, including such features as intersection
40 geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking
41 conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to
42 nearest traffic control signals, utility poles and fixtures, and adjacent land use.
- 43 G. A collision diagram showing crash experience by type, location, direction of movement, severity,
44 weather, time of day, date, and day of week for at least 1 year.

45 The following data, which are desirable for a more precise understanding of the operation of the
46 intersection, may be obtained during the periods ~~specified~~ described in Item B of ~~the preceding~~ Paragraph 17:

- 47 A. Vehicle-hours of stopped time delay determined separately for each approach.
- 48 B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance
49 from the minor street.
- 50 C. The posted or statutory speed limit or the 85th-percentile speed on controlled approaches at a point
51 near to the intersection but unaffected by the control.
- 52 D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday
53 or like periods of a Saturday or Sunday.
- 54 E. Queue length on stop-controlled approaches.

1 **Section 4C.02 Warrant 1, Eight-Hour Vehicular Volume**

2 Support:

3 The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large
4 volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

5 The Interruption of Continuous Traffic, Condition B, is intended for application at locations where
6 Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor
7 intersecting street suffers excessive delay or conflict in entering or crossing the major street.

8 It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then ~~the criteria for~~
9 Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed.
10 Similarly, if Condition B is satisfied, then ~~the criteria for~~ Warrant 1 is satisfied and an analysis of the
11 combination of Conditions A and B is not needed.

12 **Standard:**

13 **The need for a traffic control signal shall be considered if an engineering study finds that one of the**
14 **following conditions exist for each of any 8 hours of an average day:**

- 15 **A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1**
16 **exist on the major-street and the higher-volume minor-street approaches, respectively, to the**
17 **intersection; or**
- 18 **B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1**
19 **exist on the major-street and the higher-volume minor-street approaches, respectively, to the**
20 **intersection.**

21 **In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On**
22 **the minor street, the higher volume shall not be required to be on the same approach during each of**
23 **these 8 hours.**

24 Option:

25 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if
26 the intersection lies within the built-up area of an isolated community having a population of less than 10,000,
27 the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

28 Guidance:

29 The combination of Conditions A and B is intended for application at locations where Condition A is not
30 satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other
31 alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

32 **Standard:**

33 **The need for a traffic control signal shall be considered if an engineering study finds that both of**
34 **the following conditions exist for each of any 8 hours of an average day:**

- 35 **A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1**
36 **exist on the major-street and the higher-volume minor-street approaches, respectively, to the**
37 **intersection; and**
- 38 **B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1**
39 **exist on the major-street and the higher-volume minor-street approaches, respectively, to the**
40 **intersection.**

41 **These major-street and minor-street volumes shall be for the same 8 hours for each condition; however,**
42 **the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition**
43 **B. On the minor street, the higher volume shall not be required to be on the same approach during**
44 **each of the 8 hours.**

45 Option:

46 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if
47 the intersection lies within the built-up area of an isolated community having a population of less than 10,000,
48 the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.

49 **Section 4C.03 Warrant 2, Four-Hour Vehicular Volume**

50 Support:

1 The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume
2 of intersecting traffic is the principal reason to consider installing a traffic control signal.

3 **Standard:**

4 **The need for a traffic control signal shall be considered if an engineering study finds that, for each**
5 **of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major**
6 **street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-**
7 **street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing**
8 **combination of approach lanes. On the minor street, the higher volume shall not be required to be on**
9 **the same approach during each of these 4 hours.**

10 Option:

11 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if
12 the intersection lies within the built-up area of an isolated community having a population of less than 10,000,
13 Figure 4C-2 may be used in place of Figure 4C-1.

14 **Section 4C.04 Warrant 3, Peak Hour**

15 Support:

16 The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a
17 minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing
18 the major street.

19 **Standard:**

20 **This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing**
21 **plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large**
22 **numbers of vehicles over a short time.**

23 **The need for a traffic control signal shall be considered if an engineering study finds that the**
24 **criteria in either of the following two categories are met:**

25 **A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute**
26 **periods) of an average day:**

- 27 1. **The total stopped time delay experienced by the traffic on one minor-street approach (one**
28 **direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane**
29 **approach or 5 vehicle-hours for a two-lane approach; and**
- 30 2. **The volume on the same minor-street approach (one direction only) equals or exceeds 100**
31 **vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving**
32 **lanes; and**
- 33 3. **The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour**
34 **for intersections with three approaches or 800 vehicles per hour for intersections with four**
35 **or more approaches.**

36 **B. The plotted point representing the vehicles per hour on the major street (total of both**
37 **approaches) and the corresponding vehicles per hour on the higher-volume minor-street**
38 **approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average**
39 **day falls above the applicable curve in Figure 4C-3 for the existing combination of approach**
40 **lanes.**

41 Option:

42 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if
43 the intersection lies within the built-up area of an isolated community having a population of less than 10,000,
44 Figure 4C-4 may be used in place of Figure 4C-3 to ~~satisfy~~ evaluate the criteria in the second category of the
45 Standard.

46 If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the
47 traffic control signal may be operated in the flashing mode during the hours that the volume criteria of this
48 warrant are not met.

49 Guidance:

50 If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the
51 traffic control signal should be traffic-actuated.

1 **Section 4C.05 Warrant 4, Pedestrian Volume**

2 Support:

3 The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major
4 street is so heavy that pedestrians experience excessive delay in crossing the major street.

5 **Standard:**

6 The need for a traffic control signal at an intersection or midblock crossing shall be considered if an
7 engineering study finds that ~~both~~ one of the following criteria ~~are~~ is met:

8 ~~A. The pedestrian volume crossing the major street at an intersection or midblock location during~~
9 ~~an average day is 100 or more for each of any 4 hours or 190 or more during any 1 hour; and~~

10 ~~B. There are fewer than 60 gaps per hour in the traffic stream of adequate length to allow~~
11 ~~pedestrians to cross during the same period when the pedestrian volume criterion is satisfied.~~
12 ~~Where there is a divided street having a median of sufficient width for pedestrians to wait, the~~
13 ~~requirement applies separately to each direction of vehicular traffic.~~

14 A. For each of any 4 hours of an average day, the plotted points representing the vehicles per hour
15 on the major street (total of both approaches) and the corresponding pedestrians per hour
16 crossing the major street (total of all crossings) all fall above the curve in Figure 4C-5; or

17 B. For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point
18 representing the vehicles per hour on the major street (total of both approaches) and the
19 corresponding pedestrians per hour crossing the major street (total of all crossings) falls above
20 the curve in Figure 4C-7.

21 Option:

22 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 35 mph, or if
23 the intersection lies within the built-up area of an isolated community having a population of less than 10,000,
24 Figure 4C-6 may be used in place of Figure 4C-5 to evaluate Criterion A in Paragraph 2, and Figure 4C-8 may
25 be used in place of Figure 4C-7 to evaluate Criterion B in Paragraph 2.

26 **Standard:**

27 The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the
28 nearest traffic control signal ~~along~~ or STOP sign controlling the major street that pedestrians desire to
29 cross is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive
30 movement of traffic.

31 If this warrant is met and a traffic control signal is justified by an engineering study, the traffic
32 control signal shall be equipped with pedestrian signal heads ~~conforming to requirements~~ complying
33 with the provisions set forth in Chapter 4E.

34 Guidance:

35 If this warrant is met and a traffic control signal is justified by an engineering study, then:

36 A. If it is installed at an intersection or major driveway location, the traffic control signal should also
37 control the minor-street or driveway traffic, should be traffic-actuated, and should include pedestrian
38 ~~detectors~~ detection.

39 B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100
40 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be
41 pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one
42 of the signal faces should be over the traveled way for each approach, parking and other sight
43 obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the
44 crosswalk or site accommodations should be made through curb extensions or other techniques to
45 provide adequate sight distance, and the installation should include suitable standard signs and
46 pavement markings.

47 C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.

48 Option:

49 The criterion for the pedestrian volume crossing the major ~~roadway~~ street may be reduced as much as 50
50 percent if the ~~average~~ 15th-percentile crossing speed of pedestrians is less than ~~4~~ 3.5 feet per second.

51 A traffic control signal may not be needed at the study location if adjacent coordinated traffic control
52 signals consistently provide gaps of adequate length for pedestrians to cross the street, ~~even if the rate of gap~~
53 ~~occurrence is less than one per minute.~~

1 **Section 4C.06 Warrant 5, School Crossing**

2 Support:

3 The School Crossing signal warrant is intended for application where the fact that schoolchildren cross the
4 major street is the principal reason to consider installing a traffic control signal. [For the purposes of this
5 warrant, the word “schoolchildren” includes elementary through high school students.](#)

6 **Standard:**

7 **The need for a traffic control signal shall be considered when an engineering study of the frequency
8 and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of
9 schoolchildren at an established school crossing across the major street shows that the number of
10 adequate gaps in the traffic stream during the period when the [school](#)children are using the crossing is
11 less than the number of minutes in the same period (see Section 7A.03) and there are a minimum of 20
12 ~~students~~ [schoolchildren](#) during the highest crossing hour.**

13 **Before a decision is made to install a traffic control signal, consideration shall be given to the
14 implementation of other remedial measures, such as warning signs and flashers, school speed zones,
15 school crossing guards, or a grade-separated crossing.**

16 **The School Crossing signal warrant shall not be applied at locations where the distance to the
17 nearest traffic control signal along the major street is less than 300 feet, unless the proposed traffic
18 control signal will not restrict the progressive movement of traffic.**

19 Guidance:

20 If this warrant is met and a traffic control signal is justified by an engineering study, then:

- 21 A. If [it is installed](#) at an intersection [or major driveway location](#), the traffic control signal should [also
22 control the minor-street or driveway traffic, should](#) be traffic-actuated, and should include pedestrian
23 ~~detectors~~ [detection](#).
- 24 B. If [it is installed](#) at a non-intersection crossing, the traffic control signal should be [installed at least 100
25 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should](#) be
26 pedestrian-actuated. [If the traffic control signal is installed at a non-intersection crossing, at least one
27 of the signal faces should be over the traveled way for each approach](#), parking and other sight
28 obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the
29 crosswalk [or site accommodations should be made through curb extensions or other techniques to
30 provide adequate sight distance](#), and the installation should include suitable standard signs and
31 pavement markings.
- 32 C. Furthermore, if [it is](#) installed within a signal system, the traffic control signal should be coordinated.

33 **Section 4C.07 Warrant 6, Coordinated Signal System**

34 Support:

35 Progressive movement in a coordinated signal system sometimes necessitates installing traffic control
36 signals at intersections where they would not otherwise be needed in order to maintain proper platooning of
37 vehicles.

38 **Standard:**

39 **The need for a traffic control signal shall be considered if an engineering study finds that one of the
40 following criteria is met:**

- 41 **A. On a one-way street or a street that has traffic predominantly in one direction, the adjacent
42 traffic control signals are so far apart that they do not provide the necessary degree of vehicular
43 platooning.**
- 44 **B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of
45 platooning and the proposed and adjacent traffic control signals will collectively provide a
46 progressive operation.**

47 Guidance:

48 The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic
49 control signals would be less than 1,000 feet.

50 **Section 4C.08 Warrant 7, Crash Experience**

51 Support:

1 The Crash Experience signal warrant conditions are intended for application where the severity and
2 frequency of crashes are the principal reasons to consider installing a traffic control signal.

3 **Standard:**

4 **The need for a traffic control signal shall be considered if an engineering study finds that all of the**
5 **following criteria are met:**

- 6 **A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce**
7 **the crash frequency; and**
- 8 **B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have**
9 **occurred within a 12-month period, each crash involving personal injury or property damage**
10 **apparently exceeding the applicable requirements for a reportable crash; and**
- 11 **C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80**
12 **percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80**
13 **percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume**
14 **minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not**
15 **less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These**
16 **major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the**
17 **higher volume shall not be required to be on the same approach during each of the 8 hours.**

18 **Option:**

19 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if
20 the intersection lies within the built-up area of an isolated community having a population of less than 10,000,
21 the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.

22 **Section 4C.09 Warrant 8, Roadway Network**

23 **Support:**

24 Installing a traffic control signal at some intersections might be justified to encourage concentration and
25 organization of traffic flow on a roadway network.

26 **Standard:**

27 **The need for a traffic control signal shall be considered if an engineering study finds that the**
28 **common intersection of two or more major routes meets one or both of the following criteria:**

- 29 **A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000**
30 **vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic**
31 **volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during**
32 **an average weekday; or**
- 33 **B. The intersection has a total existing or immediately projected entering volume of at least 1,000**
34 **vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).**

35 A major route as used in this signal warrant shall have at least one ~~or more~~ of the following
36 characteristics:

- 37 **A. It is part of the street or highway system that serves as the principal roadway network for**
38 **through traffic flow.**
- 39 **B. It includes rural or suburban highways outside, entering, or traversing a city.**
- 40 **C. It appears as a major route on an official plan, such as a major street plan in an urban area**
41 **traffic and transportation study.**

42 **Section 4C.10 Warrant 9, Intersection Near a Grade Crossing**

43 **Support:**

44 The Intersection Near a Grade Crossing signal warrant is intended for use at a location where none of the
45 conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a
46 grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to
47 consider installing a traffic control signal.

48 **Guidance:**

49 This signal warrant should be applied only after adequate consideration has been given to other
50 alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade
51 crossing. Among the alternatives that should be considered or tried are:

- 1 A. Providing additional pavement that would enable vehicles to clear the track or that would provide
2 space for an evasive maneuver, or
- 3 B. Reassigning the stop controls at the intersection to make the approach across the track a non-stopping
4 approach.

5 **Standard:**

6 **The need for a traffic control signal shall be considered if an engineering study finds that both of**
7 **the following criteria are met:**

- 8 **A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of**
9 **the track nearest to the intersection is within 140 feet of the stop line or yield line on the**
10 **approach; and**
- 11 **B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted**
12 **point representing the vehicles per hour on the major street (total of both approaches) and the**
13 **corresponding vehicles per hour on the minor-street approach that crosses the track (one**
14 **direction only, approaching the intersection) falls above the applicable curve in Figure 4C-9 or**
15 **4C-10 for the existing combination of approach lanes over the track and the distance D, which is**
16 **the clear storage distance as defined in Section 1A.13.**

17 **Guidance:**

18 The following considerations apply when plotting the traffic volume data on Figure 4C-9 or 4C-10:

- 19 A. Figure 4C-9 should be used if there is only one lane approaching the intersection at the track crossing
20 location and Figure 4C-10 should be used if there are two or more lanes approaching the intersection
21 at the track crossing location.
- 22 B. After determining the actual distance D, the curve for the distance D that is nearest to the actual
23 distance D should be used. For example, if the actual distance D is 95 feet, the plotted point should be
24 compared to the curve for D = 90 feet.
- 25 C. If the rail traffic arrival times are unknown, the highest traffic volume hour of the day should be used.

26 **Option:**

27 The minor-street approach volume may be multiplied by up to three adjustment factors as provided in
28 Paragraphs 6 through 8.

29 Because the curves are based on an average of four occurrences of rail traffic per day, the vehicles per
30 hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-2 for the
31 appropriate number of occurrences of rail traffic per day.

32 Because the curves are based on typical vehicle occupancy, if at least 2% of the vehicles crossing the track
33 are buses carrying at least 20 people, the vehicles per hour on the minor-street approach may be multiplied by
34 the adjustment factor shown in Table 4C-3 for the appropriate percentage of high-occupancy buses.

35 Because the curves are based on tractor-trailer trucks comprising 10% of the vehicles crossing the track,
36 the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table
37 4C-4 for the appropriate distance and percentage of tractor-trailer trucks.

38 **Standard:**

39 **If this warrant is met and a traffic control signal at the intersection is justified by an engineering**
40 **study, then:**

- 41 **A. The traffic control signal shall have actuation on the minor street;**
- 42 **B. Preemption control shall be provided in accordance with Sections 4D.27, 8C.09, and 8C.10; and**
- 43 **C. The grade crossing shall have flashing-light signals (see Chapter 8C).**

44 **Guidance:**

45 If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, the
46 grade crossing should have automatic gates (see Chapter 8C).

1 **CHAPTER 4D. TRAFFIC CONTROL SIGNAL FEATURES** the Sections in this Chapter and the
2 text within the Sections have been substantially reorganized

3 **Section 4D.01 General** three paragraphs were relocated to Sections 4D.34 and 4D.35

4 Support:

5 The features of traffic control signals of interest to road users are the location, design, and meaning of the
6 signal indications. Uniformity in the design features that affect the traffic to be controlled, as set forth in this
7 Manual, is especially important for ~~reasonably safe and efficient traffic~~ the safety and efficiency of operations.

8 Traffic control signals can be operated in pretimed, semi-actuated, or full-actuated modes. For isolated
9 (non-interconnected) signalized locations on rural high-speed highways, full-actuated mode with advance
10 vehicle detection on the high-speed approaches is typically used. These features are designed to reduce the
11 frequency with which the onset of the yellow change interval is displayed when high-speed approaching
12 vehicles are in the “dilemma zone” such that the drivers of these high-speed vehicles find it difficult to decide
13 whether to stop or proceed.

14 **Standard:**

15 **When a traffic control signal is not in operation, such as before it is placed in service, during**
16 **seasonal shutdowns, or when it is not desirable to operate the traffic control signal, the signal faces shall**
17 **be covered, turned, or taken down to clearly indicate that the traffic control signal is not in operation.**

18 Support:

19 Seasonal shutdown is a condition in which a permanent traffic signal is turned off or otherwise made non-
20 operational during a particular season when its operation is not justified. This might be applied in a
21 community where tourist traffic during most of the year justifies the permanent signalization, but a seasonal
22 shutdown of the signal during an annual period of lower tourist traffic would reduce delays; or where a major
23 traffic generator, such as a large factory, justifies the permanent signalization, but the large factory is shut
24 down for an annual factory vacation for a few weeks in the summer.

25 Standard:

26 **A traffic control signal shall control traffic only at the intersection or midblock location where the**
27 **signal faces are placed.**

28 **Midblock crosswalks shall not be signalized if they are located within 300 feet from the nearest**
29 **traffic control signal, unless the proposed traffic control signal will not restrict the progressive**
30 **movement of traffic.**

31 Guidance:

32 A midblock crosswalk's location should not be ~~signalized~~ controlled by a traffic control signal if ~~they are~~
33 the crosswalk is located within 100 feet from side streets or driveways that are controlled by STOP signs or
34 YIELD signs.

35 Engineering judgment should be used to determine the proper phasing and timing for a traffic control
36 signal. Since traffic flows and patterns change, phasing and timing should be reevaluated regularly and
37 updated if needed.

38 Traffic control signals within 1/2 mile of one another along a major route or in a network of intersecting
39 major routes should be coordinated, preferably with interconnected controller units. Where traffic control
40 signals that are within 1/2 mile of one another along a major route have a jurisdictional boundary or a
41 boundary between different signal systems between them, coordination across the boundary should be
42 considered. paragraph relocated from Section 4D.14

43 Support:

44 ~~However,~~ Signal coordination need not be maintained ~~across boundaries between signal systems~~ between
45 control sections that operate on different cycle lengths. paragraph relocated from Section 4D.14

46 For coordination with ~~railroad-highway~~ grade crossing signals and movable bridge signals, see Sections
47 4D.27, 4J.03, 8C.09, and 8C.10. paragraph relocated from Section 4D.14

48 **Section 4D.02 Responsibility for Operation and Maintenance**

49 Guidance:

50 Prior to installing any traffic control signal, the responsibility for the maintenance of the signal and all of
51 the appurtenances, hardware, software, and the timing plan(s) should be clearly established. The responsible

1 agency should provide for the maintenance of the traffic control signal and all of its appurtenances in a
2 competent manner.

3 To this end the agency should:

- 4 A. Keep every controller assembly in effective operation in accordance with its predetermined timing
5 schedule; check the operation of the controller assembly frequently enough to verify that it is
6 operating in accordance with the predetermined timing schedule; and establish a policy to maintain a
7 record of all timing changes and that only authorized persons are permitted to make timing changes;
- 8 B. Clean the optical system of the signal sections and replace the light sources as frequently as
9 experience proves necessary;
- 10 C. Clean and service equipment and other appurtenances as frequently as experience proves necessary;
- 11 D. Provide for alternate operation of the traffic control signal during a period of failure, using flashing
12 mode or manual control, or manual traffic direction by proper authorities as might be required by
13 traffic volumes or congestion, or by erecting other traffic control devices;
- 14 E. Have properly skilled maintenance personnel available without undue delay for all ~~emergency and~~
15 ~~lamp failure calls~~ [signal malfunctions and signal indication failures](#);
- 16 F. Provide spare equipment to minimize the interruption of traffic control signal operation as a result of
17 equipment failure;
- 18 G. Provide for the availability of properly skilled maintenance personnel for the repair of all components;
19 and
- 20 H. Maintain the appearance of the signal displays and equipment.

21 **Section 4D.03 Provisions for Pedestrians**

22 Support:

23 Chapter 4E contains additional information regarding pedestrian signals [and Chapter 4F contains](#)
24 [additional information regarding pedestrian hybrid beacons](#).

25 **Standard:**

26 **The design and operation of traffic control signals shall take into consideration the needs of**
27 **pedestrian as well as vehicular traffic.**

28 **If engineering judgment indicates the need for provisions for a given pedestrian movement, signal**
29 **faces conveniently visible to pedestrians shall be provided by pedestrian signal heads [\(see Chapter 4E\)](#)**
30 **or a [vehicular](#) signal face(s) for ~~an adjacent~~ [a concurrent](#) vehicular movement.**

31 Guidance:

32 ~~Safety considerations should include the installation, where appropriate, of~~ Accessible pedestrian signals
33 (see Sections ~~4E.06 and~~ 4E.09 [through 4E.13](#)) that provide information in non-visual formats (such as audible
34 tones, ~~verbal~~ [speech](#) messages, and/or vibrating surfaces) [should be provided where determined appropriate by](#)
35 [engineering judgment](#).

36 Where pedestrian movements regularly occur, pedestrians should be provided with sufficient time to cross
37 the roadway by adjusting the traffic control signal operation and timing to provide sufficient crossing time
38 every cycle or by providing pedestrian detectors.

39 ~~Option:~~

40 If it is [necessary or](#) desirable to prohibit certain pedestrian movements at a traffic control signal [location](#), ~~#~~
41 ~~PEDESTRIANS PROHIBITED (R9-3)~~ or No Pedestrian Crossing (R9-3~~#~~) signs ~~may be used~~ (see Section
42 2B.51) [should be used if it is not practical to provide a barrier or other physical feature to physically prevent](#)
43 [the pedestrian movements](#).

44 **Section 4D.04 Meaning of Vehicular Signal Indications**

45 Support:

46 The “Uniform Vehicle Code” (see Section 1A.11) is the primary source for the standards for the meaning
47 of vehicular signal indications to both vehicle operators and pedestrians as ~~set forth~~ [provided below in this](#)
48 [Section](#), and the standards for the meaning of separate pedestrian signal [head](#) indications as ~~set forth~~ [provided](#)
49 in Section 4E.02.

50 [The physical area that is defined as being “within the intersection” is dependent upon the conditions that](#)
51 [are described in the definition of intersection in Section 1A.13.](#)

52 **Standard:**

1 The following meanings shall be given to highway traffic signal indications for vehicles and
2 pedestrians:

3 A. Steady green signal indications shall have the following meanings:

- 4 1. Vehicular traffic, ~~except pedestrians~~, facing a CIRCULAR GREEN signal indication is
5 permitted to proceed straight through or turn right or left or make a U-turn movement
6 except as such movement is modified by lane-use signs, turn prohibition signs, lane
7 markings, ~~or~~ roadway design, separate turn signal indications, or other traffic control
8 devices.

9 ~~But~~ Such vehicular traffic, including vehicles turning right or left or making a U-turn
10 movement, shall yield the right-of-way to: ~~other vehicles, and to~~

11 (a) Pedestrians lawfully within the intersection or an adjacent associated crosswalk, at the
12 time such signal indication is exhibited and

13 (b) Other vehicles lawfully within the intersection.

14 In addition, vehicular traffic turning left or making a U-turn movement to the left shall
15 yield the right-of-way to other vehicles approaching from the opposite direction so closely as
16 to constitute an immediate hazard during the time when such turning vehicle is moving
17 across or within the intersection.

- 18 2. Vehicular traffic, ~~except pedestrians~~, facing a GREEN ARROW signal indication, ~~shown~~
19 displayed alone or in combination with another signal indication, is permitted to cautiously
20 enter the intersection only to make the movement indicated by such arrow, or such other
21 movement as is permitted by other signal indications ~~shown~~ displayed at the same time.

22 Such vehicular traffic, including vehicles turning right or left or making a U-turn
23 movement, shall yield the right-of-way to:

24 (a) Pedestrians lawfully within an adjacent associated crosswalk, and to

25 (b) Other traffic vehicles lawfully using within the intersection.

- 26 3. ~~Unless otherwise directed by a pedestrian signal head,~~ Pedestrians facing ~~any~~ a CIRCULAR
27 GREEN signal indication, unless otherwise directed by a pedestrian signal indication or
28 other traffic control device, except when the sole green signal indication is a turn arrow, are
29 permitted to proceed across the roadway within any marked or unmarked associated
30 crosswalk. The pedestrian shall yield the right-of-way to vehicles lawfully within the
31 intersection or so close as to create an immediate hazard at the time that the green signal
32 indication is first ~~shown~~ displayed.

- 33 4. Pedestrians facing a GREEN ARROW signal indication, unless otherwise directed by a
34 pedestrian signal indication or other traffic control device, shall not cross the roadway.

35 B. Steady yellow signal indications shall have the following meanings:

- 36 1. Vehicular traffic, ~~except pedestrians~~, facing a steady CIRCULAR YELLOW ~~or YELLOW~~
37 ~~ARROW~~ signal indication is thereby warned that the related green movement or the related
38 flashing arrow movement is being terminated or that a steady red signal indication will be
39 ~~exhibited~~ displayed immediately thereafter when vehicular traffic shall not enter the
40 intersection. The rules set forth concerning vehicular operation under the movement(s)
41 being terminated shall continue to apply while the steady CIRCULAR YELLOW signal
42 indication is displayed.

- 43 2. Vehicular traffic facing a steady YELLOW ARROW signal indication is thereby warned
44 that the related GREEN ARROW movement or the related flashing arrow movement is
45 being terminated. The rules set forth concerning vehicular operation under the
46 movement(s) being terminated shall continue to apply while the steady YELLOW ARROW
47 signal indication is displayed.

- 48 3. Pedestrians facing a steady CIRCULAR YELLOW or YELLOW ARROW signal
49 indication, unless otherwise directed by a pedestrian signal ~~head, are thereby advised that~~
50 ~~there is insufficient time to cross the roadway before a red signal indication is shown, and no~~
51 ~~pedestrian~~ indication or other traffic control device shall then not start to cross the
52 roadway.

53 C. Steady red signal indications shall have the following meanings:

- 1 1. Vehicular traffic facing a steady CIRCULAR RED signal indication ~~alone, unless entering~~
2 the intersection to make another movement permitted by another signal indication, shall
3 stop at a clearly marked stop line; but if there is no stop line, traffic shall stop before
4 entering the crosswalk on the near side of the intersection; or if there is no crosswalk, then
5 before entering the intersection; and shall remain stopped until a signal indication to
6 proceed is ~~shown~~ displayed, or as provided below.

7 Except when a ~~sign~~ traffic control device is in place prohibiting a turn on red or a steady
8 RED ARROW signal indication is displayed, vehicular traffic facing a steady CIRCULAR
9 RED signal indication is permitted to enter the intersection to turn right, or to turn left from
10 a one-way street into a one-way street, after stopping. ~~Such vehicular traffic shall yield the~~
11 ~~right-of-way to pedestrians lawfully within an adjacent crosswalk and to other traffic~~
12 ~~lawfully using the intersection.~~ The right to proceed with the turn shall be subject to the
13 rules applicable after making a stop at a STOP sign.

- 14 2. Vehicular traffic facing a steady RED ARROW signal indication shall not enter the
15 intersection to make the movement indicated by the arrow and, unless entering the
16 intersection to make another movement permitted by another signal indication, shall stop at
17 a clearly marked stop line; but if there is no stop line, before entering the crosswalk on the
18 near side of the intersection; or if there is no crosswalk, then before entering the
19 intersection; and shall remain stopped until a signal indication or other traffic control
20 device permitting the movement indicated by such RED ARROW is ~~shown~~ displayed.

21 When ~~an R10-17a sign (see Section 2B.45)~~ a traffic control device is in place permitting
22 a turn on a steady RED ARROW signal indication, vehicular traffic facing a steady RED
23 ARROW signal indication is permitted to enter the intersection to ~~turn right, or to turn left~~
24 ~~from a one-way street into a one-way street~~ make the movement indicated by the arrow
25 signal indication, after stopping. ~~Such vehicular traffic shall yield the right-of-way to~~
26 ~~pedestrians lawfully within an adjacent crosswalk and to other traffic lawfully using the~~
27 ~~intersection.~~ The right to proceed with the turn shall be limited to the direction indicated by
28 the arrow and shall be subject to the rules applicable after making a stop at a STOP sign.

- 29 3. Unless otherwise directed by a pedestrian signal ~~head~~ indication or other traffic control
30 device, pedestrians facing a steady CIRCULAR RED or steady RED ARROW signal
31 indication ~~alone~~ shall not enter the roadway.

32 ~~D. Flashing signal indications shall have the following meanings:~~

- 33 ~~1. Flashing yellow—When a yellow lens is illuminated with rapid intermittent flashes,~~
34 ~~vehicular traffic is permitted to proceed through the intersection or past such signal~~
35 ~~indication only with caution.~~
36 ~~2. Flashing red—When a red lens is illuminated with rapid intermittent flashes, vehicular~~
37 ~~traffic shall stop at a clearly marked stop line; but if there is no stop line, traffic shall stop~~
38 ~~before entering the crosswalk on the near side of the intersection; or if there is no crosswalk,~~
39 ~~at the point nearest the intersecting roadway where the driver has a view of approaching~~
40 ~~traffic on the intersecting roadway before entering the intersection. The right to proceed~~
41 ~~shall be subject to the rules applicable after making a stop at a STOP sign.~~
42 ~~3. Flashing RED ARROW and flashing YELLOW ARROW signal indications have the same~~
43 ~~meaning as the corresponding flashing circular signal indication, except that they apply only~~
44 ~~to vehicular traffic intending to make the movement indicated by the arrow.~~

45 D. A flashing green signal indication has no meaning and shall not be used.

46 E. Flashing yellow signal indications shall have the following meanings:

- 47 1. Vehicular traffic, on an approach to an intersection, facing a flashing CIRCULAR
48 YELLOW signal indication is permitted to cautiously enter the intersection to proceed
49 straight through or turn right or left or make a U-turn except as such movement is modified
50 by lane-use signs, turn prohibition signs, lane markings, roadway design, separate turn
51 signal indications, or other traffic control devices.

52 Such vehicular traffic, including vehicles turning right or left or making a U-turn, shall
53 yield the right-of-way to:

- 54 (a) Pedestrians lawfully within an associated crosswalk, and
55 (b) Other vehicles lawfully within the intersection.

1 In addition, vehicular traffic turning left or making a U-turn to the left shall yield the
2 right-of-way to other vehicles approaching from the opposite direction so closely as to
3 constitute an immediate hazard during the time when such turning vehicle is moving across
4 or within the intersection.

- 5 2. Vehicular traffic, on an approach to an intersection, facing a flashing YELLOW ARROW
6 signal indication, displayed alone or in combination with another signal indication, is
7 permitted to cautiously enter the intersection only to make the movement indicated by such
8 arrow, or other such movement as is permitted by other signal indications displayed at the
9 same time.

10 Such vehicular traffic, including vehicles turning right or left or making a U-turn, shall
11 yield the right-of-way to:

- 12 (a) Pedestrians lawfully within an associated crosswalk, and
13 (b) Other vehicles lawfully within the intersection.

14 In addition, vehicular traffic turning left or making a U-turn to the left shall yield the
15 right-of-way to other vehicles approaching from the opposite direction so closely as to
16 constitute an immediate hazard during the time when such turning vehicle is moving across
17 or within the intersection.

- 18 3. Pedestrians facing any flashing yellow signal indication at an intersection, unless otherwise
19 directed by a pedestrian signal indication or other traffic control device, are permitted to
20 proceed across the roadway within any marked or unmarked associated crosswalk.
21 Pedestrians shall yield the right-of-way to vehicles lawfully within the intersection at the
22 time that the flashing yellow signal indication is first displayed.
23 4. When a flashing CIRCULAR YELLOW signal indication(s) is displayed as a beacon (see
24 Chapter 4L) to supplement another traffic control device, road users are notified that there
25 is a need to pay extra attention to the message contained thereon or that the regulatory or
26 warning requirements of the other traffic control device, which might not be applicable at
27 all times, are currently applicable.

28 **F. Flashing red signal indications shall have the following meanings:**

- 29 1. Vehicular traffic, on an approach to an intersection, facing a flashing CIRCULAR RED
30 signal indication shall stop at a clearly marked stop line; but if there is no stop line, before
31 entering the crosswalk on the near side of the intersection; or if there is no crosswalk, at the
32 point nearest the intersecting roadway where the driver has a view of approaching traffic on
33 the intersecting roadway before entering the intersection. The right to proceed shall be
34 subject to the rules applicable after making a stop at a STOP sign.
35 2. Vehicular traffic, on an approach to an intersection, facing a flashing RED ARROW signal
36 indication if intending to turn in the direction indicated by the arrow shall stop at a clearly
37 marked stop line; but if there is no stop line, before entering the crosswalk on the near side
38 of the intersection; or if there is no crosswalk, at the point nearest the intersecting roadway
39 where the driver has a view of approaching traffic on the intersecting roadway before
40 entering the intersection. The right to proceed with the turn shall be limited to the direction
41 indicated by the arrow and shall be subject to the rules applicable after making a stop at a
42 STOP sign.
43 3. Pedestrians facing any flashing red signal indication at an intersection, unless otherwise
44 directed by a pedestrian signal indication or other traffic control device, are permitted to
45 proceed across the roadway within any marked or unmarked associated crosswalk.
46 Pedestrians shall yield the right-of-way to vehicles lawfully within the intersection at the
47 time that the flashing red signal indication is first displayed.
48 4. When a flashing CIRCULAR RED signal indication(s) is displayed as a beacon (see Chapter
49 4L) to supplement another traffic control device, road users are notified that there is a need
50 to pay extra attention to the message contained thereon or that the regulatory requirements
51 of the other traffic control device, which might not be applicable at all times, are currently
52 applicable. Use of this signal indication shall be limited to supplementing STOP (R1-1), DO
53 NOT ENTER (R5-1), or WRONG WAY (R5-1a) signs, and to applications where
54 compliance with the supplemented traffic control device requires a stop at a designated
55 point.

1 **Section 4D.05 Application of Steady Signal Indications**

2 **Standard:**

3 When a traffic control signal is being operated in a steady (stop-and-go) mode, at least one ~~lens~~
4 indication in each signal face shall be ~~illuminated~~ displayed at any given time.

5 A signal face(s) that controls a particular vehicular movement during any interval of a cycle shall
6 control that same movement during all intervals of the cycle.

7 Steady signal indications shall be applied as follows:

8 **A. A steady CIRCULAR RED signal indication:**

- 9 1. Shall be displayed when it is intended to prohibit traffic, except pedestrians directed by a
10 pedestrian signal head, from entering the intersection or other controlled area. Turning
11 after stopping is permitted as stated in Item C.1 in Paragraph 3 of Section 4D.04.
12 2. Shall be displayed with the appropriate GREEN ARROW signal indications when it is
13 intended to permit traffic to make a specified turn or turns, and to prohibit traffic from
14 proceeding straight ahead through the intersection or other controlled area, except in
15 protected only mode ~~turn-signal-faces~~ operation (see Sections 4D.19 and 4D.23), or in
16 protected/permissive mode ~~left-turn~~ operation with separate ~~left-turn~~ signal faces (see
17 Sections 4D.20 and 4D.24).

18 **B. A steady CIRCULAR YELLOW signal indication:**

- 19 1. Shall be displayed following a CIRCULAR GREEN or straight-through GREEN ARROW
20 signal indication in the same signal face.
21 2. Shall not be displayed in conjunction with the change from the CIRCULAR RED signal
22 indication to the CIRCULAR GREEN signal indication.
23 3. Shall be followed by a CIRCULAR RED signal indication except that, when entering
24 preemption operation, the return to the previous CIRCULAR GREEN signal indication
25 shall be permitted following a steady CIRCULAR YELLOW signal indication (see Section
26 4D.27).
27 4. Shall not be displayed to an approach from which drivers are turning left permissively or
28 making a U-turn to the left permissively unless one of the following conditions exists:
29 (a) A steady CIRCULAR YELLOW signal indication is also simultaneously being ~~shown~~
30 displayed simultaneously to the opposing approach;
31 ~~(b) A separate left turn signal face is provided and operated as described in Section 4D.06;~~
32 (b) An engineering study has determined that, because of unique intersection conditions, the
33 conditions described in Items (a) ~~and (b) above~~ cannot reasonably be implemented
34 without causing significant operational or safety problems and that the volume of
35 impacted left-turning or U-turning traffic is relatively low, and those left-turning or U-
36 turning drivers are advised that a steady CIRCULAR YELLOW signal indication ~~the~~
37 ~~opposing traffic~~ is not simultaneously being ~~shown displayed~~ a CIRCULAR YELLOW
38 signal indication to the opposing traffic if this operation occurs continuously by the
39 installation near the left-most signal head of a W25-1 sign (see Section 2C.48) with the
40 legend ONCOMING TRAFFIC HAS EXTENDED GREEN; or
41 (c) Drivers are advised of the operation if it occurs only occasionally, such as during a
42 preemption sequence ~~or because of the skipping of actuated phases~~, by the installation
43 near the left-most signal head of a W25-2 sign (see Section 2C.48) with the legend
44 ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN.

45 **C. A steady CIRCULAR GREEN signal indication shall be displayed only when it is intended to**
46 **permit traffic to proceed in any direction that is lawful and practical.**

47 **D. A steady RED ARROW signal indication shall be displayed when it is intended to prohibit**
48 **traffic, except pedestrians directed by a pedestrian signal head, from entering the intersection**
49 **or other controlled area to make the indicated turn. Except as described in Item C.2 in**
50 **Paragraph 3 of Section 4D.04, turning on a steady RED ARROW signal indication shall not be**
51 **permitted.**

52 **E. A steady YELLOW ARROW signal indication:**

- 53 1. Shall be displayed in the same direction as a GREEN ARROW signal indication following a
54 GREEN ARROW signal indication in the same signal face, unless:

- (a) The GREEN ARROW signal indication and a CIRCULAR GREEN (or straight-through GREEN ARROW) signal indication terminate simultaneously in the same signal face, or
 - (b) The green arrow is a straight-through GREEN ARROW (see Item B.1).
2. Shall be displayed in the same direction as a flashing YELLOW ARROW signal indication or flashing RED ARROW signal indication following a flashing YELLOW ARROW signal indication or flashing RED ARROW signal indication in the same signal face, when the flashing arrow indication is displayed as part of a steady mode operation, if the signal face will subsequently display a steady red signal indication.
 3. Shall not be displayed in conjunction with the change from a steady RED ARROW, flashing RED ARROW, or flashing YELLOW ARROW signal indication to a GREEN ARROW signal indication, except when entering preemption operation as provided in Item 5(a).
 4. Shall not be displayed when any conflicting vehicular movement has a green or yellow signal indication (except for the situation regarding U-turns to the left provided in Paragraph 4) or any conflicting pedestrian movement has a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication (~~see Section 4D.09~~), except that a steady left-turn (or U-turn to the left) YELLOW ARROW signal indication used to terminate a flashing left-turn (or U-turn to the left) YELLOW ARROW or a flashing left-turn (or U-turn to the left) RED ARROW signal indication in a signal face controlling a permissive left-turn (or U-turn to the left) movement as described in Sections 4D.18 and 4D.20 shall be permitted to be displayed when a CIRCULAR YELLOW signal indication is displayed for the opposing through movement. Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or raised channelization clearly indicate which departure lane to use.
 5. Shall not be displayed to terminate a flashing arrow signal indication on an approach from which drivers are turning left permissively or making a U-turn to the left permissively unless one of the following conditions exists:
 - (a) A steady CIRCULAR YELLOW signal indication is also simultaneously being displayed to the opposing approach;
 - (b) An engineering study has determined that, because of unique intersection conditions, the condition described in Item (a) cannot reasonably be implemented without causing significant operational or safety problems and that the volume of impacted left-turning or U-turning traffic is relatively low, and those left-turning or U-turning drivers are advised that a steady CIRCULAR YELLOW signal indication is not simultaneously being displayed to the opposing traffic if this operation occurs continuously by the installation near the left-most signal head of a W25-1 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC HAS EXTENDED GREEN; or
 - (c) Drivers are advised of the operation if it occurs only occasionally, such as during a preemption sequence, by the installation near the left-most signal head of a W25-2 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN.
 6. Shall be terminated by a RED ARROW signal indication for the same direction or a CIRCULAR RED signal indication except:
 - (a) When entering preemption operation, the ~~return to the previous~~ display of a GREEN ARROW signal indication or a flashing arrow signal indication shall be permitted following a steady YELLOW ARROW signal indication.
 - (b) When the movement controlled by the arrow is to continue on a permissive mode basis during an immediately following CIRCULAR GREEN or flashing YELLOW ARROW signal indication.

F. A steady GREEN ARROW signal indication:

1. Shall be displayed only to allow vehicular movements, in the direction indicated, that are not in conflict with other vehicles moving on a green or yellow signal indication ~~or~~ and are not in conflict with pedestrians crossing in ~~conformance~~ compliance with a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT

1 WALK) signal indication ~~(see Section 4D.09)~~. Vehicles departing in the same direction shall
2 not be considered in conflict if, for each turn lane with moving traffic, there is a separate
3 departing lane, and pavement markings or raised channelization clearly indicate which
4 departure lane to use.

- 5 2. Shall be displayed on a signal face that controls a left-turn movement when said movement
6 is not in conflict with other vehicles moving on a green or yellow signal indication (except
7 for the situation regarding U-turns provided in Paragraph 4) ~~or~~ and is not in conflict with
8 pedestrians crossing in ~~conformance~~ compliance with a WALKING PERSON (symbolizing
9 WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication ~~(see~~
10 ~~Section 4D.09)~~. Vehicles departing in the same direction shall not be considered in conflict
11 if, for each turn lane with moving traffic, there is a separate departing lane, and pavement
12 markings or raised channelization clearly indicate which departure lane to use.
- 13 3. Shall not be required on the stem of a T-intersection or for turns from a one-way street.

14 Option:

15 If U-turns are permitted from the approach and a right-turn GREEN ARROW signal indication is if
16 ~~drivers making a right turn from the conflicting approach to the left are~~ simultaneously being ~~shown~~ displayed
17 to road users making a right turn from the conflicting approach to the left ~~a right-turn GREEN ARROW signal~~
18 ~~indication, drivers~~ road users making a U-turn may be advised of the operation by the installation near the left-
19 turn signal face of a U-TURN YIELD TO RIGHT TURN (R10-16) sign (see Section 2B.53).

20 ~~Steady RED ARROW, YELLOW ARROW, and GREEN ARROW signal indications, if not otherwise~~
21 ~~prohibited, may be used instead of the corresponding circular signal indications at the following locations:~~

- 22 ~~A. On an approach intersecting a one-way street;~~
23 ~~B. Where certain movements are prohibited, and~~
24 ~~C. Where certain movements are physically impossible.~~

25 If not otherwise prohibited, a steady straight-through GREEN ARROW signal indication may be used
26 instead of a CIRCULAR GREEN signal indication in a signal face on an approach intersecting a one-way
27 street to discourage wrong-way turns.

28 If not otherwise prohibited, steady red, yellow, and green turn arrow signal indications may be used
29 instead of steady circular red, yellow, and green signal indications in a signal face on an approach where all
30 traffic is required to turn or where the straight-through movement is not physically possible.

31 Support:

32 Section 4D.25 contains information regarding the signalization of approaches that have a shared left-
33 turn/right-turn lane and no through movement.

34 **Standard:**

35 **H.** If supplemental signal faces are used, the following limitations shall apply: relocated from
36 Section 4D.15

- 37 A. Left-turn arrows and U-turn arrows to the left shall not be used in near-right signal faces.
38 B. Right-turn arrows and U-turn arrows to the right shall not be used in far-left signal faces. A
39 far-side median-mounted signal face shall be considered a far-left signal for this application.

40 A straight-through RED ARROW signal indication or a straight-through YELLOW ARROW
41 signal indication shall not be displayed on any signal face, either alone or in combination with any other
42 signal indication. relocated from Section 4D.08

43 The following combinations of signal indications shall not be simultaneously displayed on any one
44 signal face: relocated from Section 4D.08

- 45 ~~A. CIRCULAR GREEN with CIRCULAR YELLOW;~~
46 A. CIRCULAR RED with CIRCULAR YELLOW;
47 B. CIRCULAR GREEN with CIRCULAR RED; or
48 C. Straight-through GREEN ARROW with CIRCULAR RED;

49 Additionally, the above combinations shall not be simultaneously displayed in different signal faces
50 on any one an approach as a result of the combination of displays from multiple signal faces unless one
51 of the following conditions exists the display is created by a signal face(s) devoted exclusively to the
52 control of a right-turning movement and: relocated from Section 4D.08

- 1 A. The signal face(s) controlling the right-turning movement ~~are shielded, hooded, louvered,~~
2 ~~positioned, or designed~~ is visibility-limited from the adjacent through movement or positioned
3 ~~so that the combination is not confusing~~ to minimize potential confusion to approaching road
4 users, or
5 B. ~~One of the signal faces is a turn signal controlling a protected-only mode turn, and~~ A ~~LEFT~~
6 ~~(RIGHT)~~ TURN SIGNAL (R10-10) sign (see Sections 4D.21 through 4D.24) is mounted adjacent
7 to ~~each such~~ the signal face(s) controlling the right-turning movement.

8 The following combinations of signal indications shall not be simultaneously displayed on any one
9 signal face or as a result of the combination of displays from multiple signal faces on an approach:

- 10 A. CIRCULAR GREEN with CIRCULAR YELLOW;
11 B. Straight-through GREEN ARROW with CIRCULAR YELLOW;
12 C. GREEN ARROW with YELLOW ARROW pointing in the same direction;
13 D. RED ARROW with YELLOW ARROW pointing in the same direction; or
14 E. GREEN ARROW with RED ARROW pointing in the same direction.

15 Except as otherwise provided in Sections 4F.03 and 4G.04, the same signal section shall not be used
16 to display both a flashing yellow and a steady yellow indication during steady mode operation. Except
17 as otherwise provided in Sections 4D.18, 4D.20, 4D.22, and 4D.24, the same signal section shall not be
18 used to display both a flashing red and a steady red indication during steady mode operation.

19 ~~A steady GREEN ARROW or YELLOW ARROW signal indication shall not be displayed to~~
20 ~~vehicular movements that are in conflict with the following:~~ relocated from Section 4D.09 and deleted
21 because it is now covered in Items E and F in Paragraph 3

22 ~~A. Other vehicles moving on a green or yellow signal indication, except for the situation regarding~~
23 ~~U turns described earlier in this Section. Vehicles departing in the same direction shall not be~~
24 ~~considered in conflict if, for each turn lane with moving traffic, there is a separate departing~~
25 ~~lane, and pavement markings or raised channelization clearly indicate which departure lane to~~
26 ~~use.~~

27 ~~B. Pedestrians crossing in conformance with a WALKING PERSON (symbolizing WALK) or~~
28 ~~flashing UPRAISED HAND (symbolizing DONT WALK) signal indication.~~

29 Guidance:

30 No movement that creates an unexpected crossing of pathways of moving vehicles or pedestrians should
31 be allowed during any green or yellow interval, except when all three of the following conditions are met:
32 relocated from Section 4D.09

- 33 A. The movement involves only slight conflict, and
34 B. Serious traffic delays are substantially reduced by permitting the conflicting movement, and
35 C. Drivers and pedestrians subjected to the unexpected conflict are effectively warned thereof by a sign.

36 Section ~~4D.18~~ 4D.06 Signal Indications – Design, Illumination, and Color, of Signal Sections
37 and Shape one paragraph relocated to Section 4D.12

38 Standard:

39 Each signal indication, except those used for pedestrian signal heads and lane-use control signals,
40 shall be circular or arrow.

41 Letters or numbers (including those associated with countdown displays) shall not be displayed as
42 part of a vehicular signal indication.

43 Strobes shall not be used within or adjacent to any signal indication.

44 Except for the flashing signal indications and the pre-emption confirmation lights that are expressly
45 allowed by the provisions of this Chapter, flashing displays shall not be used within or adjacent to any
46 signal indications.

47 ~~Each signal indication shall be independently illuminated.~~

48 Each circular signal indication shall emit a single color: red, yellow, or green.

49 Each arrow signal indication shall emit a single color: red, yellow, or green except that the alternate
50 display (dual-arrow signal section) of a GREEN ARROW and a YELLOW ARROW signal indication,
51 both pointing in the same direction, shall be permitted, provided that they are not displayed
52 simultaneously.

1 The arrow, which shall show only one direction, shall be the only illuminated part of an arrow
2 signal indication.

3 Arrows shall be pointed: **relocated from Section 4D.16**

4 A. Vertically upward to indicate a straight-through movement, or

5 B. Horizontally in the direction of the turn to indicate a turn at approximately or greater than a
6 right angle, ~~and~~ or

7 C. Upward with a slope at an angle approximately equal to that of the turn if the angle of the turn
8 is substantially less than a right angle, or

9 D. In a manner that directs the driver through the turn if a U-turn arrow is used (see Figure 4D-1).

10 Except ~~for the requirements of this section~~ as provided in Paragraph 10, the requirements of the
11 publication entitled “Standards for Vehicle Traffic Control Signal Heads” (see Section 1A.11) that
12 pertain to the aspects of the signal head design that affect the display of the signal indications shall be
13 met.

14 Guidance:

15 The intensity and distribution of light from each illuminated signal lens should ~~conform to~~ comply with
16 the ~~current~~ publications entitled “Standards for Vehicle Traffic Control Signal Heads” and “Traffic Signal
17 Lamps” (see Section 1A.11).

18 **Standard:**

19 **References to signal lenses in this section shall not be used to limit signal optical units to**
20 **incandescent lamps within optical assemblies that include lenses.**

21 Support:

22 Research has resulted in signal optical units that are not lenses, such as, but not limited to, light emitting
23 diode (LED) traffic signal modules. Some units are practical for all signal indications, and some are practical
24 for specific types such as visibility-limited signal indications.

25 Guidance:

26 If a signal indication is ~~operated in the flashing mode for nighttime operation and the signal indication is~~
27 so bright ~~as to~~ that it causes excessive glare during nighttime conditions, some form of automatic dimming
28 should be used to reduce the brilliance of the signal indication.

29 Section 4D.07 Size of Vehicular Signal Indications **paragraphs relocated from Section 4D.15**

30 **Standard:**

31 There shall be two nominal diameter sizes for vehicular signal ~~lenses~~ indications: 8 inches and 12
32 inches.

33 Except as provided in Paragraph 3 below, 12-inch signal ~~lenses~~ indications shall be used for all
34 signal sections in all new signal faces.*

35 ~~A. For signal indications for approaches (see definition in Section 4A.02) where road users view~~
36 ~~both traffic control and lane-use control signal heads simultaneously;~~

37 ~~B. If the nearest signal face is between 120 feet and 150 feet beyond the stop line, unless a~~
38 ~~supplemental near-side signal face is provided;~~

39 ~~C. For signal faces located more than 150 feet from the stop line;~~

40 ~~D. For approaches to all signalized locations for which the minimum sight distance in Table 4D-1~~
41 ~~cannot be met; and~~

42 ~~E. For arrow signal indications.~~

43 ~~An 8-inch signal lens for a CIRCULAR RED signal indication shall not be used in combination with~~
44 ~~a 12-inch signal lens for a CIRCULAR GREEN signal indication or a 12-inch signal lens for a~~
45 ~~CIRCULAR YELLOW signal indication.~~

46 Option:

47 ~~Different sizes of signal lenses may be used in the same signal face or signal head, except for the~~
48 ~~prohibitions listed in the Standards in this Section.~~

49 Eight-inch circular signal indications may be used in new signal faces only for:

50 A. The green or flashing yellow signal indications in an emergency-vehicle traffic control signal (see
51 Section 4G.02);

- B. The circular indications in signal faces controlling the approach to the downstream location where two adjacent signalized locations are close to each other and it is not practical because of factors such as high approach speeds, horizontal or vertical curves, or other geometric factors to install visibility-limited signal faces for the downstream approach;
- C. The circular indications in a signal face that is located less than 120 feet from the stop line on a roadway with a posted or statutory speed limit of 30 mph or less;
- D. The circular indications in a supplemental near-side signal face;
- E. The circular indications in a supplemental signal face installed for the sole purpose of controlling pedestrian movements (see Section 4D.03) rather than vehicular movements; and
- F. The circular indications in a signal face installed for the sole purpose of controlling a bikeway or a bicycle movement.

Existing 8-inch circular signal indications that are not included in Items A through F in Paragraph 3 may be retained for the remainder of their useful service life.

Guidance:

~~Twelve-inch signal lenses should be used for all signal indications for the following:~~

- ~~A. Approaches with 85th percentile approach speeds exceeding 40 mph;~~
- ~~B. Approaches where a traffic control signal might be unexpected;~~
- ~~C. All approaches without curbs and gutters where only post-mounted signal heads are used, and~~
- ~~D. Locations where there is a significant percentage of elderly drivers.~~

Section 4D.08 Positions of Signal Indications Within a Signal Face – General paragraphs

relocated from Section 4D.16

Support:

Standardization of the number and arrangements of signal sections in vehicular traffic control signal faces enables road users who are color vision deficient to identify the illuminated color by its position relative to other signal sections.

Standard:

Unless otherwise provided in this Manual for a particular application, each signal face at a signalized location shall have three, four, or five signal sections. Unless otherwise provided in this Manual for a particular application, if a vertical signal face includes a cluster (see Section 4D.09), the signal face shall have at least three vertical positions.

A single-section signal face shall be permitted at a traffic control signal if it consists of a continuously-~~illuminated~~ displayed GREEN ARROW signal ~~lens~~ indication that is being used to indicate a continuous movement.

The signal ~~lenses~~ sections in a signal face shall be arranged in a vertical or horizontal straight line, except ~~that in a vertical array, signal lenses of the same color may be arranged horizontally adjacent to each other at right angles to the basic straight line arrangement~~ as otherwise provided in Section 4D.09.

~~C. If The arrangement of adjacent signal indications sections in a signal face are not identical, their arrangement shall follow Items A or B above~~ the relative positions listed in Sections 4D.09 or 4D.10, as applicable.

If a signal section that displays a CIRCULAR YELLOW signal lens indication is used, it shall be located between the signal section that displays the red signal lens or lenses indication and all other signal ~~lenses~~ sections.

If a U-turn arrow signal section is used in a signal face for a U-turn to the left, its position in the signal face shall be the same as stated in Sections 4D.09 and 4D.10 for a left-turn arrow signal section of the same color. If a U-turn arrow signal section is used in a signal face for a U-turn to the right, its position in the signal face shall be the same as stated in Sections 4D.09 and 4D.10 for a right-turn arrow signal section of the same color.

A U-turn arrow signal indication pointing to the left shall not be used in a signal face that also contains a left-turn arrow signal indication. A U-turn arrow signal indication pointing to the right shall not be used in a signal face that also contains a right-turn arrow signal indication.

Option:

1 Within a signal face, two identical CIRCULAR RED or RED ARROW signal indications may be
2 displayed immediately horizontally adjacent to each other in a vertical or horizontal signal face (see Figure
3 4D-2) for emphasis.

4 Horizontally-arranged and vertically-arranged signal faces may be used on the same approach provided
5 they are separated to meet the lateral separation spacing required in Section 4D.13.

6 Support:

7 Figure 4D-2 illustrates some of the ~~possible~~ typical arrangements of signal ~~lenses~~ sections in signal faces
8 that do not control separate turning movements. Figures 4D-6 through 4D-12 illustrate the typical
9 arrangements of signal sections in left-turn signal faces. Figures 4D-13 through 4D-19 illustrate the typical
10 arrangements of signal sections in right-turn signal faces.

11 Section 4D.09 Positions of Signal Indications Within a Vertical Signal Face paragraphs relocated 12 from Section 4D.16

13 **Standard:**

14 In each vertically-arranged signal face, all signal sections that display red signal lenses indications
15 ~~in vertically-arranged signal faces~~ shall be located above, ~~and in horizontally-arranged signal faces shall~~
16 ~~be located to the left of,~~ all signal sections that display yellow and green signal lenses indications.

17 In vertically-arranged signal faces, each signal section that displays a YELLOW ARROW signal
18 lens indication shall be located ~~immediately~~ above the signal section that displays the GREEN ARROW
19 signal lens indication to which it applies.

20 The relative positions of signal lenses sections within the signal face in a vertically-arranged signal
21 face, from top to bottom, shall be as follows:

22 ~~A. In a vertically-arranged signal face from top to bottom:~~

23 CIRCULAR RED

24 Steady and/or flashing left-turn RED ARROW

25 Steady and/or flashing right-turn RED ARROW

26 CIRCULAR YELLOW

27 CIRCULAR GREEN

28 Straight-through GREEN ARROW

29 Steady left-turn YELLOW ARROW

30 Flashing left-turn YELLOW ARROW

31 Left-turn GREEN ARROW

32 Steady right-turn YELLOW ARROW

33 Flashing right-turn YELLOW ARROW

34 Right-turn GREEN ARROW

35 If a dual-arrow signal section (capable of alternating between the display of a GREEN ARROW
36 and a YELLOW ARROW signal indication) is used in a vertically-arranged signal face, the ~~lenses dual-~~
37 arrow signal section shall ~~be in~~ occupy the same position relative to the other lenses sections as ~~are~~ the
38 signal section that displays the GREEN ARROW signal lenses indication in a vertically-arranged signal
39 face would occupy.

40 Option:

41 In a vertically-arranged signal face, ~~identical~~ signal sections that display signal indications of the same
42 color may be ~~repeated in adjacent horizontal locations within the same signal face~~ arranged horizontally
43 adjacent to each other at right angles to the basic straight line arrangement to form a clustered signal face (see
44 Figures 4D-2, 4D-9, 4D-11, 4D-16, and 4D-18).

45 **Standard:**

46 Such clusters shall be limited to the following:

47 A. Two identical signal lenses sections,

48 B. ~~or to~~ Two or three different signal lenses sections that display signal indications of the same
49 color, or

50 C. For only the specific case described in Section 4D.25 (see Drawing B of Figure 4D-20), two
51 signal sections, one of which displays a GREEN ARROW signal indication and the other of
52 which displays a flashing YELLOW ARROW signal indication.

1 The signal section that displays a flashing yellow signal indication during steady mode operation:

2 A. Shall not be placed in the same vertical position as the signal section that displays a steady
3 yellow signal indication, and

4 B. Shall be placed below the signal section that displays a steady yellow signal indication.

5 Support:

6 Sections 4F.02 and 4G.04 contain exceptions to the provisions of this Section that are applicable to hybrid
7 beacons.

8 Section 4D.10 Positions of Signal Indications Within a Horizontal Signal Face paragraphs
9 relocated from Section 4D.16

10 Standard:

11 In each horizontally-arranged signal face, all signal sections that display red signal indications shall
12 be located to the left of all signal sections that display yellow and green signal indications.

13 In horizontally-arranged signal faces, ~~the~~ each signal section that displays a YELLOW ARROW
14 signal lens indication shall be located immediately to the left of the signal section that displays the
15 GREEN ARROW signal lens indication to which it applies.

16 ~~B.~~ The relative positions of signal sections in a horizontally-arranged signal face, from left to right,
17 shall be as follows:

18 CIRCULAR RED

19 Steady and/or flashing left-turn RED ARROW

20 Steady and/or flashing right-turn RED ARROW

21 CIRCULAR YELLOW

22 Steady left-turn YELLOW ARROW

23 Flashing left-turn YELLOW ARROW

24 Left-turn GREEN ARROW

25 CIRCULAR GREEN

26 Straight-through GREEN ARROW

27 Steady right-turn YELLOW ARROW

28 Flashing right-turn YELLOW ARROW

29 Right-turn GREEN ARROW

30 If a dual-arrow signal section (capable of alternating between the display of a GREEN ARROW
31 and a YELLOW ARROW signal indication) is used in a horizontally-arranged signal face, the signal
32 section that displays the dual left-turn arrow signal lens indication shall be located immediately to the
33 right of the signal section that displays the CIRCULAR YELLOW signal lens indication, the signal
34 section that displays the straight-through GREEN ARROW signal lens indication shall be located
35 immediately to the right of the signal section that displays the CIRCULAR GREEN signal lens
36 indication, and the signal section that displays the dual right-turn arrow signal lens indication shall be
37 located to the right of all other signal ~~lenses~~ sections.

38 The signal section that displays a flashing yellow signal indication during steady mode operation:

39 A. Shall not be placed in the same horizontal position as the signal section that displays a steady
40 yellow signal indication, and

41 B. Shall be placed to the right of the signal section that displays a steady yellow signal indication.

42 Section 4D.11 Number of Signal Faces on an Approach paragraphs relocated from Section 4D.15

43 Standard:

44 The signal faces for each approach to an intersection or a midblock location shall be provided as
45 follows:

46 A. If a signalized through movement exists on an approach, a minimum of two primary signal
47 faces shall be provided for the ~~major through movement on the approach, even if the major~~
48 ~~movement is a turning movement.~~ If a signalized through movement does not exist on an
49 approach, a minimum of two primary signal faces shall be provided for the signalized turning
50 movement that is considered to be the major movement from the approach (also see Section
51 4D.25).

52 B. See Sections 4D.17 through 4D.20 for left-turn (and U-turn to the left) signal faces.

1 **C. See Sections 4D.21 through 4D.24 for right-turn (and U-turn to the right) signal faces.**

2 Option:

3 Where a movement (or a certain lane or lanes) at the intersection never conflicts with any other signalized
4 vehicular or pedestrian movement, a continuously-displayed single-section GREEN ARROW signal
5 indication may be used to inform road users that the movement is free-flow and does not need to stop.

6 Support:

7 In some circumstances where the through movement never conflicts with any other signalized vehicular or
8 pedestrian movement at the intersection, such as at T-intersections with appropriate geometrics and/or
9 pavement markings and signing, an engineering study might determine that the through movement (or certain
10 lanes of the through movement) can be free-flow and not signalized.

11 Guidance:

12 If two or more left-turn lanes are provided for a separately controlled protected only mode left-turn
13 movement, or if a left-turn movement represents the major movement from an approach, two or more primary
14 left-turn signal faces should be provided.

15 If two or more right-turn lanes are provided for a separately controlled right-turn movement, or if a right-
16 turn movement represents the major movement from an approach, two or more primary right-turn signal faces
17 should be provided.

18 Support:

19 Locating primary signal faces overhead on the far side of the intersection has been shown to provide safer
20 operation by reducing intersection entries late in the yellow interval and by reducing red signal violations, as
21 compared to post-mounting signal faces at the roadside or locating signal faces overhead within the
22 intersection on a diagonally-oriented mast arm or span wire. On approaches with two or more lanes for the
23 through movement, one signal face per through lane, centered over each through lane, has also been shown to
24 provide safer operation.

25 Guidance:

26 If the posted or statutory speed limit or the 85th-percentile speed on an approach to a signalized location is
27 45 mph or higher, signal faces should be provided as follows for all new or reconstructed signal installations
28 (see Figure 4D-3):

- 29 A. The minimum number and location of primary (non-supplemental) signal faces for through traffic
30 should be provided in accordance with Table 4D-1.
31 B. If the number of overhead primary signal faces for through traffic is equal to the number of through
32 lanes on an approach, one overhead signal face should be located approximately over the center of
33 each through lane.
34 C. Except for shared left-turn and right-turn signal faces, any primary signal face required by Sections
35 4D.17 through 4D.25 for an exclusive turn lane should be located overhead approximately over the
36 center of each exclusive turn lane.
37 D. All primary signal faces should be located on the far side of the intersection.
38 E. In addition to the primary signal faces, one or more supplemental pole-mounted or overhead signal
39 faces should be considered to provide added visibility for approaching traffic that is traveling behind
40 large vehicles.
41 F. All signal faces should have backplates.

42 This layout of signal faces should also be considered for any major urban or suburban arterial street with
43 four or more lanes and for other approaches with speeds of less than 45 mph.

44 **Section 4D.12 Visibility, Aiming, and Shielding of Signal Faces**

45 **Standard:**

46 **The primary consideration in signal face placement, aiming, and adjustment shall be to optimize the**
47 **visibility of signal indications to approaching traffic. relocated from Section 4D.17**

48 **Road users approaching a signalized intersection or other signalized area, such as a midblock**
49 **crosswalk, shall be given a clear and unmistakable indication of their right-of-way assignment. relocated**
50 **from Section 4D.17**

51 **The geometry of each intersection to be signalized, including vertical grades, horizontal curves, and**
52 **obstructions as well as the lateral and vertical angles of sight toward a signal face, as determined by**

1 **typical driver-eye position, shall be considered in determining the vertical, longitudinal, and lateral**
2 **position of the signal face.** **relocated from Section 4D.17**

3 Guidance:

4 The two **primary** signal faces required **as a minimum** for each approach should be continuously visible to
5 traffic approaching the traffic control signal, from a point at least the minimum sight distance **indicated**
6 **provided** in Table 4D-2 in advance of and measured to the stop line. This range of continuous visibility
7 should be provided unless precluded by a physical obstruction or unless another signalized location is within
8 this range. **relocated from Section 4D.15**

9 There should be legal authority to prohibit the display of any unauthorized sign, signal, marking, or
10 device that interferes with the effectiveness of any official traffic control device (see Section 11-205 of the
11 “Uniform Vehicle Code”). **relocated from Section 4D.17**

12 At signalized midblock crosswalks, at least one of the signal faces should be over the traveled way for
13 each approach. **relocated from Section 4D.15**

14 **Standard:**

15 **~~E~~ If approaching traffic does not have a continuous view of at least two signal faces for at least the**
16 **minimum sight distance shown in Table 4D-2 cannot be met, a sign (see Section 2C.36) shall be installed**
17 **to warn approaching traffic of the traffic control signal.** **relocated from Section 4D.15**

18 Option:

19 If a sign is installed to warn approaching road users of the traffic control signal, the sign may be
20 supplemented by a Warning Beacon (see Section 4L.03). **relocated from Section 4D.15**

21 A Warning Beacon used in this manner may be interconnected with the traffic signal controller assembly
22 in such a manner as to flash yellow during the period when road users passing this beacon at the legal speed
23 for the roadway might encounter a red signal indication (or a queue resulting from the display of the red signal
24 indication) upon arrival at the signalized location. **relocated from Section 4D.15**

25 If the sight distance to the signal ~~heads facing the~~ **faces for an** approach is limited by horizontal or vertical
26 alignment, supplemental signal faces aimed at a point on the approach at which the signal indications first
27 become visible may be used. **relocated from Section 4D.17**

28 Guidance:

29 Supplemental signal faces should be used if engineering judgment has shown that they are needed to
30 achieve intersection visibility both in advance and immediately before the signalized location. **relocated from**
31 **Section 4D.15**

32 If supplemental signal faces are used, they should be located to provide optimum visibility for the
33 movement to be controlled. **relocated from Section 4D.15**

34 **Standard:**

35 **In cases where irregular street design necessitates placing signal faces for different street**
36 **approaches with a comparatively small angle between their respective signal lenses indications, each**
37 **signal lens indication shall, to the extent practical, be shielded or directed visibility-limited by signal**
38 **visors, signal louvers, or other means so that an approaching road user’s can see only view of the signal**
39 **lens(es) indication(s) controlling the movements on the road user’s other approaches is minimized.**
40 **relocated from Section 4D.17**

41 **Signal visors exceeding 12 inches in length shall not be used on free-swinging signal heads faces.**
42 **relocated from Section 4D.17**

43 Guidance:

44 Signal visors should be used on signal faces to aid in directing the signal indication specifically to
45 approaching traffic, as well as to reduce “sun phantom,” which can result when external light enters the lens.
46 **relocated from Section 4D.17**

47 The use of signal visors, or the use of signal faces or devices that direct the light without a reduction in
48 intensity, should be considered as an alternative to signal louvers because of the reduction in light output
49 caused by signal louvers. **relocated from Section 4D.17**

50 Option:

51 Special signal faces, such as visibility-limited signal faces, may be used such that the road user does not
52 see signal indications intended for other approaches before seeing the signal indications for their own

1 approach, if simultaneous viewing of both signal indications could cause the road user to be misdirected.
2 **relocated from Section 4D.17**

3 Guidance:

4 If the posted or statutory speed limit or the 85th-percentile speed on an approach to a signalized location is
5 45 mph or higher, signal backplates should be used on all of the signal faces that face the approach. ~~The use~~
6 of a Signal backplates for target value enhancement should also be considered for use on signal faces viewed
7 against a on approaches with posted or statutory speed limits or 85th-percentile speeds of less than 45 mph
8 where sun glare, bright sky, ~~or bright~~ and/or complex or confusing backgrounds indicate a need for enhanced
9 signal face target value. **relocated from Section 4D.17**

10 Support:

11 The use of backplates enhances the contrast between the traffic signal indications and their surroundings
12 for both day and night conditions, which is also helpful to ~~elderly~~ older drivers. **relocated from Section 4D.17**

13 **Standard:**

14 The inside of signal visors (hoods), the entire surface of louvers and fins, and the front surface of
15 backplates shall have a dull black finish to minimize light reflection and to increase contrast between
16 the signal indication and its background. **relocated from Section 4D.18**

17 Option:

18 A yellow retroreflective strip with a minimum width of 1 inch and a maximum width of 3 inches may be
19 placed along the perimeter of the face of a signal backplate to project a rectangular appearance at night.

20 Section 4D.13 Lateral Positioning of Signal Faces

21 **Standard:**

22 ~~4.~~ At least one and preferably both of the minimum of two primary signal faces required by Item
23 A in this Standard for the through movement (or the major turning movement if there is no through
24 movement) on the approach shall be located between two lines intersecting with the center of the
25 approach at a point 10 feet behind the stop line, one making an angle of approximately 20 degrees to the
26 right of the center of the approach extended, and the other making an angle of approximately 20
27 degrees to the left of the center of the approach extended (see Figure 4D-2). The signal face that satisfies
28 this requirement shall simultaneously satisfy the longitudinal placement requirement described in
29 Section 4D.14 (see Figure 4D-4). **relocated from Section 4D.15**

30 ~~5.~~ If both of the minimum of two primary signal faces required by Item A in this Standard for the
31 through movement (or the major turning movement if there is no through movement) on the approach
32 are post-mounted, they shall both be on the far side of the intersection, one on the right and one on the
33 left of the approach lane(s). **relocated from Section 4D.15**

34 ~~F.~~ The required signal faces for through traffic on any one an approach shall be located not less
35 than 8 feet apart measured horizontally perpendicular to the approach between the centers of the signal
36 faces. **relocated from Section 4D.15**

37 ~~G.~~ If more than one separate turn signal face is provided for a protected-mode turning movement
38 and if one or both of the separate turn signal faces are located over the roadway, the signal faces shall
39 be located not less than 8 feet apart measured horizontally perpendicular to the approach between the
40 centers of the signal faces. **relocated from Section 4D.15**

41 Guidance:

42 If a signal face controls a specific lane or lanes of an approach, its position should make it readily visible
43 to road users making that movement. **relocated from Section 4D.15**

44 Support:

45 Section 4D.11 contains additional provisions regarding lateral positioning of signal faces for approaches
46 having a posted or statutory speed limit or an 85th-percentile speed of 45 mph or higher.

47 **Standard:**

48 If an exclusive left-turn, right-turn, or U-turn lane is present on an approach and if a primary
49 separate turn signal face controlling that lane is mounted over the roadway, the primary separate turn
50 signal face shall not be positioned any further to the right than the extension of the right-hand edge of
51 the exclusive turn lane or any further to the left than the extension of the left-hand edge of the exclusive
52 turn lane.

1 Supplemental turn signal faces mounted over the roadway shall not be subject to the positioning
2 requirements in the previous paragraph.

3 Guidance:

4 For new or reconstructed signal installations, on an approach with an exclusive turn lane(s) for a left-turn
5 (or U-turn to the left) movement and with opposing vehicular traffic, signal faces that display a CIRCULAR
6 GREEN signal indication should not be post-mounted on the far-side median or mounted overhead above the
7 exclusive turn lane(s) or the extension of the lane(s).

8 Standard:

9 If supplemental post-mounted signal faces are used, the following limitations shall apply: repeated
10 from new Section 4D.10

11 A. Left-turn arrows and U-turn arrows to the left shall not be used in near-right signal faces.

12 B. Right-turn arrows and U-turn arrows to the right shall not be used in far-left signal faces. A
13 far-side median-mounted signal face shall be considered a far-left signal for this application.

14 Section 4D.14 Longitudinal Positioning of Signal Faces text relocated from Section 4D.15

15 Standard:

16 Except where the width of an intersecting roadway or other conditions make it physically
17 impractical, the signal faces for each approach to an intersection or a midblock location shall be
18 provided as follows:

19 ~~D. Except where the width of an intersecting roadway or other conditions make it physically~~
20 ~~impractical;~~

21 A. A signal face installed to satisfy the requirements for primary left-turn signal faces (see Sections
22 4D.17 through 4D.20) and primary right-turn signal faces (see Sections 4D.21 through 4D.24),
23 and at least one and preferably both of the minimum of two primary signal faces required for
24 the ~~major~~ through movement (or the major turning movement if there is no through movement)
25 on the approach shall be located:

- 26 1. ~~No~~ less than 40 feet beyond the stop line,
- 27 2. ~~No~~ more than 180 feet beyond the stop line unless a supplemental near-side signal face is
28 provided, and
- 29 3. As near as practical to the line of the driver's normal view, if mounted over the roadway.

30 The primary signal face that satisfies this requirement shall simultaneously satisfy the lateral
31 placement requirement described in Section 4D.13 (see Figure 4D-4).

32 B. Where the nearest signal face is located between 150 and 180 feet beyond the stop line,
33 engineering judgment of the conditions, including the worst-case visibility conditions, shall be
34 used to determine if the provision of a supplemental near-side signal face would be beneficial.

35 Support:

36 Section 4D.11 contains additional provisions regarding longitudinal positioning of signal faces for
37 approaches having a posted or 85th-percentile speed of 45 mph or higher.

38 Guidance:

39 Supplemental near-side signal faces should be located as near as practical to the stop line.

40 Section 4D.15 Mounting Height of Signal Faces

41 Standard:

42 The top of the signal housing of a vehicular signal face located over a roadway any portion of a
43 highway that can be used by motor vehicles shall not be more than 25.6 feet above the pavement.

44 relocated from Section 4D.17

45 ~~3. A signal face installed to satisfy the requirements for left turn signal faces (see Section 4D.06)~~
46 ~~and right turn signal faces (see Section 4D.07), and at least one and preferably both of the two signal~~
47 ~~faces required for the major movement on the approach shall be located no higher than at a maximum~~
48 ~~height to the top of the signal housing mounted over a roadway of 25.6 feet above the pavement (see~~
49 ~~Section 4D.17). For viewing distances between 40 and 53 feet from the stop line, the maximum~~
50 ~~mounting height to the top of the signal housing shall be as shown in Figure 4D-5. (See Section 4D.17~~

1 ~~for additional information regarding mounting heights.)~~ relocated from Section 4D.15 (the first sentence
2 was deleted as it is covered in the previous paragraph)

3 The bottom of the signal housing and any related attachments to a vehicular signal face located over
4 ~~a roadway~~ any portion of a highway that can be used by motor vehicles shall be at least 15 feet above
5 the pavement. ~~relocated from Section 4D.17~~

6 The bottom of the signal housing (including brackets) of a vehicular signal face that is vertically
7 arranged and not located over a roadway: ~~relocated from Section 4D.17~~

- 8 A. Shall be ~~at least~~ a minimum of 8 feet ~~but not more than~~ and a maximum of 19 feet above the
9 sidewalk or, if there is no sidewalk, above the pavement grade at the center of the roadway.
10 B. Shall be ~~at least~~ a minimum of 4.5 feet ~~but not more than~~ and a maximum of 19 feet above the
11 median island grade of a center median island if located on the near side of the intersection.

12 The bottom of the signal housing (including brackets) of a vehicular signal face that is horizontally
13 arranged and not located over a roadway: ~~relocated from Section 4D.17~~

- 14 A. Shall be ~~at least~~ a minimum of 8 feet ~~but not more than~~ and a maximum of 22 feet above the
15 sidewalk or, if there is no sidewalk, above the pavement grade at the center of the roadway.
16 B. Shall be ~~at least~~ a minimum of 4.5 feet ~~but not more than~~ and a maximum of 22 feet above the
17 median island grade of a center median island if located on the near side of the intersection.

18 Section 4D.16 Lateral Offset (Clearance) of Signal Faces ~~text relocated from Section 4D.17~~

19 Standard:

20 Signal ~~heads~~ faces mounted at the side of a roadway with curbs at less than 15 feet from the bottom
21 of the housing and any related attachments ~~at the side of a roadway with curbs~~ shall have a horizontal
22 clearance offset of not less than 2 feet from the face of a vertical curb, or if there is no curb, ~~signal-~~
23 ~~heads shall have a horizontal clearance of~~ not less than 2 feet from the edge of a shoulder.

24 Section ~~4D.06~~ 4D.17 ~~Application of Steady~~ Signal Indications for Left-Turns Movements – 25 General

26 Standard:

27 In Sections 4D.17 through 4D.20, provisions applicable to left-turn movements and left-turn lanes
28 shall also apply to signal indications for U-turns to the left that are provided at locations where left
29 turns are prohibited or not geometrically possible.

30 Support:

31 Left-turning traffic is controlled by one of four modes as follows:

- 32 A. Permissive Only Mode—turns made on ~~the a~~ CIRCULAR GREEN signal indication, a flashing left-
33 turn YELLOW ARROW signal indication, or a flashing left-turn RED ARROW signal indication
34 after yielding to pedestrians, if any, and/or oncoming opposing traffic, if any and pedestrians.
35 B. Protected Only Mode—turns made only when ~~the a~~ left-turn GREEN ARROW signal indication is
36 displayed.
37 C. Protected/Permissive Mode—both modes can occur on an approach during the same cycle.
38 D. Variable Left-Turn Mode—the operating mode changes among the protected only mode and/or the
39 protected/permissive mode and/or the permissive only mode during different periods of the day or as
40 traffic conditions change.

41 Option:

42 In areas having a high percentage of ~~elderly~~ older drivers, special consideration may be given to the use of
43 protected only mode left-turn phasing, when appropriate.

44 Standard:

45 During a permissive left-turn movement, the signal faces for through traffic on the opposing
46 approach shall simultaneously display green or steady yellow signal indications. If pedestrians crossing
47 the lane or lanes used by the permissive left-turn movement to depart the intersection are controlled by
48 pedestrian signal heads, the signal indications displayed by those pedestrian signal heads shall not be
49 limited to any particular display during the permissive left-turn movement.

50 During a protected left-turn movement, the signal faces for through traffic on the opposing
51 approach shall simultaneously display steady CIRCULAR RED signal indications. If pedestrians

1 crossing the lane or lanes used by the protected left-turn movement to depart the intersection are
2 controlled by pedestrian signal heads, the pedestrian signal heads shall display a steady UPRAISED
3 HAND (symbolizing DONT WALK) signal indication during the protected left-turn movement.

4 A protected only mode left-turn movement that does not begin and terminate at the same time as
5 the adjacent through movement shall not be provided on an approach unless an exclusive left-turn lane
6 exists.

7 A yellow change interval for the left-turn movement shall not be displayed when the status of the
8 left-turn operation is changing from permissive to protected within any given signal sequence.

9 ~~D. Variable Left-Turn Mode—If the protected only operating mode occurs during one or more~~
10 ~~periods of the day, and the permissive only mode or the combined protected/permissive mode occurs~~
11 ~~changes among the protected only mode and/or the protected/permissive mode and/or the permissive~~
12 ~~only mode during other different periods of the day or as traffic conditions change, the requirements of~~
13 ~~Items A, B, and C in this Standard Sections 4D.18 through 4D.20 that are appropriate to that mode of~~
14 ~~operation shall be met, subject to the following:~~

- 15 A. The CIRCULAR GREEN and CIRCULAR YELLOW signal indications shall not be displayed
16 when operating in the protected only mode.
17 B. The left-turn GREEN ARROW and left-turn YELLOW ARROW signal indications shall not be
18 displayed when operating in the permissive only mode.

19 Option:

20 Additional ~~appropriate signal indications~~ static signs or changeable message signs may be used to meet
21 the requirements for the variable left-turn mode or to inform drivers that left-turn green arrows will not be
22 available during certain times of the day.

23 Support:

24 Sections 4D.17 through 4D.20 describe the use of the following two types of signal faces for controlling
25 left-turn movements:

- 26 A. Shared signal face – This type of signal face controls both the left-turn movement and the adjacent
27 movement (usually the through movement) and can serve as one of the two required primary signal
28 faces for the adjacent movement. A shared signal face always displays the same color of circular
29 indication that is displayed by the signal face or faces for the adjacent movement. If a shared signal
30 face that provides protected/permissive mode left turns is mounted overhead at the intersection, it is
31 usually positioned over or slightly to the right of the extension of the lane line separating the left-turn
32 lane from the adjacent lane.
33 B. Separate left-turn signal face – This type of signal face controls only the left-turn movement and
34 cannot serve as one of the two required primary signal faces for the adjacent movement (usually the
35 through movement) because it displays signal indications that are applicable only to the left-turn
36 movement. If a separate left-turn signal face is mounted overhead at the intersection, it is positioned
37 over the extension of the left-turn lane. In a separate left-turn signal face, a flashing left-turn
38 YELLOW ARROW signal indication or a flashing left-turn RED ARROW signal indication is used to
39 control permissive left-turning movements.

40 Section 4D.13 contains provisions regarding the lateral positioning of signal faces that control left-turn
41 movements.

42 It is not necessary that the same mode of left-turn operation or same type of left-turn signal face be used
43 on every approach to a signalized location. Selecting different modes and types of left-turn signal faces for
44 the various approaches to the same signalized location is acceptable.

45 Option:

46 A signal face that is shared by left-turning and right-turning traffic may be provided for a shared left-
47 turn/right-turn lane on an approach that has no through traffic (see Section 4D.25).

48 Section 4D.18 Signal Indications for Permissive Only Mode Left-Turn Movements

49 Standard:

50 ~~The required left-turn signal faces and operation for an approach shall be determined by the~~
51 ~~selected mode of left-turn operation, as follows:~~

1 ~~A. Permissive Only Mode~~—If a shared signal face is provided for a permissive only mode left
2 turns, it shall meet the following requirements (see Figure 4D-6):

3 ~~A. The signal indications for permissive only mode left turns shall be provided by the signal faces~~
4 ~~controlling the through movement, or by a permissive only left turn signal face that is either a~~
5 ~~shared signal face or a separate signal face. It shall be capable of displaying the following signal~~
6 ~~indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, and CIRCULAR~~
7 ~~GREEN. Only one of the three indications shall be displayed at any given time.~~

8 B. During the permissive left-turn movement, a CIRCULAR GREEN signal indication shall be
9 displayed.

10 C. A permissive only shared signal face, regardless of where ~~the permissive only left turn signal~~
11 ~~face~~ it is positioned and regardless of how many adjacent through signal faces are provided,
12 shall always simultaneously display the same color of circular indication that the adjacent
13 through signal face or faces display. ~~A separate permissive only left turn signal face sometimes~~
14 ~~displays a different color of circular signal indication than the adjacent through signal faces~~
15 ~~display.~~

16 D. If the permissive only mode is not the only left-turn mode used for the approach, the signal face
17 shall be the same shared signal face that is used for the protected/permissive mode (see Section
18 4D.20) except that the left-turn GREEN ARROW and left-turn YELLOW ARROW signal
19 indications shall not be displayed when operating in the permissive only mode.

20 If a separate left-turn signal face is ~~provided for~~ being operated in a permissive only left-turns
21 mode, it shall meet the following requirements: a CIRCULAR GREEN signal indication shall not be
22 used in that face.

23 ~~A. During the permissive left turn movement, the left turn signal face shall display a CIRCULAR~~
24 ~~GREEN signal indication.~~

25 ~~B. If the CIRCULAR GREEN and CIRCULAR YELLOW signal indications in the left turn signal~~
26 ~~face are visibility limited from the adjacent through movement, the left turn signal face shall~~
27 ~~not be required to simultaneously display the same color of circular signal indication as the~~
28 ~~signal faces for the adjacent through movement.~~

29 ~~C. If the CIRCULAR GREEN and CIRCULAR YELLOW signal indications in the left turn signal~~
30 ~~face are visibility limited from the adjacent through movement, the display of a CIRCULAR~~
31 ~~GREEN signal indication for a permissive left turn movement while the signal faces for the~~
32 ~~adjacent through movement display CIRCULAR RED signal indications and the opposing left~~
33 ~~turn signal faces display left turn GREEN ARROW signal indications for a protected left turn~~
34 ~~movement shall be permitted.~~

35 ~~D. If the left turn signal face does not simultaneously display the same color of circular signal~~
36 ~~indication as the signal faces for the adjacent through movement, a LEFT TURN YIELD ON~~
37 ~~GREEN (symbolic green ball) (R10-12) sign or a LEFT TURN SIGNAL—YIELD ON GREEN~~
38 ~~(symbolic green ball) (R10-21) sign (see Figure 2B-19) shall be used.~~

39 If a separate left-turn signal face is being operated in a permissive only left-turn mode and a
40 flashing left-turn YELLOW ARROW signal indication is provided, it shall meet the following
41 requirements (see Figure 4D-7):

42 A. It shall be capable of displaying the following signal indications: steady left-turn RED ARROW,
43 steady left-turn YELLOW ARROW, and flashing left-turn YELLOW ARROW. Only one of
44 the three indications shall be displayed at any given time.

45 B. During the permissive left-turn movement, a flashing left-turn YELLOW ARROW signal
46 indication shall be displayed.

47 C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing
48 left-turn YELLOW ARROW signal indication.

49 D. It shall be permitted to display a flashing left-turn YELLOW ARROW signal indication for a
50 permissive left-turn movement while the signal faces for the adjacent through movement display
51 steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-
52 turn GREEN ARROW signal indications for a protected left-turn movement.

53 E. During steady mode (stop-and-go) operation, the signal section that displays the steady left-turn
54 YELLOW ARROW signal indication during change intervals shall not be used to display the
55 flashing left-turn YELLOW ARROW signal indication for permissive left turns.

- 1 F. During flashing mode operation (see Section 4D.30), the display of a flashing left-turn
2 YELLOW ARROW signal indication shall be only from the signal section that displays a steady
3 left-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.
4 G. If the permissive only mode is not the only left-turn mode used for the approach, the signal face
5 shall be the same separate left-turn signal face with a flashing YELLOW ARROW signal
6 indication that is used for the protected/permissive mode (see Section 4D.20) except that the left-
7 turn GREEN ARROW signal indication shall not be displayed when operating in the permissive
8 only mode.

9 Option:

10 A separate left-turn signal face with a flashing left-turn RED ARROW signal indication during the
11 permissive left-turn movement may be used for unusual geometric conditions, such as wide medians with
12 offset left-turn lanes, but only when an engineering study determines that each and every vehicle must
13 successively come to a full stop before making a permissive left turn.

14 Standard:

15 If a separate left-turn signal face is being operated in a permissive only left-turn mode and a
16 flashing left-turn RED ARROW signal indication is provided, it shall meet the following requirements
17 (see Figure 4D-8):

- 18 A. It shall be capable of displaying the following signal indications: steady or flashing left-turn
19 RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one
20 of the three indications shall be displayed at any given time. The GREEN ARROW indication is
21 required in order to provide a three-section signal face, but shall not be displayed during the
22 permissive only mode.
23 B. During the permissive left-turn movement, a flashing left-turn RED ARROW signal indication
24 shall be displayed, thus indicating that each and every vehicle must successively come to a full
25 stop before making a permissive left turn.
26 C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing
27 left-turn RED ARROW signal indication.
28 D. It shall be permitted to display a flashing left-turn RED ARROW signal indication for a
29 permissive left-turn movement while the signal faces for the adjacent through movement display
30 steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-
31 turn GREEN ARROW signal indications for a protected left-turn movement.
32 E. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON
33 FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).

34 Option:

35 The requirements of Item A in Paragraph 5 may be met by a vertically-arranged signal face with a
36 horizontal cluster of two left-turn RED ARROW signal indications, the left-most of which displays a steady
37 indication and the right-most of which displays a flashing indication (see Figure 4D-8).

38 Section 4D.19 Signal Indications for Protected Only Mode Left-Turn Movements

39 Standard:

40 A shared signal face shall not be used for protected only mode left turns unless the CIRCULAR
41 GREEN and left-turn GREEN ARROW signal indications always begin and terminate together. If a
42 shared signal face is provided for a protected only mode left turn, it shall meet the following
43 requirements (see Figure 4D-9):

- 44 A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED,
45 steady CIRCULAR YELLOW, CIRCULAR GREEN, and left-turn GREEN ARROW. Only
46 one of the three colors shall be displayed at any given time.
47 B. During the protected left-turn movement, the shared signal face shall simultaneously display
48 both a CIRCULAR GREEN signal indication and a left-turn GREEN ARROW signal
49 indication.
50 C. The shared signal face shall always simultaneously display the same color of circular indication
51 that the adjacent through signal face or faces display.
52 D. If the protected only mode is not the only left-turn mode used for the approach, the signal face
53 shall be the same shared signal face that is used for the protected/permissive mode (see Section
54 4D.20).

1 Option:

2 A straight-through GREEN ARROW signal indication may be used instead of the CIRCULAR GREEN
3 signal indication in Items A and B in Paragraph 1 on an approach where right turns are prohibited and a
4 straight-through GREEN ARROW signal indication is also used instead of a CIRCULAR GREEN signal
5 indication in the other signal face(s) for through traffic.

6 Standard:

7 ~~B. Protected Only Mode—The left-turn signal face~~ If a separate left-turn signal face is provided
8 for a protected only mode left turn, it shall meet the following requirements (see Figure 4D-10):

9 A. It shall be capable of displaying, ~~one of~~ the following ~~sets of~~ signal indications: ~~1, steady~~ left-
10 turn RED ARROW, ~~steady left-turn~~ YELLOW ARROW, and ~~left-turn~~ GREEN ARROW
11 signal indications only. At least one left-turn signal face shall be provided in addition to the two
12 approach signal faces required in Section 4D.15 for the major movement. Only one of the three
13 colors ~~indications~~ shall be ~~illuminated~~ displayed at any given time. A signal instruction sign
14 shall not be required with this set of signal indications. If used, it shall be a LEFT ON GREEN
15 ARROW ONLY (R10-5) sign (see Figure 2B-27).

16 ~~2. CIRCULAR RED, left-turn YELLOW ARROW, and left-turn GREEN ARROW signal~~
17 ~~indications. At least one left-turn signal face shall be provided in addition to the two approach~~
18 ~~signal faces required in Section 4D.15 for the major movement. Only one of the three colors~~
19 ~~shall be illuminated at any given time. Unless the CIRCULAR RED signal indication is~~
20 ~~shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in~~
21 ~~the through lane(s), a LEFT TURN SIGNAL (R10-10) sign shall be used.~~

22 ~~3. CIRCULAR RED, CIRCULAR YELLOW, CIRCULAR GREEN, and left-turn GREEN~~
23 ~~ARROW signal indications. This four-section signal face shall be used only when the~~
24 ~~CIRCULAR GREEN and left-turn GREEN ARROW signal indications begin and terminate~~
25 ~~together. During each interval, the circular signal indication shall be the same color as the~~
26 ~~signal indication on the signal face(s) for the adjacent through traffic.~~

27 B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall
28 be displayed.

29 C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-
30 turn GREEN ARROW signal indication.

31 D. If the protected only mode is not the only left-turn mode used for the approach, the signal face
32 shall be the same separate left-turn signal face that is used for the protected/permissive mode
33 (see Section 4D.20 and Figures 4D-8 and 4D-12) except that the flashing left-turn YELLOW
34 ARROW or flashing left-turn RED ARROW signal indication shall not be displayed when
35 operating in the protected only mode.

36 Section 4D.20 Signal Indications for Protected/Permissive Mode Left-Turn Movements

37 Standard:

38 ~~C. Protected/Permissive Mode—The signal indications for protected/permissive mode left turns~~
39 ~~shall be provided in either a shared signal face or a separate signal face. Any~~
40 ~~protected/permissive left-turn signal face that always simultaneously displays the same color of~~
41 ~~circular signal indication that the adjacent through signal faces display shall be considered to be~~
42 ~~a shared signal face, regardless of where the left-turn signal face is positioned and regardless of~~
43 ~~how many adjacent through signal faces are provided. Any protected/permissive left-turn~~
44 ~~signal face that sometimes displays a different color of circular signal indication than the~~
45 ~~adjacent through signal faces display shall be considered to be a separate signal face. The~~
46 ~~requirements for each type of signal face are as follows:~~

47 1, If a shared signal face is provided for a protected/permissive mode left turn, it shall ~~be considered~~
48 an approach signal face, and shall meet the following requirements (see Figure 4D-11):

49 A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED,
50 steady CIRCULAR YELLOW, CIRCULAR GREEN, steady left-turn YELLOW ARROW, and
51 left-turn GREEN ARROW. Only one of the three circular indications shall be displayed at any
52 given time. Only one of the two arrow indications shall be displayed at any given time. If the
53 left-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s)

1 for the adjacent through movement are always terminated together, the steady left-turn
2 YELLOW ARROW signal indication shall not be required.

- 3 B. During the protected left-turn movement, the shared signal face shall simultaneously display a
4 left-turn GREEN ARROW signal indication and a circular signal indication that is the same
5 color as the signal indication for the adjacent through lane on the same approach as the
6 protected left turn. ~~During the protected left-turn movement, the signal faces for through-~~
7 ~~traffic on the opposing approach shall simultaneously display CIRCULAR RED signal-~~
8 ~~indications.~~

9 C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-
10 turn GREEN ARROW signal indication, unless the left-turn GREEN ARROW signal indication
11 and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are being
12 terminated together. When the left-turn GREEN ARROW and CIRCULAR GREEN signal
13 indications are being terminated together, the required display following the left-turn GREEN
14 ARROW signal indication shall be either the display of a CIRCULAR YELLOW signal
15 indication alone or the simultaneous display of the CIRCULAR YELLOW and left-turn
16 YELLOW ARROW signal indications.

17 D. During the permissive left-turn movement, ~~all signal faces on the approach~~ the shared signal
18 face shall display only a CIRCULAR GREEN signal indications.

19 E. ~~All signal faces on the approach~~ A protected/permissive shared signal face, regardless of where
20 it is positioned and regardless of how many adjacent through signal faces are provided, shall
21 always simultaneously display the same color of circular indications to both through and left-
22 turn road users that the adjacent through signal face or faces display.

23 F. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON
24 GREEN (symbolic circular green ~~ball~~) (R10-12) sign (see Figure 2B-27).

25 ~~⚠~~ If a separate left-turn signal face is provided being operated in a protected/permissive left-turn
26 mode, it shall be considered a left-turn signal face, and shall meet the following requirements: a
27 CIRCULAR GREEN signal indication shall not be used in that face.

28 ~~A. During the protected left-turn movement, the left-turn signal face shall display a left-turn~~
29 ~~GREEN ARROW signal indication. During the protected left-turn movement, the signal faces~~
30 ~~for through traffic on the opposing approach shall simultaneously display CIRCULAR RED~~
31 ~~signal indications.~~

32 ~~B. During the permissive left-turn movement, the left-turn signal face shall display a CIRCULAR~~
33 ~~GREEN signal indication.~~

34 ~~C. If the CIRCULAR GREEN and CIRCULAR YELLOW signal indications in the left-turn signal~~
35 ~~face are visibility limited from the adjacent through movement, the left-turn signal face shall~~
36 ~~not be required to simultaneously display the same color of circular signal indication as the~~
37 ~~signal faces for the adjacent through movement.~~

38 ~~D. If the CIRCULAR GREEN and CIRCULAR YELLOW signal indications in the left-turn signal~~
39 ~~face are visibility limited from the adjacent through movement, the display of a CIRCULAR~~
40 ~~GREEN signal indication for a permissive left-turn movement while the signal faces for the~~
41 ~~adjacent through movement display CIRCULAR RED signal indications and the opposing left-~~
42 ~~turn signal face displays a left-turn GREEN ARROW for a protected left-turn movement shall~~
43 ~~be permitted.~~

44 ~~E. If the left-turn signal face does not simultaneously display the same color of circular signal~~
45 ~~indication as the signal faces for the adjacent through movement, a LEFT TURN SIGNAL~~
46 ~~YIELD ON GREEN (symbolic green ball) (R10-21) sign (see Figure 2B-19) shall be used.~~

47 If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a
48 flashing left-turn YELLOW ARROW signal indication is provided, it shall meet the following
49 requirements (see Figure 4D-12):

50 A. It shall be capable of displaying the following signal indications: steady left-turn RED ARROW,
51 steady left-turn YELLOW ARROW, flashing left-turn YELLOW ARROW, and left-turn
52 GREEN ARROW. Only one of the four indications shall be displayed at any given time.

53 B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall
54 be displayed.

55 C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-
56 turn GREEN ARROW signal indication.

- 1 D. During the permissive left-turn movement, a flashing left-turn YELLOW ARROW signal
2 indication shall be displayed.
- 3 E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing
4 left-turn YELLOW ARROW signal indication if the permissive left-turn movement is being
5 terminated and the separate left-turn signal face will subsequently display a steady left-turn
6 RED ARROW indication.
- 7 F. It shall be permitted to display a flashing left-turn YELLOW ARROW signal indication for a
8 permissive left-turn movement while the signal faces for the adjacent through movement display
9 steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-
10 turn GREEN ARROW signal indications for a protected left-turn movement.
- 11 G. When a permissive left-turn movement is changing to a protected left-turn movement, a left-
12 turn GREEN ARROW signal indication shall be displayed immediately upon the termination of
13 the flashing left-turn YELLOW ARROW signal indication. A steady left-turn YELLOW
14 ARROW signal indication shall not be displayed between the display of the flashing left-turn
15 YELLOW ARROW signal indication and the display of the steady left-turn GREEN ARROW
16 signal indication.
- 17 H. The display shall be a four-section signal face except that a three-section signal face containing a
18 dual-arrow signal section shall be permitted where signal head height limitations (or lateral
19 positioning limitations for a horizontally-mounted signal face) will not permit the use of a four-
20 section signal face. The dual-arrow signal section, where used, shall display a GREEN ARROW
21 for the protected left-turn movement and a flashing YELLOW ARROW for the permissive left-
22 turn movement.
- 23 I. During steady mode (stop-and-go) operation, the signal section that displays the steady left-turn
24 YELLOW ARROW signal indication during change intervals shall not be used to display the
25 flashing left-turn YELLOW ARROW signal indication for permissive left turns.
- 26 J. During flashing mode operation (see Section 4D.30), the display of a flashing left-turn
27 YELLOW ARROW signal indication shall be only from the signal section that displays a steady
28 left-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.

29 Option:

30 A separate left-turn signal face with a flashing left-turn RED ARROW signal indication during the
31 permissive left-turn movement may be used for unusual geometric conditions, such as wide medians with
32 offset left-turn lanes, but only when an engineering study determines that each and every vehicle must
33 successively come to a full stop before making a permissive left turn.

34 Standard:

35 If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a
36 flashing left-turn RED ARROW signal indication is provided, it shall meet the following requirements
37 (see Figure 4D-8):

- 38 A. It shall be capable of displaying the following signal indications: steady or flashing left-turn
39 RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one
40 of the three indications shall be displayed at any given time.
- 41 B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall
42 be displayed.
- 43 C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-
44 turn GREEN ARROW signal indication.
- 45 D. During the permissive left-turn movement, a flashing left-turn RED ARROW signal indication
46 shall be displayed.
- 47 E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing
48 left-turn RED ARROW signal indication if the permissive left-turn movement is being
49 terminated and the separate left-turn signal face will subsequently display a steady left-turn
50 RED ARROW indication.
- 51 F. When a permissive left-turn movement is changing to a protected left-turn movement, a left-
52 turn GREEN ARROW signal indication shall be displayed immediately upon the termination of
53 the flashing left-turn RED ARROW signal indication. A steady left-turn YELLOW ARROW
54 signal indication shall not be displayed between the display of the flashing left-turn RED
55 ARROW signal indication and the display of the steady left-turn GREEN ARROW signal
56 indication.

1 G. It shall be permitted to display a flashing left-turn RED ARROW signal indication for a
2 permissive left-turn movement while the signal faces for the adjacent through movement display
3 steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-
4 turn GREEN ARROW signal indications for a protected left-turn movement.

5 H. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON
6 FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).

7 Option:

8 The requirements of Item A in Paragraph 5 may be met by a vertically-arranged signal face with a
9 horizontal cluster of two left-turn RED ARROW signal indications, the left-most of which displays a steady
10 indication and the right-most of which displays a flashing indication (see Figure 4D-8).

11 **Section ~~4D.07~~ 4D.21 ~~Application of Steady~~ Signal Indications for Right-Turns Movements –**
12 **General**

13 **Standard:**

14 In Sections 4D.21 through 4D.24, provisions applicable to right-turn movements and right-turn
15 lanes shall also apply to signal indications for U-turns to the right that are provided at locations where
16 right turns are prohibited or not geometrically possible.

17 **Support:**

18 Right-turning traffic is controlled by one of four modes as follows:

- 19 A. Permissive Only Mode—turns made on ~~the~~ a CIRCULAR GREEN signal indication, a flashing right-
20 turn YELLOW ARROW signal indication, or a flashing right-turn RED ARROW signal indication
21 after yielding to pedestrians, if any.
22 B. Protected Only Mode—turns made only when ~~the~~ a right-turn GREEN ARROW signal indication is
23 displayed.
24 C. Protected/Permissive Mode—both modes occur on an approach during the same cycle.
25 D. Variable Right-Turn Mode—the operating mode changes among the protected only mode and/or the
26 protected/permissive mode and/or the permissive only mode during different periods of the day or as
27 traffic conditions change.

28 **Standard:**

29 During a permissive right-turn movement, the signal faces, if any, that exclusively control U-turn
30 traffic that conflicts with the permissive right-turn movement (see Item F.1 in Section 4D.05) shall
31 simultaneously display steady U-turn RED ARROW signal indications. If pedestrians crossing the lane
32 or lanes used by the permissive right-turn movement to depart the intersection are controlled by
33 pedestrian signal heads, the signal indications displayed by those pedestrian signal heads shall not be
34 limited to any particular display during the permissive right-turn movement.

35 During a protected right-turn movement, the signal faces for left-turn traffic, if any, on the
36 opposing approach shall not simultaneously display a steady left-turn GREEN ARROW or steady left-
37 turn YELLOW ARROW signal indication, and signal faces, if any, that exclusively control U-turn
38 traffic that conflicts with the protected right-turn movement (see Item F.1 in Section 4D.05) shall
39 simultaneously display steady U-turn RED ARROW signal indications. If pedestrians crossing the lane
40 or lanes used by the protected right-turn movement to depart the intersection are controlled by
41 pedestrian signal heads, the pedestrian signal heads shall display a steady UPRAISED HAND
42 (symbolizing DONT WALK) signal indication during the protected right-turn movement.

43 A protected only mode right-turn movement that does not begin and terminate at the same time as
44 the adjacent through movement shall not be provided on an approach unless an exclusive right-turn
45 lane exists.

46 A yellow change interval for the right-turn movement shall not be displayed when the status of the
47 right-turn operation is changing from permissive to protected within any given signal sequence.

48 ~~D. Variable Right-Turn Mode—If the protected only operating mode occurs during one or more~~
49 ~~periods of the day, and the permissive only mode or the combined protected/permissive mode occurs~~
50 ~~changes among the protected only mode and/or the protected/permissive mode and/or the permissive~~
51 ~~only mode during other different periods of the day or as traffic conditions change, the requirements of~~
52 ~~Items A, B, and C in this Standard Sections 4D.22 through 4D.24 that are appropriate to that mode of~~
53 **operation shall be met, subject to the following:**

- 1 **A. The CIRCULAR GREEN and CIRCULAR YELLOW signal indications shall not be displayed**
2 **when operating in the protected only mode.**
3 **B. The right-turn GREEN ARROW and right-turn YELLOW ARROW signal indications shall**
4 **not be displayed when operating in the permissive only mode.**

5 Option:

6 Additional ~~appropriate signal indications~~ static signs or changeable message signs may be used to meet
7 the requirements for the variable right-turn mode or to inform drivers that right-turn green arrows will not be
8 available during certain times of the day.

9 Support:

10 Sections 4D.21 through 4D.24 describe the use of the following two types of signal faces for controlling
11 right-turn movements:

- 12 A. Shared signal face – This type of signal face controls both the right-turn movement and the adjacent
13 movement (usually the through movement) and can serve as one of the two required primary signal
14 faces for the adjacent movement. A shared signal face always displays the same color of circular
15 indication that is displayed by the signal face or faces for the adjacent movement.
16 B. Separate right-turn signal face – This type of signal face controls only the right-turn movement and
17 cannot serve as one of the two required primary signal faces for the adjacent movement (usually the
18 through movement) because it displays signal indications that are applicable only to the right-turn
19 movement. If a separate right-turn signal face is mounted overhead at the intersection, it is positioned
20 over the extension of the right-turn lane. In a separate right-turn signal face, a flashing right-turn
21 YELLOW ARROW signal indication or a flashing right-turn RED ARROW signal indication is used
22 to control permissive right-turning movements.

23 Section 4D.13 contains provisions regarding the lateral positioning of signal faces that control right-turn
24 movements.

25 It is not necessary that the same mode of right-turn operation or same type of right-turn signal face be
26 used on every approach to a signalized location. Selecting different modes and types of right-turn signal faces
27 for the various approaches to the same signalized location is acceptable.

28 Option:

29 A signal face that is shared by left-turning and right-turning traffic may be provided for a shared left-
30 turn/right-turn lane on an approach that has no through traffic (see Section 4D.25).

31 Section 4D.22 Signal Indications for Permissive Only Mode Right-Turn Movements

32 Standard:

33 ~~The required right-turn signal faces and operation for an approach shall be determined by the~~
34 ~~selected mode of right-turn operation, as follows:~~

- 35 ~~A. Permissive Only Mode—A separate signal indication or signal face for right turns shall not be~~
36 ~~required. The signal indication for permissive only mode right turns shall be the same color as~~
37 ~~the signal indication for adjacent through traffic, except that if the right turn is held to provide~~
38 ~~an exclusive pedestrian movement, a separate right-turn RED ARROW signal indication shall~~
39 ~~be provided.~~

40 If a shared signal face is provided for a permissive only mode right turn, it shall meet the following
41 requirements (see Figure 4D-13):

- 42 A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED,
43 steady CIRCULAR YELLOW, and CIRCULAR GREEN. Only one of the three indications
44 shall be displayed at any given time.
45 B. During the permissive right-turn movement, a CIRCULAR GREEN signal indication shall be
46 displayed.
47 C. A permissive only shared signal face, regardless of where it is positioned and regardless of how
48 many adjacent through signal faces are provided, shall always simultaneously display the same
49 color of circular indication that the adjacent through signal face or faces display.
50 D. If the permissive only mode is not the only right-turn mode used for the approach, the signal
51 face shall be the same shared signal face that is used for the protected/permissive mode (see
52 Section 4D.24) except that the right-turn GREEN ARROW and right-turn YELLOW ARROW
53 signal indications shall not be displayed when operating in the permissive only mode.

1 If a separate right-turn signal face is being operated in a permissive only right-turn mode, a
2 CIRCULAR GREEN signal indication shall not be used in that face.

3 If a separate right-turn signal face is being operated in a permissive only right-turn mode and a
4 flashing right-turn YELLOW ARROW signal indication is provided, it shall meet the following
5 requirements (see Figure 4D-14):

6 A. It shall be capable of displaying one of the following sets of signal indications:

- 7 1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, and flashing right-
8 turn YELLOW ARROW. Only one of the three indications shall be displayed at any given
9 time.
- 10 2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, and flashing right-turn
11 YELLOW ARROW. Only one of the three indications shall be displayed at any given time.
12 If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for
13 the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a
14 RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the
15 CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded,
16 louvered, positioned, or designed such that it is not readily visible to drivers in the through
17 lane(s).

18 B. During the permissive right-turn movement, a flashing right-turn YELLOW ARROW signal
19 indication shall be displayed.

20 C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the
21 flashing right-turn YELLOW ARROW signal indication.

22 D. When the separate right-turn signal face is providing a message to stop and remain stopped, a
23 steady right-turn RED ARROW signal indication shall be displayed if it is intended that right
24 turns on red not be permitted (except when a traffic control device is in place permitting a turn
25 on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication
26 shall be displayed if it is intended that right turns on red be permitted.

27 E. It shall be permitted to display a flashing right-turn YELLOW ARROW signal indication for a
28 permissive right-turn movement while the signal faces for the adjacent through movement
29 display steady CIRCULAR RED signal indications.

30 F. During steady mode (stop-and-go) operation, the signal section that displays the steady right-
31 turn YELLOW ARROW signal indication during change intervals shall not be used to display
32 the flashing right-turn YELLOW ARROW signal indication for permissive right turns.

33 G. During flashing mode operation (see Section 4D.30), the display of a flashing right-turn
34 YELLOW ARROW signal indication shall be only from the signal section that displays a steady
35 right-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.

36 H. If the permissive only mode is not the only right-turn mode used for the approach, the signal
37 face shall be the same separate right-turn signal face with a flashing YELLOW ARROW signal
38 indication that is used for the protected/permissive mode (see Section 4D.24) except that the
39 right-turn GREEN ARROW signal indication shall not be displayed when operating in the
40 permissive only mode.

41 Option:

42 When an engineering study determines that each and every vehicle must successively come to a full stop
43 before making a permissive right turn, a separate right-turn signal face with a flashing right-turn RED
44 ARROW signal indication during the permissive right-turn movement may be used.

45 Standard:

46 If a separate right-turn signal face is being operated in a permissive only right-turn mode and a
47 flashing right-turn RED ARROW signal indication is provided, it shall meet the following requirements
48 (see Figure 4D-15):

49 A. It shall be capable of displaying one of the following sets of signal indications:

- 50 1. Steady or flashing right-turn RED ARROW, steady right-turn YELLOW ARROW, and
51 right-turn GREEN ARROW. Only one of the three indications shall be displayed at any
52 given time. The GREEN ARROW indication is required in order to provide a three-section
53 signal face, but shall not be displayed during permissive only mode.

1 2. Steady CIRCULAR RED on the left and steady right-turn RED ARROW on the right of the
2 top position, steady right-turn YELLOW ARROW in the middle position, and right-turn
3 GREEN ARROW in the bottom position. Only one of the four indications shall be
4 displayed at any given time. The GREEN ARROW indication is required in order to
5 provide three vertical positions, but shall not be displayed during permissive only mode. If
6 the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the
7 adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT
8 TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR
9 RED signal indication in the separate right-turn signal face is shielded, hooded, louvered,
10 positioned, or designed such that it is not readily visible to drivers in the through lane(s).

11 B. During the permissive right-turn movement, a flashing right-turn RED ARROW signal
12 indication shall be displayed, thus indicating that each and every vehicle must successively come
13 to a full stop before making a permissive right turn.

14 C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the
15 flashing right-turn RED ARROW signal indication.

16 D. When the separate right-turn signal face is providing a message to stop and remain stopped, a
17 steady right-turn RED ARROW signal indication shall be displayed if it is intended that right
18 turns on red not be permitted (except when a traffic control device is in place permitting a turn
19 on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication
20 shall be displayed if it is intended that right turns on red be permitted.

21 E. The display of a flashing right-turn RED ARROW signal indication for a permissive right-turn
22 movement while the signal faces for the adjacent through movement display steady CIRCULAR
23 RED signal indications and the opposing left-turn signal faces display left-turn GREEN
24 ARROW signal indications for a protected left-turn movement shall be permitted.

25 F. A supplementary sign shall not be required. If used, it shall be a RIGHT TURN YIELD ON
26 FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).

27 Option:

28 The requirements of Item A.1 in Paragraph 5 may be met by a vertically-arranged signal face with a
29 horizontal cluster of two right-turn RED ARROW signal indications, the left-most of which displays a steady
30 indication and the right-most of which displays a flashing indication (see Figure 4D-15).

31 Section 4D.23 Signal Indications for Protected Only Mode Right-Turn Movements

32 Standard:

33 A shared signal face shall not be used for protected only mode right turns unless the CIRCULAR
34 GREEN and right-turn GREEN ARROW signal indications always begin and terminate together. If a
35 shared signal face is provided for a protected only right turn, it shall meet the following requirements
36 (see Figure 4D-16):

37 A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED,
38 steady CIRCULAR YELLOW, CIRCULAR GREEN, and right-turn GREEN ARROW. Only
39 one of the three colors shall be displayed at any given time.

40 B. During the protected right-turn movement, the shared signal face shall simultaneously display
41 both a CIRCULAR GREEN signal indication and a right-turn GREEN ARROW signal
42 indication.

43 C. The shared signal face shall always simultaneously display the same color of circular indication
44 that the adjacent through signal face or faces display.

45 D. If the protected only mode is not the only right-turn mode used for the approach, the signal face
46 shall be the same shared signal face that is used for the protected/permissive mode (see Section
47 4D.24).

48 Option:

49 A straight-through GREEN ARROW signal indication may be used instead of the CIRCULAR GREEN
50 signal indication in Items A and B in Paragraph 1 on an approach where left turns are prohibited and a
51 straight-through GREEN ARROW signal indication is also used instead of a CIRCULAR GREEN signal
52 indication in the other signal face(s) for through traffic.

53 Standard:

1 ~~**B. Protected Only Mode—The**~~ If a separate right-turn signal face is provided for a protected only
2 mode right turn, it shall meet the following requirements (see Figure 4D-17):

3 A. It shall be capable of displaying one of the following sets of signal indications:

- 4 1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, and right-turn
5 GREEN ARROW signal indications only. At least one right-turn signal face shall be
6 provided in addition to the two approach signal faces required in Section 4D.15 for the
7 major movement. Only one of the three colors indications shall be illuminated displayed at
8 any given time. A signal instruction sign shall not be required with this set of signal
9 indications. If used, it shall be a RIGHT ON GREEN ARROW ONLY (R10-5a) sign (see
10 Figure 2B-27).
- 11 2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, and right-turn GREEN
12 ARROW signal indications. At least one right-turn signal face shall be provided in addition
13 to the two approach signal faces required in Section 4D.15 for the major movement. Only
14 one of three colors indications shall be illuminated displayed at any given time. If the
15 CIRCULAR RED signal indication is sometimes displayed when the signal faces for the
16 adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT
17 TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR
18 RED signal indication is shielded, hooded, louvered, positioned, or designed such that it is
19 not readily visible to drivers in the through lane(s), a RIGHT TURN SIGNAL (R10-10R)
20 sign shall be used.
- 21 ~~3. CIRCULAR RED, CIRCULAR YELLOW, CIRCULAR GREEN, and right-turn GREEN~~
22 ~~ARROW signal indications. This four-section signal face shall be used only when the~~
23 ~~CIRCULAR GREEN and right-turn GREEN ARROW signal indications begin and~~
24 ~~terminate together. During each interval, the circular signal indication shall be the same~~
25 ~~color as the signal indication on the signal faces for the adjacent through traffic.~~

26 B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication
27 shall be displayed.

28 C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-
29 turn GREEN ARROW signal indication.

30 D. When the separate signal face is providing a message to stop and remain stopped, a steady
31 right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on
32 red not be permitted (except when a traffic control device is in place permitting a turn on a
33 steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication shall be
34 displayed if it is intended that right turns on red be permitted.

35 E. If the protected only mode is not the only right-turn mode used for the approach, the signal face
36 shall be the same separate right-turn signal face that is used for the protected/permissive mode
37 (see Section 4D.24 and Figure 4D-19) except that a flashing right-turn YELLOW ARROW or
38 flashing right-turn RED ARROW signal indication shall not be displayed when operating in the
39 protected only mode.

40 Section 4D.24 Signal Indications for Protected/Permissive Mode Right-Turn Movements

41 Standard:

42 ~~**C. If a shared Protected/Permissive Mode—A separate**~~ signal face is not required for the right turn,
43 but, if provided for a protected/permissive mode right turn, it shall be considered an approach signal
44 face, and shall meet the following requirements (see Figure 4D-18):

45 A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED,
46 steady CIRCULAR YELLOW, CIRCULAR GREEN, steady right-turn YELLOW ARROW,
47 and right-turn GREEN ARROW. Only one of the three circular indications shall be displayed
48 at any given time. Only one of the two arrow indications shall be displayed at any given time. If
49 the right-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal
50 indication(s) for the adjacent through movement are always terminated together, the steady
51 right-turn YELLOW ARROW signal indication shall not be required.

52 B. During the protected right-turn movement, the shared signal face shall simultaneously display a
53 right-turn GREEN ARROW signal indication and a circular signal indication that is the same

1 color as the signal indication for the adjacent through lane on the same approach as the
2 protected right turn.

3 C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-
4 turn GREEN ARROW signal indication, unless the right-turn GREEN ARROW signal
5 indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement
6 are being terminated together. When the right-turn GREEN ARROW and CIRCULAR
7 GREEN signal indications are being terminated together, the required display following the
8 right-turn GREEN ARROW signal indication shall be either the display of a CIRCULAR
9 YELLOW signal indication alone or the simultaneous display of the CIRCULAR YELLOW
10 and right-turn YELLOW ARROW signal indications.

11 D. During the permissive right-turn movement, ~~all signal faces on the approach~~ the shared signal
12 face shall display only a CIRCULAR GREEN signal indications.

13 E. ~~All signal faces on the approach~~ A protected/permissive shared signal face, regardless of where
14 it is positioned and regardless of how many adjacent through signal faces are provided, shall
15 always simultaneously display the same color of circular indications ~~to both through and right-~~
16 turn road users that the adjacent through signal face or faces display.

17 If a separate right-turn signal face is being operated in a protected/permissive right-turn mode, a
18 CIRCULAR GREEN signal indication shall not be used in that face.

19 If a separate right-turn signal face is being operated in a protected/permissive right-turn mode and
20 a flashing right-turn YELLOW ARROW signal indication is provided, it shall meet the following
21 requirements (see Figure 4D-19):

22 A. It shall be capable of displaying one of the following sets of signal indications:

23 1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, flashing right-turn
24 YELLOW ARROW, and right-turn GREEN ARROW. Only one of the four indications
25 shall be displayed at any given time.

26 2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, flashing right-turn
27 YELLOW ARROW, and right-turn GREEN ARROW. Only one of the four indications
28 shall be displayed at any given time. If the CIRCULAR RED signal indication is sometimes
29 displayed when the signal faces for the adjacent through lane(s) are not displaying a
30 CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure
31 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn
32 signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily
33 visible to drivers in the through lane(s).

34 B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication
35 shall be displayed.

36 C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-
37 turn GREEN ARROW signal indication.

38 D. During the permissive right-turn movement, a flashing right-turn YELLOW ARROW signal
39 indication shall be displayed.

40 E. A steady right-turn YELLOW ARROW signal indication shall be displayed following the
41 flashing right-turn YELLOW ARROW signal indication if the permissive right-turn movement
42 is being terminated and the separate right-turn signal face will subsequently display a steady
43 red indication.

44 F. When a permissive right-turn movement is changing to a protected right-turn movement, a
45 right-turn GREEN ARROW signal indication shall be displayed immediately upon the
46 termination of the flashing right-turn YELLOW ARROW signal indication. A steady right-
47 turn YELLOW ARROW signal indication shall not be displayed between the display of the
48 flashing right-turn YELLOW ARROW signal indication and the display of the steady right-
49 turn GREEN ARROW signal indication.

50 G. When the separate right-turn signal face is providing a message to stop and remain stopped, a
51 steady right-turn RED ARROW signal indication shall be displayed if it is intended that right
52 turns on red not be permitted (except when a traffic control device is in place permitting a turn
53 on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication
54 shall be displayed if it is intended that right turns on red be permitted.

- 1 H. It shall be permitted to display a flashing right-turn YELLOW ARROW signal indication for a
2 permissive right-turn movement while the signal faces for the adjacent through movement
3 display steady CIRCULAR RED signal indications.
- 4 I. A signal face containing a dual-arrow signal section in place of separate flashing right-turn
5 YELLOW ARROW and right-turn GREEN ARROW signal sections shall be permitted where
6 signal head height limitations (or lateral positioning limitations for a horizontally-mounted
7 signal face) are a concern. The dual-arrow signal section, where used, shall display a GREEN
8 ARROW for the protected right-turn movement and a flashing YELLOW ARROW for the
9 permissive right-turn movement.
- 10 J. During steady mode (stop-and-go) operation, the signal section that displays the steady right-
11 turn YELLOW ARROW signal indication during change intervals shall not be used to display
12 the flashing right-turn YELLOW ARROW signal indication for permissive right turns.
- 13 K. During flashing mode operation (see Section 4D.30), the display of a flashing right-turn
14 YELLOW ARROW signal indication shall be only from the signal section that displays a steady
15 right-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.

16 Option:

17 When an engineering study determines that each and every vehicle must successively come to a full stop
18 before making a permissive right turn, a separate signal face that has a flashing right-turn RED ARROW
19 signal indication during the permissive right-turn movement may be used.

20 Standard:

21 If a separate right-turn signal face is being operated in a protected/permissive right-turn mode and
22 a flashing right-turn RED ARROW signal indication is provided, it shall meet the following
23 requirements (see Figure 4D-15):

- 24 A. It shall be capable of displaying one of the following sets of signal indications:
- 25 1. Steady or flashing right-turn RED ARROW, steady right-turn YELLOW ARROW, and
26 right-turn GREEN ARROW. Only one of the three indications shall be displayed at any
27 given time.
 - 28 2. Steady CIRCULAR RED on the left and steady or flashing right-turn RED ARROW on the
29 right of the top position, steady right-turn YELLOW ARROW in the middle position, and
30 right-turn GREEN ARROW in the bottom position. Only one of the four indications shall
31 be displayed at any given time. If the CIRCULAR RED signal indication is sometimes
32 displayed when the signal faces for the adjacent through lane(s) are not displaying a
33 CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure
34 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn
35 signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily
36 visible to drivers in the through lane(s).
- 37 B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication
38 shall be displayed.
- 39 C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-
40 turn GREEN ARROW signal indication.
- 41 D. During the permissive right-turn movement, the separate right-turn signal face shall display a
42 flashing right-turn RED ARROW signal indication.
- 43 E. A steady right-turn YELLOW ARROW signal indication shall be displayed following the
44 flashing right-turn RED ARROW signal indication if the permissive right-turn movement is
45 being terminated and the separate right-turn signal face will subsequently display a steady red
46 indication.
- 47 F. When a permissive right-turn movement is changing to a protected right-turn movement, a
48 right-turn GREEN ARROW signal indication shall be displayed immediately upon the
49 termination of the flashing right-turn RED ARROW signal indication. A steady right-turn
50 YELLOW ARROW signal indication shall not be displayed between the display of the flashing
51 right-turn RED ARROW signal indication and the display of the steady right-turn GREEN
52 ARROW signal indication.
- 53 G. When the separate right-turn signal face is providing a message to stop and remain stopped, a
54 steady right-turn RED ARROW signal indication shall be displayed if it is intended that right
55 turns on red not be permitted (except when a traffic control device is in place permitting a turn

1 on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication
2 shall be displayed if it is intended that right turns on red be permitted.

3 H. It shall be permitted to display a flashing right-turn RED ARROW signal indication for a
4 permissive right-turn movement while the signal faces for the adjacent through movement
5 display steady CIRCULAR RED signal indications and the opposing left-turn signal faces
6 display left-turn GREEN ARROW signal indications for a protected left-turn movement.

7 I. A supplementary sign shall not be required. If used, it shall be a RIGHT TURN YIELD ON
8 FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).

9 Option:

10 The requirements of Item A.1 in Paragraph 5 may be met by a vertically-arranged signal face with a
11 horizontal cluster of two right-turn RED ARROW signal indications, the left-most of which displays a steady
12 indication and the right-most of which displays a flashing indication (see Figure 4D-15).

13 Section 4D.25 Signal Indications for Approaches With Shared Left-Turn/Right-Turn Lanes
14 and No Through Movement

15 Support:

16 A lane that is shared by left-turn and right-turn movements is sometimes provided on an approach that has
17 no through movement, such as the stem of a T-intersection or where the opposite approach is a one-way
18 roadway in the opposing direction.

19 Standard:

20 When a shared left-turn/right-turn lane exists on a signalized approach, the left-turn and right-turn
21 movements shall start and terminate simultaneously and the red signal indication used in each of the
22 signal faces on the approach shall be a CIRCULAR RED.

23 Support:

24 This requirement for the use of CIRCULAR RED signal indications in signal faces for approaches having
25 a shared lane for left-turn and right-turn movements is a specific exception to other provisions in this Chapter
26 that would otherwise require the use of RED ARROW signal indications.

27 Standard:

28 The signal faces provided for an approach with a shared left-turn/right-turn lane and no through
29 movement shall be one of the following:

30 A. Two or more signal faces, each capable of displaying CIRCULAR RED, CIRCULAR
31 YELLOW, and CIRCULAR GREEN signal indications, shall be provided for the approach.
32 This display shall be permissible regardless of number of exclusive left-turn and/or right-turn
33 lanes that exist on the approach in addition to the shared left-turn/right-turn lane and
34 regardless of whether or not there are pedestrian or opposing vehicular movements that conflict
35 with the left-turn or right-turn movements. However, if there is an opposing approach and the
36 signal phasing protects the left-turn movement on the approach with the shared left-turn/right-
37 turn lane from conflicts with the opposing vehicular movements and any signalized pedestrian
38 movements, a left-turn GREEN ARROW signal indication shall also be included in the left-most
39 signal face and shall be displayed simultaneously with the CIRCULAR GREEN signal
40 indication.

41 B. If the approach has one or more exclusive turn lanes in addition to the shared left-turn/right-
42 turn lane and there is no conflict with a signalized vehicular or pedestrian movement, and
43 GREEN ARROW signal indications are used in place of CIRCULAR GREEN signal indications
44 on the approach, the signal faces for the approach shall be:

45 1. A signal face(s) capable of displaying CIRCULAR RED, YELLOW ARROW, and GREEN
46 ARROW signal indications for the exclusive turn lane(s), with the arrows pointing in the
47 direction of the turn, and

48 2. A shared left-turn/right-turn signal face capable of displaying CIRCULAR RED, left-turn
49 YELLOW ARROW, left-turn GREEN ARROW, right-turn YELLOW ARROW, and right-
50 turn GREEN ARROW signal indications, in an arrangement of signal sections that complies
51 with the provisions of Section 4D.09 or 4D.10.

52 C. If the approach has one or more exclusive turn lanes in addition to the shared left-turn/right-
53 turn lane and there is a conflict with a signalized vehicular or pedestrian movement, and

1 flashing YELLOW ARROW signal indications are used in place of CIRCULAR GREEN signal
2 indications on the approach, the signal faces for the approach shall be as described in Items B.1
3 and B.2, except that flashing YELLOW ARROW signal indications shall be used in place of the
4 GREEN ARROW signal indications for the turning movement(s) that conflicts with the
5 signalized vehicular or pedestrian movement.

6 Support:

7 Figure 4D-20 illustrates application of these Standards on approaches that have only a shared left-
8 turn/right-turn lane, and on approaches that have one or more exclusive turn lanes in addition to the shared
9 left-turn/right-turn lane.

10 Option:

11 If the lane-use regulations on an approach are variable such that at certain times all of the lanes on the
12 approach are designated as exclusive turn lanes and no lane is designated as a shared left-turn/right-turn lane:

13 A. During the times that no lane is designated as a shared left-turn/right-turn lane, the left-turn and right-
14 turn movements may start and terminate independently, and the left-turn and right-turn movements
15 may be operated in one or more of the modes of operation as described in Sections 4D.17 through
16 4D.24; and

17 B. If a protected-permissive mode is used, the shared left-turn/right-turn signal face provided in
18 Paragraph 4 may be modified to include a dual-arrow signal section capable of displaying both a
19 GREEN ARROW signal indication and a flashing YELLOW ARROW signal indication for a turn
20 movement(s) in order to not exceed the maximum of five sections per signal face provided in Section
21 4D.08.

22 **Section ~~4D.10~~ 4D.26 Yellow Change and Red Clearance Intervals**

23 **Standard:**

24 A steady yellow signal indication shall be displayed following every CIRCULAR GREEN or
25 GREEN ARROW signal indication and following every flashing YELLOW ARROW or flashing RED
26 ARROW signal indication displayed as a part of a steady mode operation. This requirement shall not
27 apply when a CIRCULAR GREEN, a flashing YELLOW ARROW, or a flashing RED ARROW signal
28 indication is followed immediately by a GREEN ARROW signal indication.

29 The exclusive function of the yellow change interval shall be to warn traffic of an impending change
30 in the right-of-way assignment.

31 The duration of ~~a~~ the yellow change interval shall be ~~pre~~determined using engineering practices.

32 Support:

33 Section 4D.05 contains provisions regarding the display of steady CIRCULAR YELLOW signal
34 indications to approaches from which drivers are allowed to make permissive left turns.

35 ~~Option~~ Guidance:

36 When indicated by the application of engineering practices, the yellow change interval ~~may~~ should be
37 followed by a red clearance interval to provide additional time before conflicting traffic movements, including
38 pedestrians, are released.

39 **Standard:**

40 When used, the duration of ~~a~~ the red clearance interval shall be ~~pre~~determined using engineering
41 practices.

42 Support:

43 Engineering practices for determining the duration of yellow change and red clearance intervals can be
44 found in ITE's "Traffic Control Devices Handbook" and in ITE's "Manual of Traffic Signal Design" (see
45 Section 1A.11).

46 **Standard:**

47 The durations of yellow change intervals and red clearance intervals shall be consistent with the
48 determined values within the technical capabilities of the controller unit.

49 The duration of a yellow change interval shall not vary on a cycle-by-cycle basis within the same
50 signal timing plan.

1 Except as provided in Paragraph 12, the duration of a red clearance interval shall not be decreased
2 or omitted on a cycle-by-cycle basis within the same signal timing plan.

3 Option:

4 The duration of a red clearance interval may be extended from its predetermined value for a given cycle
5 based upon the detection of a vehicle that is predicted to violate the red signal indication.

6 When an actuated signal sequence includes a signal phase for permissive/protected (lagging) left-turn
7 movements in both directions, the red clearance interval may be shown during those cycles when the lagging
8 left-turn signal phase is skipped and may be omitted during those cycles when the lagging left-turn signal
9 phase is shown.

10 The duration of a yellow change interval or a red clearance interval may be different in different signal
11 timing plans for the same controller unit.

12 Guidance:

13 A yellow change interval should have a minimum duration of ~~approximately 3 to~~ seconds and a maximum
14 duration of 6 seconds. The longer intervals should be reserved for use on approaches with higher speeds.

15 Except when clearing a one-lane, two-way facility (see Section 4H.02) or when clearing an exceptionally
16 wide intersection, a red clearance interval should have a duration not exceeding 6 seconds.

17 **Standard:**

18 Except for warning beacons mounted on advance warning signs on the approach to a signalized
19 location (see Section 2C.36), signal displays that are intended to provide a “pre-yellow warning”
20 interval, such as flashing green signal indications, vehicular countdown displays, or other similar
21 displays, shall not be used at a signalized location.

22 **Support:**

23 The use of signal displays (other than warning beacons mounted on advance warning signs) that convey a
24 “pre-yellow warning” have been found by research to increase the frequency of crashes.

25 **Section ~~4D.13~~ 4D.27 Preemption and Priority Control of Traffic Control Signals**

26 Option:

27 Traffic control signals may be designed and operated to respond to certain classes of approaching vehicles
28 by altering the normal signal timing and phasing plan(s) during the approach and passage of those vehicles.
29 The alternative plan(s) may be as simple as extending a currently displayed green interval or as complex as
30 replacing the entire set of signal phases and timing.

31 Support:

32 Preemption control (see definition in Section 1A.13) is typically given to trains, boats, emergency
33 vehicles, and light rail transit.

34 Examples of preemption control include the following:

- 35 A. The prompt displaying of green signal indications at signalized locations ahead of fire vehicles, law
36 enforcement vehicles, ambulances, and other official emergency vehicles;
- 37 B. A special sequence of signal phases and timing to expedite and/or provide additional clearance time
38 for vehicles to clear the tracks prior to the arrival of ~~a train~~ rail traffic; and
- 39 C. A special sequence of signal phases to display a steady red indication to prohibit turning movements
40 toward the tracks during the approach or passage of ~~a train or transit vehicle~~ rail traffic.

41 Priority control (see definition in Section 1A.13) is typically given to certain non-emergency vehicles
42 such as ~~buses and~~ light-rail transit vehicles operating in a mixed-use alignment and buses.

43 Examples of priority control include the following:

- 44 A. The displaying of early or extended green signal indications at an intersection to assist public transit
45 vehicles in remaining on schedule, and
- 46 B. Special phasing to assist public transit vehicles in entering the travel stream ahead of the platoon of
47 traffic.

48 Some types or classes of vehicles supersede others when a traffic control signal responds to more than one
49 type or class. In general, a vehicle that is more difficult to control supersedes a vehicle that is easier to
50 control. ~~Typically, the order of priority is: train, boat, heavy vehicle (fire vehicle, emergency medical~~
51 ~~service), light vehicle (law enforcement), light rail transit, rubber-tired transit.~~

1 Option:

2 Preemption or priority control of traffic control signals may also be a means of assigning priority right-of-
3 way to specified classes of vehicles at certain non-intersection locations such as on approaches to one-lane
4 bridges and tunnels, movable bridges, highway maintenance and construction activities, metered freeway
5 entrance ramps, and transit operations.

6 **Standard:**

7 **During the transition into preemption control:**

- 8 A. The yellow change interval, and any red clearance interval that follows, shall not be shortened
9 or omitted.
10 B. The shortening or omission of any pedestrian walk interval and/or pedestrian change interval
11 shall be permitted.
12 C. The return to the previous ~~steady~~ green signal indication shall be permitted following a steady
13 yellow signal indication in the same signal face, omitting the red clearance interval, if any.

14 **During preemption control and during the transition out of preemption control:**

- 15 A. The shortening or omission of any yellow change interval, and of any red clearance interval that
16 follows, shall not be permitted.
17 B. A signal indication sequence from a steady yellow signal indication to a ~~steady~~ green signal
18 indication shall not be permitted.

19 **During priority control and during the transition into or out of priority control:**

- 20 A. The shortening or omission of any yellow change interval, and of any red clearance interval that
21 follows, shall not be permitted.
22 B. The shortening of any pedestrian walk interval below that time described in Section 4E.06 shall
23 not be permitted.
24 C. The omission of a pedestrian walk interval and its associated change interval shall not be
25 permitted unless the associated vehicular phase is also omitted or the pedestrian phase is
26 exclusive.
27 D. The shortening or omission of any pedestrian change interval shall not be permitted.
28 E. A signal indication sequence from a steady yellow signal indication to a ~~steady~~ green signal
29 indication shall not be permitted.

30 Guidance:

31 [Except for traffic control signals interconnected with light rail transit systems, traffic control signals with](#)
32 [railroad preemption or coordinated with flashing-light signal systems should be provided with a back-up](#)
33 [power supply.](#)

34 When a traffic control signal that is returning to a steady mode from a dark mode (typically upon
35 restoration from a power failure) receives a preemption or priority request, care should be exercised to
36 minimize the possibility of vehicles or pedestrians being misdirected into a conflict with the vehicle making
37 the request.

38 Option:

39 During the change from a dark mode to a steady mode under a preemption or priority request, the display
40 of signal indications that could misdirect road users may be prevented by [one or more of](#) the following
41 [methods](#):

- 42 A. Having the traffic control signal remain in the dark mode,
43 B. Having the traffic control signal remain in the flashing mode,
44 C. Altering the flashing mode,
45 D. Executing the normal start-up routine before responding, or
46 E. Responding directly to initial or dwell period.

47 Guidance:

48 If a traffic control signal is installed near or within a ~~highway-railroad~~ grade crossing or if a ~~highway-~~
49 ~~railroad~~ grade crossing with active traffic control devices is within or near a signalized highway intersection,
50 Chapter 8C should be consulted.

51 Traffic control signals operating under preemption control or under priority control should be operated in
52 a manner designed to keep traffic moving.

1 Traffic control signals that are designed to respond under preemption or priority control to more than one
2 type or class of vehicle should be designed to respond in the relative order of importance or difficulty in
3 stopping the type or class of vehicle. ~~Typically,~~ The order of priority ~~is~~ **should be**: train, boat, heavy vehicle
4 (fire vehicle, emergency medical service), light vehicle (law enforcement), light rail transit, rubber-tired
5 transit.

6 Option:

7 A distinctive indication may be provided at the intersection to show that an emergency vehicle has been
8 given control of the traffic control signal (see Section 11-106 of the “Uniform Vehicle Code”). In order to
9 assist in the understanding of the control of the traffic signal, a common distinctive indication may be used
10 where drivers from different agencies travel through the same intersection when responding to emergencies.

11 If engineering judgment indicates that light rail transit signal indications would reduce road user
12 confusion that might otherwise occur if standard traffic signal indications were used to control these
13 movements, light rail transit signal indications complying with Section 8C.11 and as illustrated in Figure 8C-3
14 may be used for preemption or priority control of the following exclusive movements at signalized
15 intersections:

16 A. Public transit buses in “queue jumper” lanes, and

17 B. Bus rapid transit in semi-exclusive or mixed-use alignments.

18 Section 4D.28 Flashing Operation of Traffic Control Signals – General

19 **Standard:**

20 **The light source of a flashing signal indication shall be flashed continuously at a rate of not less than**
21 **50 or more than 60 times per minute.** **relocated from Section 4D.11**

22 **The ~~illuminated~~ displayed period of each flash shall be ~~not less than half a minimum of 1/2~~ and ~~not~~**
23 **~~more than two thirds~~ a maximum of 2/3 of the total flash cycle.** **relocated from Section 4D.11**

24 **Flashing signal indications shall comply with the requirements of other Sections of this Manual**
25 **regarding ~~shielding~~ visibility-limiting or positioning of conflicting signal indications, except that**
26 **flashing yellow signal indications for through traffic shall not be required to be ~~shielded~~ visibility-**
27 **limited or positioned to ~~prevent~~ minimize visual conflict for road users in separately controlled turn**
28 **lanes.** **relocated from Section 4D.11**

29 **Each traffic control signal shall be provided with an independent flasher mechanism that operates**
30 **in compliance with this Section.** **relocated from Section 4D.12**

31 **The flashing operation shall not be terminated by removal or turn off of the controller unit or of the**
32 **conflict monitor (malfunction management unit) or both.** **relocated from Section 4D.12**

33 **A manual switch, a conflict monitor (malfunction management unit) circuit, and, if appropriate,**
34 **automatic means shall be provided to initiate the flashing mode.** **relocated from Section 4D.12**

35 Option:

36 Based on engineering study or engineering judgment, traffic control signals may be operated in the
37 flashing mode on a scheduled basis during one or more periods of the day rather than operated continuously in
38 the steady (stop-and-go) mode.

39 **Support:**

40 Sections 4E.06 and 4E.09 contains information regarding the operation of pedestrian signal heads and
41 accessible pedestrian signal detector pushbutton locator tones, respectively, during flashing operation.
42 **relocated from Section 4D.12**

43 Section 4D.29 Flashing Operation – Transition Into Flashing Mode **paragraphs relocated from** 44 **Section 4D.12**

45 **Standard:**

46 **The transition from steady (stop-and-go) mode to flashing mode, if initiated by a conflict monitor**
47 **(malfunction management unit) or by a manual switch, shall be permitted to be made at any time.**

48 **Programmed changes from steady (stop-and-go) mode to flashing mode shall be made under either**
49 **of the following circumstances:**

50 **A. At the end of the common major-street red interval (such as just prior to the start of the green**
51 **in both directions on the major street), or**

1 B. Directly from a ~~steady~~ CIRCULAR GREEN ~~or GREEN ARROW~~ signal indication to a flashing
2 CIRCULAR YELLOW ~~or YELLOW ARROW~~ signal indication, ~~respectively or from a~~
3 GREEN ARROW signal indication to a flashing YELLOW ARROW signal indication, or from
4 a flashing YELLOW ARROW signal indication (see Sections 4D.17 to 4D.24) to a flashing
5 YELLOW ARROW signal indication in a different signal section.

6 During programmed changes into flashing mode, no ~~steady~~ green signal indication or flashing
7 yellow signal indication shall be terminated and immediately followed by a steady red or flashing red
8 signal indication without first displaying the steady yellow signal indication.

9 Section 4D.30 Flashing Operation – Signal Indications During Flashing Mode

10 Guidance:

11 When a traffic control signal is operated in the flashing mode, a flashing yellow signal indication should
12 be used for the major street and a flashing red signal indication should be used for the other approaches unless
13 flashing red signal indications are used on all approaches. relocated from Section 4D.11

14 **Standard:**

15 ~~When a traffic control signal is operated in the flashing mode:~~ relocated from Section 4D.12

16 When a traffic control signal is operated in the flashing mode, all of the green signal indications at
17 the signalized location shall be dark (non-illuminated) and shall not be displayed in either a steady or
18 flashing manner, except for single-section GREEN ARROW signal indications as provided elsewhere in
19 this Section.

20 ~~A. Flashing yellow signal indications shall be used on more than one approach to a signalized~~
21 ~~location only if those approaches do not be displayed for approaches with conflicting traffic movements~~
22 ~~with each other, except for permissive left turn movements.~~ relocated from Section 4D.12

23 ~~B. At least~~ Except as provided in Paragraph 5, when a traffic control signal is operated in the
24 flashing mode, one and only one signal indication in each every signal face on an approach at the
25 signalized location shall be flashed, except in the following circumstance:

26 Option:

27 If a signal face has two identical CIRCULAR RED or RED ARROW signal indications (see Section
28 4D.08), both of those identical signal indications may be flashed simultaneously.

29 **Standard:**

30 No steady indications, other than a single-section signal face consisting of a continuously-
31 ~~illuminated~~ displayed GREEN ARROW signal ~~lenses~~ indication that is used alone to indicate a
32 continuous movement in the steady (stop-and-go) mode, shall be displayed at the signalized location
33 during the flashing mode. A single-section GREEN ARROW signal indication shall remain
34 continuously-illuminated displayed when the traffic control signal is operated in the flashing mode.
35 relocated from Section 4D.12

36 ~~The following applications shall apply whenever a traffic control signal is operated in the flashing~~
37 ~~mode:~~ relocated from Section 4D.11

38 ~~A. Each approach or protected only mode turn movement that is controlled during steady mode~~
39 ~~(stop-and-go) operation shall display a signal indication during flashing operation.~~ relocated
40 from Section 4D.11

41 ~~D. If a signal face includes both circular and arrow signal lenses indications of the color that is to~~
42 ~~be flashed, only the circular signal indication shall be flashed.~~ relocated from Section 4D.11

43 ~~B. All signal faces that are flashed on an approach shall flash the same color, either yellow or red,~~
44 ~~except that separate turn signal faces (see Sections 4D.17 and 4D.21) for protected only mode turn~~
45 ~~movements and separate signal faces for protected/permissive left turn movements shall be permitted to~~
46 ~~flash a CIRCULAR RED or RED ARROW signal indication when the adjacent through movement~~
47 ~~signal indications are flashed yellow. Shared signal faces (see Sections 4D.17 and 4D.21) for~~
48 ~~protected/permissive left turn movements shall not be permitted to flash a CIRCULAR RED signal~~
49 ~~indication when the adjacent through movement signal indications are flashed yellow.~~ relocated from
50 Section 4D.11

51 ~~C. The appropriate RED ARROW or YELLOW ARROW signal indication shall be flashed when~~
52 ~~a signal face consists entirely of arrow lenses indications.~~ relocated from Section 4D.11 A signal face that

1 consists entirely of arrow indications and that provides a protected only turn movement during the
2 steady (stop-and-go) mode or that provides a flashing YELLOW ARROW or flashing RED ARROW
3 signal indication for a permissive turn movement during the steady (stop-and-go) mode shall be
4 permitted to flash the YELLOW ARROW signal indication during the flashing mode if the adjacent
5 through movement signal indications are flashed yellow and if it is intended that a permissive turn
6 movement not requiring a full stop by each turning vehicle be provided during the flashing mode.

7 Section 4D.31 Flashing Operation – Transition Out of Flashing Mode paragraphs relocated from
8 Section 4D.12

9 **Standard:**

10 All changes from flashing mode to steady (stop-and-go) mode shall be made under one of the
11 following procedures:

- 12 A. **Yellow-red flashing mode:** Changes from flashing mode to steady (stop-and-go) mode shall be
13 made at the beginning of the major-street green interval (when a green signal indication is
14 ~~shown~~ displayed to through traffic in both directions on the major street), or if there is no
15 common major-street green interval, at the beginning of the green interval for the major traffic
16 movement on the major street.
- 17 B. **Red-red flashing mode:** Changes from flashing mode to steady (stop-and-go) mode shall be
18 made by changing the flashing red indications to steady red indications followed by appropriate
19 green indications to begin the steady mode cycle. These green indications shall be the beginning
20 of the major-street green interval (when a green signal indication is ~~shown~~ displayed to through
21 traffic in both directions on the major street) or if there is no common major-street green
22 interval, at the beginning of the green interval for the major traffic movement on the major
23 street.

24 **Guidance:**

25 The steady red clearance interval provided during the change from red-red flashing mode to steady (stop-
26 and-go) mode should have a duration of 6 seconds.

27 When changing from the yellow-red flashing mode to steady (stop-and-go) mode, if there is no common
28 major-street green interval, the provision of a steady red clearance interval for the other approaches before
29 changing from a flashing yellow or a flashing red signal indication to a green signal indication on the major
30 approach should be considered.

31 **Standard:**

32 During programmed changes out of flashing mode, no flashing yellow signal indication shall be
33 terminated and immediately followed by a steady red or flashing red signal indication without first
34 displaying the steady yellow signal indication.

35 **Option:**

36 Because special midblock signals that rest in flashing circular yellow in the position normally occupied by
37 the green signal indication do not have a green signal indication in the signal face, these signals may go
38 directly from flashing circular yellow (in the position normally occupied by the green signal indication) to
39 steady yellow without going first to a green signal indication.

40 **Section ~~4D.20~~ 4D.32 Temporary and Portable Traffic Control Signals**

41 ~~**Standard:**~~

42 ~~**A temporary traffic control signal shall be defined as a traffic control signal that is installed for a**~~
43 ~~**limited time period.**~~

44 ~~**A portable traffic control signal shall be defined as a temporary traffic control signal that is**~~
45 ~~**designed so that it can be easily transported and reused at different locations.**~~

46 **Support:**

47 A temporary traffic control signal is generally installed using methods that minimize the costs of
48 installation, relocation, and/or removal. Typical temporary traffic control signals are for specific purposes,
49 such as for one-lane, two-way facilities in temporary traffic control zones (see Chapter 4H), for a haul-road
50 intersection, or for access to a site that will have a permanent access point developed at another location in the
51 near future.

1 **Standard:**

2 **Advance signing shall be used when employing a temporary traffic control signal.**

3 **A temporary traffic control signal shall:**

4 **A. Meet the physical display and operational requirements of a conventional traffic control signal.**

5 **B. Be removed when no longer needed.**

6 **C. Be placed in the flashing mode when not being used if it will be operated in the steady mode**
7 **within 5 working days; otherwise, it shall be removed.**

8 **D. Be placed in the flashing mode during periods when it is not desirable to operate the signal, or**
9 **the signal heads shall be covered, turned, or taken down to indicate that the signal is not in**
10 **operation.**

11 Guidance:

12 A temporary traffic control signal should be used only if engineering judgment indicates that installing the
13 signal will improve the overall safety and/or operation of the location.

14 The use of temporary traffic control signals by a work crew on a regular basis in their work area should be
15 subject to the approval of the jurisdiction having authority over the roadway.

16 A temporary traffic control signal should not operate longer than 30 days unless associated with a longer-
17 term temporary traffic control zone project.

18 For use of temporary traffic control signals in temporary traffic control zones, reference should be made to
19 Section 6F.84.

20 **Section ~~4D.19~~ 4D.33 Lateral Placement Offset of Signal Supports and Cabinets**

21 Guidance:

22 The following items should be considered when placing signal supports and cabinets:

23 A. Reference should be made to the American Association of State Highway and Transportation
24 Officials (AASHTO) “Roadside Design Guide” (see Section 1A.11) and to the “Americans with
25 Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).

26 B. Signal supports should be placed as far as practical from the edge of the traveled way without
27 adversely affecting the visibility of the signal indications.

28 C. Where supports cannot be located based on the recommended AASHTO clearances, consideration
29 should be given to the use of appropriate safety devices.

30 D. No part of a concrete base for a signal support should extend more than 4 inches above the ground
31 level at any point. This limitation does not apply to the concrete base for a rigid support.

32 E. In order to minimize hindrance to the passage of persons with physical disabilities, a signal support or
33 controller cabinet should not obstruct the sidewalk, or access from the sidewalk to the crosswalk.

34 F. Controller cabinets should be located as far as practical from the edge of the roadway.

35 G. On medians, the ~~above~~ minimum clearances provided in Items A through E for signal supports should
36 be obtained if practical.

37 **Section ~~4D.21~~ 4D.34 Traffic Signal Use of Signs, at Signalized Locations Auxiliary**

38 Support:

39 Traffic signal signs are sometimes used at highway traffic signal locations to instruct or guide pedestrians,
40 bicyclists, or motorists. Among the signs typically used at or on the approaches to signalized locations are
41 movement prohibition signs (see Section 2B.18), lane control signs (see Sections 2B.19 to 2B.22), pedestrian
42 crossing signs (see Section 2B.51), pedestrian actuation signs (see Section 2B.52), traffic signal signs (see
43 Sections 2B.53 and 2C.48), Signal Ahead warning signs (see Section 2C.36), Street Name signs (see Section
44 2D.43), and Advance Street Name signs (see Section 2D.44).

45 Guidance:

46 Regulatory, warning, and guide signs should be used at traffic control signal locations as provided in Part
47 2 and as specifically provided elsewhere in Part 4.

48 Traffic signal signs should be located adjacent to the signal face to which they apply.

49 Support:

1 [Section 2B.19 contains information regarding the use of overhead lane control signs on signalized](#)
2 [approaches where lane drops, multiple-lane turns involving shared through-and-turn lanes, or other lane-use](#)
3 [regulations that would be unexpected by unfamiliar road users are present.](#)

4 **Standard:**

5 If used, illuminated traffic signal signs shall be designed and mounted in such a manner as to avoid
6 glare and reflections that seriously detract from the signal indications. Traffic control signal faces shall
7 be given dominant position and brightness to maximize their priority in the overall display.

8 The minimum vertical [clearance](#) and horizontal ~~clearance~~ [offset](#) of the total assembly of traffic
9 signal signs (see Section 2B.53) shall ~~conform to~~ [comply with](#) the provisions of Sections 4D.15 and
10 4D.16.

11 STOP signs shall not be used in conjunction with any traffic control signal operation, except in
12 either of the following cases: [relocated from Section 4D.01](#)

13 A. If the signal indication for an approach is a flashing red at all times, or

14 B. If a minor street or driveway is located within or adjacent to the area controlled by the traffic
15 control signal, but does not require separate traffic signal control because an extremely low
16 potential for conflict exists.

17 [Section 4D.35 Use of Pavement Markings at Signalized Locations](#) [paragraphs relocated from](#)
18 [Section 4D.01](#)

19 Support:

20 Pavement markings (see Part 3) that clearly communicate the operational plan of an intersection to road
21 users play an important role in the effective operation of traffic control signals. By designating the number of
22 lanes, the use of each lane, the length of additional lanes on the approach to an intersection, and the proper
23 stopping points, the engineer can design the signal phasing and timing to best match the goals of the
24 operational plan.

25 Guidance:

26 Pavement markings should be used at traffic control signal locations as provided in Part 3. If the road
27 surface will not retain pavement markings, signs should be installed to provide the needed road user
28 information.

29 ~~Section 4D.08 Prohibited Steady Signal Indications~~ [all paragraphs relocated to Section 4D.05](#)

30 ~~Section 4D.09 Unexpected Conflicts During Green or Yellow Intervals~~ [all paragraphs relocated to](#)
31 [Section 4D.05](#)

32 ~~Section 4D.11 Application of Flashing Signal Indications~~ [paragraphs relocated to Sections 4D.28 and](#)
33 [4D.30](#)

34 ~~Section 4D.12 Flashing Operation of Traffic Control Signals~~ [paragraphs relocated to Sections 4D.28](#)
35 [to 4D.31](#)

36 ~~Section 4D.14 Coordination of Traffic Control Signals~~ [all three paragraphs relocated to Section](#)
37 [4D.01](#)

38 ~~Section 4D.15 Size, Number, and Location of Signal Faces by Approach~~ [paragraphs relocated to](#)
39 [Sections 4D.05, 4D.07, and 4D.11 through 4D.15](#)

40 Support:

41 ~~Sections 4D.05, and 4D.16 through 4D.18 contain additional information regarding the design of signal~~
42 ~~faces.~~

43 ~~Section 4D.16 Number and Arrangement of Signal Sections in Vehicular Traffic Control~~
44 ~~Signal Faces~~ [paragraphs relocated to Sections 4D.06, 4D.08, 4D.09, and 4D.10](#)

45 ~~Section 4D.17 Visibility, Shielding, and Positioning of Signal Faces~~ [paragraphs relocated to](#)
46 [Sections 4D.12, 4D.15, and 4D.16](#)

CHAPTER 4E. PEDESTRIAN CONTROL FEATURES

Section 4E.01 Pedestrian Signal Heads

Support:

Pedestrian signal heads provide special types of traffic signal indications exclusively intended for controlling pedestrian traffic. These signal indications consist of the illuminated symbols of a WALKING PERSON (symbolizing WALK) and an UPRAISED HAND (symbolizing DONT WALK).

Guidance:

Engineering judgment should determine the need for separate pedestrian signal heads (see Section 4D.03) and accessible pedestrian signals (see Section 4E.09).

Support:

Chapter 4F contains information regarding the use of pedestrian hybrid beacons and Chapter 4N contains information regarding the use of In-Roadway Warning Lights at unsignalized marked crosswalks.

Section 4E.02 Meaning of Pedestrian Signal Head Indications

Standard:

Pedestrian signal head indications shall have the following meanings:

- A. A steady WALKING PERSON (symbolizing WALK) signal indication means that a pedestrian facing the signal indication is permitted to start to cross the roadway in the direction of the signal indication, possibly in conflict with turning vehicles. The pedestrian shall yield the right-of-way to vehicles lawfully within the intersection at the time that the WALKING PERSON (symbolizing WALK) signal indication is first shown.
- B. A flashing UPRAISED HAND (symbolizing DONT WALK) signal indication means that a pedestrian shall not start to cross the roadway in the direction of the signal indication, but that any pedestrian who has already started to cross on a steady WALKING PERSON (symbolizing WALK) signal indication shall proceed ~~out~~ to the far side of the traveled way of the street or highway, unless otherwise directed by a traffic control device to proceed only to the median of a divided highway or only to some other island or pedestrian refuge area.
- C. A steady UPRAISED HAND (symbolizing DONT WALK) signal indication means that a pedestrian shall not enter the roadway in the direction of the signal indication.
- D. A flashing WALKING PERSON (symbolizing WALK) signal indication has no meaning and shall not be used.

Section 4E.03 Application of Pedestrian Signal Heads

Standard:

Pedestrian signal heads shall be used in conjunction with vehicular traffic control signals under any of the following conditions:

- A. If a traffic control signal is justified by an engineering study and meets either Warrant 4, Pedestrian Volume or Warrant 5, School Crossing (see Chapter 4C);
- B. If an exclusive signal phase is provided or made available for pedestrian movements in one or more directions, with all conflicting vehicular movements being stopped;
- C. At an established school crossing at any signalized location; or
- D. Where engineering judgment determines that multi-phase signal indications (as with split-phase timing) would tend to confuse or cause conflicts with pedestrians using a crosswalk guided only by vehicular signal indications.

Guidance:

Pedestrian signal heads should be used under any of the following conditions:

- A. If it is necessary to assist pedestrians in ~~making a reasonably safe crossing~~ deciding when to begin crossing the roadway in the chosen direction or if engineering judgment determines that pedestrian signal heads are justified to minimize vehicle-pedestrian conflicts;
- B. If pedestrians are permitted to cross a portion of a street, such as to or from a median of sufficient width for pedestrians to wait, during a particular interval but are not permitted to cross the remainder of the street during any part of the same interval; and/or

1 C. If no vehicular signal indications are visible to pedestrians, or if the vehicular signal indications that
2 are visible to pedestrians starting ~~or continuing~~ a crossing provide insufficient guidance for them to
3 decide when ~~it is reasonably safe to cross~~ begin crossing the roadway in the chosen direction, such as
4 on one-way streets, at T-intersections, or at multi-phase signal operations.

5 Option:

6 Pedestrian signal heads may be used under other conditions based on engineering judgment.

7 **Section 4E.04 Size, Design, and Illumination of Pedestrian Signal Head Indications**

8 **Standard:**

9 All new pedestrian signal head indications shall be displayed within a rectangular background and
10 shall consist of symbolized messages (see Figure 4E-1), except that existing pedestrian signal head
11 indications with lettered or outline style symbol messages ~~may~~ shall be permitted to be retained for the
12 remainder of their useful service life. The symbol designs that are set forth in the “Standard Highway
13 Signs and Markings” book (see Section 1A.11) shall be used. Each pedestrian signal head indication
14 shall be independently ~~illuminated~~ displayed and emit a single color.

15 If a two-section pedestrian signal head is used, the UPRAISED HAND (symbolizing DONT WALK)
16 signal section shall be mounted directly above ~~or integral with~~ the WALKING PERSON (symbolizing
17 WALK) signal section. If a one-section pedestrian signal head is used, the symbols shall be either
18 overlaid upon each other or arranged side-by-side with the UPRAISED HAND symbol to the left of the
19 WALKING PERSON symbol, and a light source that can display each symbol independently shall be
20 used.

21 The WALKING PERSON (symbolizing WALK) signal indication shall be white, conforming to the
22 publication entitled “Pedestrian Traffic Control Signal Indications” (see Section 1A.11), with all except
23 the symbol obscured by an opaque material.

24 The UPRAISED HAND (symbolizing DONT WALK) signal indication shall be Portland orange,
25 conforming to the publication entitled “Pedestrian Traffic Control Signal Indications” (see Section
26 1A.11), with all except the symbol obscured by an opaque material.

27 When not illuminated, the WALKING PERSON (symbolizing WALK) and UPRAISED HAND
28 (symbolizing DONT WALK) symbols shall not be readily visible to pedestrians at the far end of the
29 crosswalk that the pedestrian signal head indications control.

30 For pedestrian signal head indications, the symbols shall be at least 6 inches high.

31 The light source of a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication
32 shall be flashed continuously at a rate of not less than 50 or more than 60 times per minute. The
33 ~~illuminated~~ displayed period of each flash shall be ~~not less than half~~ a minimum of 1/2 and ~~not more~~
34 ~~than two-thirds~~ a maximum of 2/3 of the total flash cycle.

35 Guidance:

36 Pedestrian signal head indications should be conspicuous and recognizable to pedestrians at all distances
37 from the beginning of the controlled crosswalk to a point 10 feet from the end of the controlled crosswalk
38 during both day and night.

39 For crosswalks where the pedestrian enters the crosswalk more than 100 feet from the pedestrian signal
40 head indications, the symbols should be at least 9 inches high.

41 If the pedestrian signal indication is so bright that it causes excessive glare in nighttime conditions, some
42 form of automatic dimming should be used to reduce the brilliance of the signal indication.

43 Option:

44 An animated eyes symbol may be added to a pedestrian signal head in order to prompt pedestrians to look
45 for vehicles in the intersection during the time that the WALKING PERSON (symbolizing WALK) signal
46 indication is displayed.

47 **Standard:**

48 **If used, the animated eyes symbol shall consist of an outline of a pair of white steadily-illuminated**
49 **eyes with white eyeballs that scan from side to side at a rate of approximately once per second. The**
50 **animated eyes symbol shall be at least 12 inches wide with each eye having a width of at least 5 inches**
51 **and a height of at least 2.5 inches. The animated eyes symbol shall be illuminated at the start of the**
52 **walk interval and shall terminate at the end of the walk interval.**

1 **Section 4E.05 Location and Height of Pedestrian Signal Heads**

2 **Standard:**

3 Pedestrian signal heads shall be mounted with the bottom of the signal housing including brackets
4 not less than 7 feet or more than 10 feet above sidewalk level, and shall be positioned and adjusted to
5 provide maximum visibility at the beginning of the controlled crosswalk.

6 If pedestrian signal heads are mounted on the same support as vehicular signal heads, there shall be
7 a physical separation between them.

8 ~~Section 4E.06 Accessible Pedestrian Signals~~ the text from Section 4E.06 has been combined with the
9 text from Section 4E.09 and now appears in new Sections 4E.09 through 4E.13

10 **Section ~~4E.10~~ 4E.06 Pedestrian Intervals and Signal Phases**

11 **Standard:**

12 At intersections equipped with pedestrian signal heads, the pedestrian signal indications shall be
13 displayed except when the vehicular traffic control signal is being operated in the flashing mode. At
14 those times, the pedestrian signal ~~lenses~~ indications shall not be ~~illuminated~~ displayed.

15 When the pedestrian signal heads associated with a crosswalk are displaying either a steady
16 WALKING PERSON (symbolizing WALK) or a flashing UPRAISED HAND (symbolizing DONT
17 WALK) signal indication, a steady or a flashing red signal indication shall be shown to any conflicting
18 vehicular movement that is approaching the intersection or midblock location perpendicular or nearly
19 perpendicular to the crosswalk.

20 When pedestrian signal heads are used, a WALKING PERSON (symbolizing WALK) signal
21 indication shall be displayed only when pedestrians are permitted to leave the curb or shoulder.

22 A pedestrian ~~clearance time~~ change interval consisting of a flashing UPRAISED HAND
23 (symbolizing DONT WALK) signal indication shall begin immediately following the WALKING
24 PERSON (symbolizing WALK) signal indication. ~~The first portion of the pedestrian clearance time~~
25 ~~shall consist of a pedestrian change interval during which a flashing UPRAISED HAND (symbolizing~~
26 ~~DONT WALK) signal indication shall be displayed. The remaining portions shall consist of the yellow~~
27 ~~change interval and any red clearance interval (prior to a conflicting green being displayed), during~~
28 ~~which a flashing or steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be~~
29 ~~displayed.~~ Following the pedestrian change interval, a buffer interval consisting of a steady
30 UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed for at least 3
31 seconds prior to the release of any conflicting vehicular movement. The sum of the time of the
32 pedestrian change interval and the buffer interval shall not be less than the calculated pedestrian
33 clearance time (see Paragraphs 7 through 16). The buffer interval shall not begin later than the
34 beginning of the red clearance interval, if used.

35 ~~If countdown pedestrian signals are used, a steady UPRAISED HAND (symbolizing DONT WALK)~~
36 ~~signal indication shall be displayed during the yellow change interval and any red clearance interval~~
37 ~~(prior to a conflicting green being displayed) (see Section 4E.07).~~

38 **Option:**

39 ~~The pedestrian clearance time may be entirely contained within the vehicular green interval, or may be~~
40 ~~entirely contained within the vehicular green and yellow change intervals.~~

41 During the yellow change interval, the UPRAISED HAND (symbolizing DON'T WALK) signal
42 indication may be displayed as either a flashing indication, a steady indication, or a flashing indication for an
43 initial portion of the yellow change interval and a steady indication for the remainder of the interval.

44 **Support:**

45 Figure 4E-2 illustrates the pedestrian intervals and their possible relationships with associated vehicular
46 signal phase intervals.

47 **Guidance:**

48 Except as provided in Paragraph 8, the pedestrian clearance time should be sufficient to allow a pedestrian
49 crossing in the crosswalk who left the curb or shoulder ~~during~~ at the end of the WALKING PERSON
50 (symbolizing WALK) signal indication to travel at a walking speed of ~~4~~ 3.5 feet per second to at least the far
51 side of the traveled way or to a median of sufficient width for pedestrians to wait.

1 Option:

2 ~~Passive pedestrian detection equipment, which can detect pedestrians who need more time to complete~~
3 ~~their crossing and can extend the length of the pedestrian clearance time for that particular cycle, may be used~~
4 ~~in order to avoid using a lower walking speed to determine the pedestrian clearance time.~~

5 A walking speed of up to 4 feet per second may be used to evaluate the sufficiency of the pedestrian
6 clearance time at locations where an extended pushbutton press function has been installed to provide slower
7 pedestrians an opportunity to request and receive a longer pedestrian clearance time. Passive pedestrian
8 detection may also be used to automatically adjust the pedestrian clearance time based on the pedestrian's
9 actual walking speed or actual clearance of the crosswalk.

10 The additional time provided by an extended pushbutton press to satisfy pedestrian clearance time needs
11 may be added to either the walk interval or the pedestrian change interval.

12 Guidance:

13 Where pedestrians who walk slower than ~~4~~ 3.5 feet per second, or pedestrians who use wheelchairs,
14 routinely use the crosswalk, a walking speed of less than ~~4~~ 3.5 feet per second should be considered in
15 determining the pedestrian clearance time.

16 Except as ~~noted~~ provided in ~~the Option Paragraph 12~~, the walk interval should be at least 7 seconds in
17 length so that pedestrians will have adequate opportunity to leave the curb or shoulder before the pedestrian
18 clearance time begins.

19 Option:

20 If pedestrian volumes and characteristics do not require a 7-second walk interval, walk intervals as short
21 as 4 seconds may be used.

22 Support:

23 The walk interval ~~itself need not equal or exceed the pedestrian clearance time calculated for the roadway~~
24 ~~width, because many pedestrians will complete their crossing during the pedestrian clearance time~~ is intended
25 for pedestrians to start their crossing. The pedestrian clearance time is intended to allow pedestrians who
26 started crossing during the walk interval to complete their crossing. Longer walk intervals are often used
27 when the duration of the vehicular green phase associated with the pedestrian crossing is long enough to allow
28 it.

29 Guidance:

30 The total of the walk interval and pedestrian clearance time should be sufficient to allow a pedestrian
31 crossing in the crosswalk who left the pedestrian detector (or, if no pedestrian detector is present, a location 6
32 feet from the face of the curb or from the edge of the pavement) at the beginning of the WALKING PERSON
33 (symbolizing WALK) signal indication to travel at a walking speed of 3 feet per second to the far side of the
34 traveled way being crossed or to the median if a two-stage pedestrian crossing sequence is used. Any
35 additional time that is required to satisfy the conditions of this paragraph should be added to the walk interval.

36 Option:

37 On a street with a median of sufficient width for pedestrians to wait, a pedestrian clearance time that
38 allows the pedestrian to cross only from the curb or shoulder to the median may be provided.

39 **Guidance Standard:**

40 **Where the pedestrian clearance time is sufficient only for crossing from the curb or shoulder to a**
41 **median of sufficient width for pedestrians to wait, ~~additional measures should be considered, such as~~**
42 **median-mounted pedestrian signals (with pedestrian detectors if actuated operation is used) shall be**
43 **provided (see Sections 4E.08 and 4E.09) and ~~or additional~~ signing such as the R10-3d sign (see Section**
44 **2B.52) shall be provided to notify pedestrians to cross only to the median to await the next WALKING**
45 **PERSON (symbolizing WALK) signal indication.**

46 Guidance:

47 Where median-mounted pedestrian signals and detectors are provided, the use of accessible pedestrian
48 signals (see Sections 4E.09 through 4E.13) should be considered.

49 Option:

50 During the transition into preemption, the walk interval and the pedestrian change interval may be
51 shortened or omitted as described in Section 4D.27.

1 At intersections with high pedestrian volumes and high conflicting turning vehicle volumes, a brief
2 leading pedestrian interval, during which an advance WALKING PERSON (symbolizing WALK) indication
3 is displayed for the crosswalk while red indications continue to be displayed to parallel through and/or turning
4 traffic, may be used to reduce conflicts between pedestrians and turning vehicles.

5 Guidance:

6 If a leading pedestrian interval is used, the use of accessible pedestrian signals (see Sections 4E.09
7 through 4E.13) should be considered.

8 Support:

9 If a leading pedestrian interval is used without accessible features, pedestrians who are visually impaired
10 can be expected to begin crossing at the onset of the vehicular movement when drivers are not expecting them
11 to begin crossing.

12 Guidance:

13 If a leading pedestrian interval is used, it should be at least 3 seconds in duration and should be timed to
14 allow pedestrians to cross at least one lane of traffic or, in the case of a large corner radius, to travel far
15 enough for pedestrians to establish their position ahead of the turning traffic before the turning traffic is
16 released.

17 If a leading pedestrian interval is used, consideration should be given to prohibiting turns across the
18 crosswalk during the leading pedestrian interval.

19 Support:

20 At intersections with pedestrian volumes that are so high that drivers have difficulty finding an
21 opportunity to turn across the crosswalk, the duration of the green interval for a parallel concurrent vehicular
22 movement is sometimes intentionally set to extend beyond the pedestrian clearance time to provide turning
23 drivers additional green time to make their turns while the pedestrian signal head is displaying a steady
24 UPRAISED HAND (symbolizing DONT WALK) signal indication after pedestrians have had time to
25 complete their crossings.

26 **Section 4E.07 Countdown Pedestrian Signals**

27 **~~Option~~ Standard:**

28 All pedestrian signal heads used at crosswalks where the pedestrian change interval is more than 7
29 seconds shall include a pedestrian change interval countdown display ~~may be added to a pedestrian-~~
30 ~~signal head~~ in order to inform pedestrians of the number of seconds remaining in the pedestrian change
31 interval.

32 Option:

33 Pedestrian signal heads used at crosswalks where the pedestrian change interval is 7 seconds or less may
34 include a pedestrian change interval countdown display in order to inform pedestrians of the number of
35 seconds remaining in the pedestrian change interval.

36 **Standard:**

37 Where countdown pedestrian signals are used, the countdown shall always be displayed
38 simultaneously with the flashing UPRAISED HAND (symbolizing DONT WALK) signal indication
39 displayed for that crosswalk.

40 **~~If used,~~** Countdown pedestrian signals shall consist of Portland orange numbers that are at least 6
41 inches in height on a black opaque background. The countdown pedestrian signal shall be located
42 immediately adjacent to the associated UPRAISED HAND (symbolizing DONT WALK) pedestrian
43 signal head indication (see Figure 4E-1).

44 **~~If used,~~** The display of the number of remaining seconds shall begin only at the beginning of the
45 pedestrian change interval (flashing UPRAISED HAND). After the countdown displays zero, the
46 display shall remain dark until the beginning of the next countdown.

47 **~~If used,~~** The countdown pedestrian signal shall display the number of seconds remaining until the
48 termination of the pedestrian change interval (flashing UPRAISED HAND). Countdown displays shall
49 not be used during the walk interval or during the ~~yellow change~~ red clearance interval of a concurrent
50 vehicular phase.

51 Guidance:

1 If used with a pedestrian signal head that does not have a concurrent vehicular phase, the pedestrian
2 change interval (flashing UPRAISED HAND) should be set to be approximately 4 seconds less than the
3 required pedestrian ~~crossing~~ clearance time (see Section 4E.06) and an additional clearance interval (during
4 which a steady UPRAISED HAND is displayed) should be provided prior to the start of the conflicting
5 vehicular phase. ~~In this case, the countdown display of the number of remaining seconds should be displayed
6 only during the display of the flashing UPRAISED HAND, should display zero at the time when the flashing
7 UPRAISED HAND changes to steady UPRAISED HAND, and should be dark during the additional clearance
8 interval prior to the conflicting vehicular phase.~~

9 For crosswalks where the pedestrian enters the crosswalk more than 100 feet from the countdown
10 pedestrian signal display, the numbers should be at least 9 inches in height.

11 Because some technology includes the countdown pedestrian signal logic in a separate timing device that
12 is independent of the timing in the traffic signal controller, care should be exercised by the engineer when
13 timing changes are made to pedestrian change intervals.

14 If the pedestrian change interval is interrupted or shortened as a part of a transition into a preemption
15 sequence (see Section 4E.06), the countdown pedestrian signal display should be discontinued and go dark
16 immediately upon activation of the preemption transition.

17 **Section 4E.08 Pedestrian Detectors**

18 Option:

19 Pedestrian detectors may be pushbuttons or passive detection devices.

20 Support:

21 Passive detection devices register the presence of a pedestrian in a position indicative of a desire to cross,
22 without requiring the pedestrian to push a button. Some passive detection devices are capable of tracking the
23 progress of a pedestrian as the pedestrian crosses the roadway for the purpose of extending or shortening the
24 duration of certain pedestrian timing intervals.

25 The provisions in this Section place pedestrian pushbuttons within easy reach of pedestrians who are
26 intending to cross each crosswalk and make it obvious which pushbutton is associated with each crosswalk.
27 These provisions also position pushbutton poles in optimal locations for installation of accessible pedestrian
28 signals (see Sections 4E.09 through 4E.13). Information regarding reach ranges can be found in the
29 “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see
30 Section 1A.11).

31 Guidance:

32 ~~When~~ If pedestrian ~~actuation~~ pushbuttons ~~is~~ are used, ~~pedestrian pushbutton detectors~~ they should be
33 capable of easy activation and conveniently located near each end of the crosswalks. Except as provided in
34 Paragraphs 5 and 6, pedestrian pushbuttons should be located to meet all of the following criteria (see Figure
35 4E-3):

- 36 A. Unobstructed and adjacent to a level all-weather surface to provide access from a wheelchair;
- 37 B. Where there is an all-weather surface, a wheelchair accessible route from the pushbutton to the ramp;
- 38 C. Between the edge of the crosswalk line (extended) farthest from the center of the intersection and the
39 side of a curb ramp (if present), but not greater than 5 feet from said crosswalk line;
- 40 D. Between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement;
- 41 E. With the face of the pushbutton parallel to the crosswalk to be used; and
- 42 F. At a mounting height of approximately 3.5 feet, but no more than 4 feet, above the sidewalk.

43 Where there are physical constraints that make it impractical to place the pedestrian pushbutton adjacent
44 to a level all-weather surface, the surface should be as level as feasible.

45 Where there are physical constraints that make it impractical to place the pedestrian pushbutton between
46 1.5 and 6 feet from the edge of the curb, shoulder, or pavement, it should not be farther than 10 feet from the
47 edge of curb, shoulder, or pavement.

48 ~~A mounting height of approximately 3.5 feet above the sidewalk should be used for pedestrian pushbutton
49 detectors.~~ combined with Item F above

50 Except as provided in Paragraph 8, where two pedestrian pushbuttons are provided on the same corner of
51 a signalized location, the pushbuttons should be separated by a distance of at least 10 feet.

52 Option:

1 [Where there are physical constraints on a particular corner that make it impractical to provide the 10-foot](#)
2 [separation between the two pedestrian pushbuttons, the pushbuttons may be placed closer together or on the](#)
3 [same pole.](#)

4 [Support:](#)

5 [Figure 4E-4 shows typical pedestrian pushbutton locations for a variety of situations.](#)

6 **Standard:**

7 **Signs (see Section 2B.52) shall be mounted adjacent to or integral with pedestrian pushbuttons**
8 **~~detectors~~, explaining their purpose and use.**

9 **Option:**

10 At certain locations, a [supplemental](#) sign in a more visible location may be used to call attention to the
11 pedestrian ~~detector~~ [pushbutton](#).

12 **~~Guidance~~ Standard:**

13 ~~If two crosswalks, oriented in different directions, end at or near the same location,~~ The positioning
14 of pedestrian ~~detectors~~ [pushbuttons](#) and ~~for~~ the legends on the pedestrian ~~detector~~ [pushbutton](#) signs
15 ~~should~~ [shall](#) clearly indicate which crosswalk signal is actuated by each pedestrian ~~detector~~ [pushbutton](#).

16 **~~Standard:~~**

17 **If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of**
18 **sufficient width for pedestrians to wait and the signals are pedestrian actuated, an additional pedestrian**
19 **detector shall be provided in the median.**

20 **Guidance:**

21 The use of additional pedestrian detectors on islands or medians where a pedestrian might become
22 stranded should be considered.

23 If used, special purpose pushbuttons (to be operated only by authorized persons) should include a housing
24 capable of being locked to prevent access by the general public and do not need an instructional sign.

25 **Standard:**

26 **If used, a pilot light or other means of indication installed with a pedestrian pushbutton shall not be**
27 **illuminated until actuation. Once it is actuated, ~~it~~ the pilot light shall remain illuminated until the**
28 **pedestrian's green or WALKING PERSON (symbolizing WALK) signal indication is displayed.**

29 [If a pilot light is used at an accessible pedestrian signal location \(see Sections 4E.09 through 4E.13\),](#)
30 [each actuation shall be accompanied by the speech message "wait."](#)

31 **Option:**

32 At signalized locations with a demonstrated need and subject to equipment capabilities, pedestrians with
33 special needs may be provided with additional crossing time by means of an extended pushbutton press.

34 **Standard:**

35 [If additional crossing time is provided by means of an extended pushbutton press, a PUSH](#)
36 [BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME \(R10-32P\) plaque \(see Figure 2B-26\)](#)
37 [shall be mounted adjacent to or integral with the pedestrian pushbutton.](#)

38 **Section 4E.09 Accessible Pedestrian Signals and Detectors – General** the text from Section 4E.09
39 **has been combined with the text from Section 4E.06 and now appears in new Sections 4E.09 through**
40 **4E.13**

41 **Support:**

42 Accessible pedestrian signals [and detectors](#) provide information in non-visual formats (such as audible
43 tones, ~~verbal~~ [speech](#) messages, and/or vibrating surfaces).

44 ~~Information regarding detectors for accessible pedestrian signals is found in Section 4E.09.~~

45 The primary technique that pedestrians who have visual disabilities use to cross streets at signalized
46 locations is to initiate their crossing when they hear the traffic in front of them stop and the traffic alongside
47 them begin to move, ~~corresponding~~ [which often corresponds](#) to the onset of the green interval. ~~This technique~~
48 ~~is effective at many signalized locations.~~ The existing environment is often [not](#) sufficient to provide the
49 information that pedestrians who have visual disabilities need to ~~operate reasonably safely~~ [cross a roadway](#) at
50 a signalized location. ~~Therefore, many signalized locations will not require any accessible pedestrian signals.~~

1 Guidance:

2 If a particular signalized location presents difficulties for pedestrians who have visual disabilities to cross
3 ~~reasonably safely and effectively~~ the roadway, an engineering study should be conducted that considers the
4 ~~safety and effectiveness for~~ needs of pedestrians in general, as well as the information needs of pedestrians
5 with visual disabilities. The ~~installation of accessible pedestrian signals at signalized locations should be~~
6 ~~based on an~~ engineering study, ~~which~~ should consider the following factors:

- 7 A. Potential demand for accessible pedestrian signals;
- 8 B. A request for accessible pedestrian signals;
- 9 C. Traffic volumes during times when pedestrians might be present, including periods of low traffic
10 volumes or high turn-on-red volumes;
- 11 D. The complexity of traffic signal phasing (such as split phases, protected turn phases, leading
12 pedestrian intervals, and exclusive pedestrian phases); and
- 13 E. The complexity of intersection geometry.

14 Support:

15 The factors that ~~might~~ make crossing at a signalized location difficult for pedestrians who have visual
16 disabilities include: increasingly quiet cars, right turn on red (which masks the beginning of the through
17 phase), continuous right-turn movements, complex signal operations, traffic circles, and wide streets.
18 Furthermore, low traffic volumes might make it difficult for pedestrians who have visual disabilities to discern
19 signal phase changes.

20 Local organizations, providing support services to pedestrians who have visual and/or hearing disabilities,
21 can often act as important advisors to the traffic engineer when consideration is being given to the installation
22 of devices to assist such pedestrians. Additionally, orientation and mobility specialists or similar staff also
23 might be able to provide a wide range of advice. The U.S. Access Board's ~~Document A-37, "Accessible~~
24 ~~Pedestrian Signals,"~~ (www.access-board.gov) provides ~~various techniques~~ technical assistance for making
25 pedestrian signal information available to persons with visual disabilities (see Page i for the address for the
26 U.S. Access Board).

27 **Standard:**

28 **When used, accessible pedestrian signals shall be used in combination with pedestrian signal timing.**
29 **The information provided by an accessible pedestrian signal shall clearly indicate which pedestrian**
30 **crossing is served by each device.**

31 **Under stop-and-go operation, accessible pedestrian signals shall not be limited in operation by the**
32 **time of day or day of week.**

33 Option:

34 Accessible pedestrian signal detectors may be pushbuttons or passive detection devices.

35 At locations with pretimed traffic control signals or non-actuated approaches, pedestrian pushbuttons may
36 be used to activate the accessible pedestrian signals.

37 Support:

38 Accessible pedestrian signals are typically integrated into the pedestrian detector (pushbutton), so the
39 audible tones and/or messages come from the pushbutton housing. They have a pushbutton locator tone and
40 tactile arrow, and can include audible beaconing and other special features.

41 Option:

42 The name of the street to be crossed may also be provided in accessible format, such as Braille or raised
43 print. Tactile maps of crosswalks may also be provided.

44 Support:

45 Specifications regarding the use of Braille or raised print for traffic control devices can be found in the
46 "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see
47 Section 1A.11).

48 **Standard:**

49 **At accessible pedestrian signal locations ~~with~~ where pedestrian ~~actuation~~ pushbuttons are used,**
50 **each pushbutton shall activate both the walk interval and the accessible pedestrian signals.**

51 **Section 4E.10 Accessible Pedestrian Signals and Detectors – Location**

52 Support:

1 Accessible pedestrian signals that are located as close as possible to pedestrians waiting to cross the street
2 provide the clearest and least ambiguous indication of which pedestrian crossing is served by a device.

3 Guidance:

4 Pushbuttons for accessible pedestrian signals should be located in accordance with the provisions of
5 Section 4E.08 and should be located ~~(see Figure 4E-2)~~ as follows: close as possible to the crosswalk line
6 furthest from the center of the intersection and as close as possible to the curb ramp.

- 7 ~~A. Adjacent to a level all-weather surface to provide access from a wheelchair, and where there is an all-~~
8 ~~weather surface, wheelchair accessible route to the ramp;~~
9 ~~B. Within 5 feet of the crosswalk extended;~~
10 ~~C. Within 10 feet of the edge of the curb, shoulder, or pavement; and~~
11 ~~D. Parallel to the crosswalk to be used.~~

12 ~~At corners of signalized locations with accessible pedestrian signals where two pedestrian pushbuttons are~~
13 ~~provided, the pushbuttons should be separated by a distance of at least 10 feet. This enables pedestrians who~~
14 ~~have visual disabilities to distinguish and locate the appropriate pushbutton.~~

15 Standard:

16 If two accessible pedestrian pushbuttons are placed less than 10 feet apart or on the same pole, each
17 accessible pedestrian pushbutton shall be provided with the following features (see Sections 4E.11
18 through 4E.13):

- 19 A. A pushbutton locator tone,
20 B. A tactile arrow,
21 C. A speech walk message for the WALKING PERSON (symbolizing WALK) indication, and
22 D. A speech pushbutton information message.

23 ~~Guidance:~~

24 **If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of**
25 **sufficient width for pedestrians to wait and accessible pedestrian detectors are used, an additional**
26 **accessible pedestrian detector ~~should~~ shall be provided in the median.**

27 Section 4E.11 Accessible Pedestrian Signals and Detectors – Walk Indications

28 Support:

29 Technology that provides different sounds for each non-concurrent signal phase has frequently been found
30 to provide ambiguous information. Research indicates that a rapid tick tone for each crossing coming from
31 accessible pedestrian signal devices on separated poles located close to each crosswalk provides unambiguous
32 information to pedestrians who are blind or visually impaired. Vibrotactile indications provide information to
33 pedestrians who are blind and deaf and are also used by pedestrians who are blind or who have low vision to
34 confirm the walk signal in noisy situations.

35 Standard:

36 Accessible pedestrian signals shall have both audible and vibrotactile walk indications.

37 Vibrotactile walk indications shall be provided by a tactile arrow on the pushbutton (see Section
38 4E.12) that vibrates during the walk interval.

39 ~~Support:~~

40 ~~A vibrotactile pedestrian device communicates information about pedestrian timing through a vibrating~~
41 ~~surface by touch.~~

42 ~~Standard:~~

43 ~~Vibrotactile pedestrian devices, where used, shall indicate that the walk interval is in effect, and for~~
44 ~~which direction it applies, through the use of a vibrating directional arrow or some other means.~~

45 ~~Guidance:~~

46 ~~When provided, vibrotactile pedestrian devices should be located next to, and on the same pole as, the~~
47 ~~pedestrian pushbutton, if any, and adjacent to the intended crosswalk.~~

48 ~~When~~ Accessible pedestrian signals shall have an audible ~~tone(s), they shall have a tone for~~ walk
49 indication during the walk interval only. The audible ~~tone(s)~~ walk indication shall be audible from the
50 beginning of the associated crosswalk.

1 ~~If the tone for the walk interval is similar to the pushbutton locator tone, the walk interval tone~~
2 ~~shall have a faster repetition rate than the associated pushbutton locator tone.~~

3 The accessible walk indication shall have the same duration as the pedestrian walk signal except
4 when the pedestrian signal rests in walk.

5 Guidance:

6 If the pedestrian signal rests in walk, the accessible walk indication should be limited to the first 7 seconds
7 of the walk interval. The accessible walk indication should be recalled by a button press during the walk
8 interval provided that the crossing time remaining is greater than the pedestrian change interval.

9 **Standard:**

10 Where two accessible pedestrian signals are separated by a distance of at least 10 feet, the audible
11 walk indication shall be a percussive tone. Where two accessible pedestrian signals on one corner are
12 not separated by a distance of at least 10 feet, the audible walk indication shall be a speech walk
13 message.

14 Audible tone walk indications shall repeat at eight to ten ticks per second. Audible tones used as
15 walk indications shall consist of multiple frequencies with a dominant component at 880 Hz.

16 ~~When choosing audible tones, possible extraneous sources of sounds (such as wind, rain, vehicle~~
17 ~~back-up warnings, or birds) shall be considered in order to eliminate potential confusion to pedestrians~~
18 ~~who have visual disabilities.~~

19 Guidance:

20 ~~The accessible walk signal tone should be no louder than the locator tone, except when there is optional~~
21 ~~activation to provide a louder signal tone for a single pedestrian phase. The volume of audible walk~~
22 ~~indications and pushbutton locator tones (see Section 4E.12) should be set to be a maximum of 5 dBA louder~~
23 ~~than ambient sound, except when audible beaconing is provided in response to an extended pushbutton press.~~

24 **Standard:**

25 **Automatic volume adjustment in response to ambient traffic sound level ~~should~~ shall be provided**
26 **up to a maximum volume of ~~89~~ 100 dBA. ~~Where automatic volume adjustment is used, tones should be~~**
27 **~~no more than 5 dBA louder than ambient sound. The A-weighted sound pressure level should conform~~**
28 **~~to the requirements of “ISO 1996-1:1982” and “ISO 1996-2:1987” (see Page i for the address for the~~**
29 **~~International Organization for Standards).~~**

30 Guidance:

31 The sound level of audible ~~pedestrian tones~~ walk indications and pushbutton locator tones should be
32 carefully selected ~~adjusted to be low enough~~ to avoid misleading pedestrians who have visual disabilities
33 when the following conditions exist:

- 34 A. Where there is an island that allows unsignalized right turns across a crosswalk between the island and
35 the sidewalk.
- 36 B. Where multi-leg approaches or complex signal phasing require more than two pedestrian phases, such
37 that it might be unclear which crosswalk is served by each audible tone.
- 38 C. At intersections where a diagonal pedestrian crossing is allowed, or where one street receives a
39 WALKING PERSON (symbolizing WALK) signal indication simultaneously with another street.

40 Option:

41 ~~The audible tone(s) may be made louder (up to a maximum of 89 dBA) by holding down the pushbutton~~
42 ~~for a minimum of 3 seconds. The louder audible tone(s) may also alternate back and forth across the~~
43 ~~crosswalk, thus providing optimal directional information.~~

44 An alert tone, which is a very brief burst of high-frequency sound at the beginning of the audible walk
45 indication that rapidly decays to the frequency of the walk tone, may be used to alert pedestrians to the
46 beginning of the walk interval.

47 Support:

48 An alert tone can be particularly useful if the walk tone is not easily audible in some traffic conditions.

49 Speech walk messages communicate to pedestrians which street has the walk interval. Speech messages
50 might be either directly audible or transmitted, requiring a personal receiver to hear the message. To be a
51 useful system, the words and their meaning need to be correctly understood by all users in the context of the
52 street environment where they are used. Because of this, tones are the preferred means of providing audible

1 walk indications except where two accessible pedestrian signals on one corner are not separated by a distance
2 of at least 10 feet.

3 If speech walk messages are used, pedestrians have to know the names of the streets that they are crossing
4 in order for the speech walk messages to be unambiguous. In getting directions to travel to a new location,
5 pedestrians with visual disabilities do not always get the name of each street to be crossed. Therefore, it is
6 desirable to give users of accessible pedestrian signals the name of the street controlled by the pushbutton.
7 This can be done by means of a speech pushbutton information message (see Section 4D.13) during the
8 flashing or steady UPRAISED HAND intervals, or by raised print and Braille labels on the pushbutton
9 housing.

10 By combining the information from the pushbutton message or Braille label, the tactile arrow aligned in
11 the direction of travel on the relevant crosswalk, and the speech walk message, pedestrians with visual
12 disabilities are able to correctly respond to speech walk messages even if there are two pushbuttons on the
13 same pole.

14 **Standard:**

15 ~~When verbal~~ If speech walk messages are used to communicate the pedestrian walk interval, they
16 shall provide a clear message that the walk interval is in effect, as well as to which crossing it applies.
17 Speech walk messages shall be used only at intersections where it is technically infeasible to install two
18 accessible pedestrian signals at one corner separated by a distance of at least 10 feet.

19 ~~The verbal message that is provided at regular intervals throughout the timing of the walk interval~~
20 ~~shall be the term “walk sign,” which may be followed by the name of the street to be crossed.~~

21 Speech walk messages that are used at intersections having pedestrian phasing that is concurrent
22 with vehicular phasing shall be patterned after the model: “Broadway. Walk sign is on to cross
23 Broadway.”

24 Speech walk messages that are used at intersections having exclusive pedestrian phasing shall be
25 patterned after the model: “Walk sign is on for all crossings.”

26 Speech walk messages shall not contain any additional information, except they shall include
27 designations such as “Street” or “Avenue” where this information is necessary to avoid ambiguity at a
28 particular location.

29 Guidance:

30 Speech walk messages should not state or imply a command to the pedestrian, such as “Cross Broadway
31 now.” Speech walk messages should not tell pedestrians that it is “safe to cross,” because it is always the
32 pedestrian’s responsibility to check actual traffic conditions.

33 **Standard:**

34 A ~~verbal~~ speech walk message is not required at times when the walk interval is not timing, but, if
35 provided:

36 A. It shall ~~be~~ begin with the term “wait.”

37 B. It need not be repeated for the entire time that the walk interval is not timing.

38 If a pilot light (see Section 4E.08) is used at an accessible pedestrian signal location, each actuation
39 shall be accompanied by the speech message “wait.”

40 Option:

41 Accessible pedestrian signals that provide ~~verbal~~ speech walk messages may provide similar messages in
42 languages other than English, if needed, except for the terms “walk sign” and “wait.”

43 **Standard:**

44 Following the audible walk indication, accessible pedestrian signals shall revert to the pushbutton
45 locator tone (see Section 4E.12) during the pedestrian change interval.

46 Section 4E.12 Accessible Pedestrian Signals and Detectors – Tactile Arrows and Locator

47 Tones

48 ~~Guidance~~ **Standard:**

49 To enable pedestrians who have visual disabilities to distinguish and locate the appropriate
50 pushbutton at an accessible pedestrian signal locations, pushbuttons ~~should~~ shall clearly indicate by
51 means of tactile arrows which crosswalk signal is actuated by each pushbutton. ~~Pushbuttons and~~

1 Tactile arrows ~~should~~ shall be located on the pushbutton, have high visual contrast ~~as described in the~~
2 ~~“Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see~~
3 ~~Section 1A.11)~~ (light on dark or dark on light), and shall be aligned parallel to the ~~Tactile arrows~~
4 ~~should point in the same~~ direction as of travel on the associated crosswalk.

5 An accessible pedestrian pushbutton shall incorporate a locator tone ~~s may be used with accessible~~
6 ~~pedestrian signals.~~

7 Support:

8 A pushbutton locator tone is a repeating sound that informs approaching pedestrians that ~~they are required~~
9 ~~to push a button~~ a pushbutton to actuate pedestrian timing or receive additional information exists, and that
10 enables ~~visually impaired~~ pedestrians with visual disabilities to locate the pushbutton ~~(see Section 4E.09)~~.

11 Standard:

12 ~~When used,~~ Pushbutton locator tones shall ~~be easily locatable, shall~~ have a duration of 0.15 seconds
13 or less, and shall repeat at 1-second intervals.

14 ~~Guidance:~~

15 Pushbutton locator tones ~~should~~ shall be deactivated ~~during flashing operation of~~ when the traffic
16 control signal is operating in a flashing mode. This requirement shall not apply to traffic control
17 signals or pedestrian hybrid beacons that are activated from a flashing or dark mode to a stop-and-go
18 mode by pedestrian actuations.

19 ~~Pushbuttons should be audibly locatable.~~ Pushbutton locator tones ~~should~~ shall be intensity
20 responsive to ambient sound, and be audible 6 to 12 feet from the pushbutton, or to the building line,
21 whichever is less. ~~Pushbutton locator tones should be no more than 5 dBA louder than ambient sound.~~

22 Support:

23 Section 4E.11 contains additional provisions regarding the volume and sound level of pushbutton locator
24 tones.

25 Section 4E.13 Accessible Pedestrian Signals and Detectors – Extended Pushbutton Press

26 Features

27 Option:

28 Pedestrians may be provided with additional features such as increased crossing time, audible beaconing,
29 or a speech pushbutton information message as a result of an extended pushbutton press.

30 Standard:

31 If an extended pushbutton press is used to provide any additional feature(s), a pushbutton press of
32 less than one second shall actuate only the pedestrian timing and any associated accessible walk
33 indication, and a pushbutton press of one second or more shall actuate the pedestrian timing, any
34 associated accessible walk indication, and any additional feature(s).

35 If additional crossing time is provided by means of an extended pushbutton press, a PUSH
36 BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P) plaque (see Figure 2B-26)
37 shall be mounted adjacent to or integral with the pedestrian pushbutton.

38 Support:

39 Audible beaconing is the use of an audible signal in such a way that pedestrians with visual disabilities
40 can home in on the signal that is located on the far end of the crosswalk as they cross the street.

41 Not all crosswalks at an intersection need audible beaconing; audible beaconing can actually cause
42 confusion if used at all crosswalks at some intersections. Audible beaconing is not appropriate at locations
43 with channelized turns or split phasing, because of the possibility of confusion.

44 Guidance:

45 Audible beaconing should only be considered following an engineering study at:

- 46 A. Crosswalks longer than 70 feet, unless they are divided by a median that has another accessible
47 pedestrian signal with a locator tone;
- 48 B. Crosswalks that are skewed;
- 49 C. Intersections with irregular geometry, such as more than four legs;
- 50 D. Crosswalks where audible beaconing is requested by an individual with visual disabilities; or
- 51 E. Other locations where a study indicates audible beaconing would be beneficial.

1 Option:

2 Audible beaconing may be provided in several ways, any of which are initiated by an extended
3 pushbutton press.

4 Standard:

5 If audible beaconing is used, the volume of the pushbutton locator tone during the pedestrian
6 change interval of the called pedestrian phase shall be increased and operated in one of the following
7 ways:

8 A. The louder audible walk indication and louder locator tone comes from the far end of the
9 crosswalk, as pedestrians cross the street,

10 B. The louder locator tone comes from both ends of the crosswalk, or

11 C. The louder locator tone comes from an additional speaker that is aimed at the center of the
12 crosswalk and that is mounted on a pedestrian signal head.

13 Option:

14 Speech pushbutton information messages may provide intersection identification, as well as information
15 about unusual intersection signalization and geometry, such as notification regarding exclusive pedestrian
16 phasing, leading pedestrian intervals, split phasing, diagonal crosswalks, and medians or islands.

17 Standard:

18 If speech pushbutton information messages are made available by actuating the accessible
19 pedestrian signal detector, they shall only be actuated when the walk interval is not timing. They shall
20 begin with the term “Wait,” followed by intersection identification information modeled after: “Wait to
21 cross Broadway at Grand.” If information on intersection signalization or geometry is also given, it
22 shall follow the intersection identification information.

23 Guidance:

24 Speech pushbutton information messages should not be used to provide landmark information or to
25 inform pedestrians with visual disabilities about detours or temporary traffic control situations.

26 Support:

27 Additional information on the structure and wording of speech pushbutton information messages is
28 included in ITE’s “Electronic Toolbox for Making Intersections More Accessible for Pedestrians Who Are
29 Blind or Visually Impaired,” which is available at ITE’s website (see Page i).

CHAPTER 4F. PEDESTRIAN HYBRID BEACONS

Section 4F.01 Application of Pedestrian Hybrid Beacons

Support:

A pedestrian hybrid beacon is a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.

Option:

A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C), or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal.

Standard:

If used, pedestrian hybrid beacons shall be used in conjunction with signs and pavement markings to warn and control traffic at locations where pedestrians enter or cross a street or highway. A pedestrian hybrid beacon shall only be installed at a marked crosswalk.

Guidance:

If one of the signal warrants of Chapter 4C is met and a traffic control signal is justified by an engineering study, and if a decision is made to install a traffic control signal, it should be installed based upon the provisions of Chapters 4D and 4E.

If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit pedestrians to cross, or if the speed for vehicles approaching on the major street is too high to permit pedestrians to cross, or if pedestrian delay is excessive, the need for a pedestrian hybrid beacon should be considered on the basis of an engineering study that considers major-street volumes, speeds, widths, and gaps in conjunction with pedestrian volumes, walking speeds, and delay.

For a major street where the posted or statutory speed limit or the 85th-percentile speed is 35 mph or less, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-1 for the length of the crosswalk.

For a major street where the posted or statutory speed limit or the 85th-percentile speed exceeds 35 mph, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-2 for the length of the crosswalk.

For crosswalks that have lengths other than the four that are specifically shown in Figures 4F-1 and 4F-2, the values should be interpolated between the curves.

Section 4F.02 Design of Pedestrian Hybrid Beacons

Standard:

Except as otherwise provided in this Section, a pedestrian hybrid beacon shall meet the provisions of Chapters 4D and 4E.

A pedestrian hybrid beacon face shall consist of three signal sections, with a CIRCULAR YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal indications (see Figure 4F-3).

When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:

A. At least two pedestrian hybrid beacon faces shall be installed for each approach of the major street,

B. A stop line shall be installed for each approach to the crosswalk,

C. A pedestrian signal head conforming to the provisions set forth in Chapter 4E shall be installed at each end of the marked crosswalk, and

D. The pedestrian hybrid beacon shall be pedestrian actuated.

Guidance:

When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:

- 1 A. The pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that
2 are controlled by STOP or YIELD signs.
- 3 B. Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at
4 least 20 feet beyond the marked crosswalk, or site accommodations should be made through curb
5 extensions or other techniques to provide adequate sight distance.
- 6 C. The installation should include suitable standard signs and pavement markings, and
- 7 D. If installed within a signal system, the pedestrian hybrid beacon should be coordinated.

8 On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 35 mph and
9 on approaches having traffic or operating conditions that would tend to obscure visibility of roadside hybrid
10 beacon face locations, both of the minimum of two pedestrian hybrid beacon faces should be installed over the
11 roadway.

12 On multi-lane approaches having a posted or statutory speed limits or 85th-percentile speeds of 35 mph or
13 less, either a pedestrian hybrid beacon face should be installed on each side of the approach (if a median of
14 sufficient width exists) or at least one of the pedestrian hybrid beacon faces should be installed over the
15 roadway.

16 A pedestrian hybrid beacon should comply with the signal face location provisions described in Sections
17 4D.11 through 4D.16.

18 **Standard:**

19 **A CROSSWALK STOP ON RED (symbolic circular red) (R10-23) sign (see Section 2B.53) shall be**
20 **mounted adjacent to a pedestrian hybrid beacon face on each major street approach. If an overhead**
21 **pedestrian hybrid beacon face is provided, the sign shall be mounted adjacent to the overhead signal**
22 **face.**

23 **Option:**

24 A Pedestrian (W11-2) warning sign (see Section 2C.50) with an AHEAD (W16-9P) supplemental plaque
25 may be placed in advance of a pedestrian hybrid beacon. A warning beacon may be installed to supplement
26 the W11-2 sign.

27 **Guidance:**

28 If a warning beacon supplements a W11-2 sign in advance of a pedestrian hybrid beacon, it should be
29 programmed to flash only when the pedestrian hybrid beacon is not in the dark mode.

30 **Standard:**

31 **If a warning beacon is installed to supplement the W11-2 sign, the design and location of the**
32 **warning beacon shall comply with the provisions of Sections 4L.01 and 4L.03.**

33 **Section 4F.03 Operation of Pedestrian Hybrid Beacons**

34 **Standard:**

35 **Pedestrian hybrid beacon indications shall be dark (not illuminated) during periods between**
36 **actuations.**

37 **Upon actuation by a pedestrian, a pedestrian hybrid beacon face shall display a flashing**
38 **CIRCULAR YELLOW signal indication, followed by a steady CIRCULAR YELLOW signal**
39 **indication, followed by both steady CIRCULAR RED signal indications during the pedestrian walk**
40 **interval, followed by alternating flashing CIRCULAR RED signal indications during the pedestrian**
41 **clearance interval (see Figure 4F-3). Upon termination of the pedestrian clearance interval, the**
42 **pedestrian hybrid beacon faces shall revert to a dark (not illuminated) condition.**

43 **Except as provided in Paragraph 4, the pedestrian signal heads shall continue to display a steady**
44 **UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid beacon**
45 **faces are either dark or displaying flashing or steady CIRCULAR YELLOW signal indications. The**
46 **pedestrian signal heads shall display a WALKING PERSON (symbolizing WALK) signal indication**
47 **when the pedestrian hybrid beacon faces are displaying steady CIRCULAR RED signal indications.**
48 **The pedestrian signal heads shall display a flashing UPRAISED HAND (symbolizing DONT WALK)**
49 **signal indication when the pedestrian hybrid beacon faces are displaying alternating flashing**
50 **CIRCULAR RED signal indications. Upon termination of the pedestrian clearance interval, the**
51 **pedestrian signal heads shall revert to a steady UPRAISED HAND (symbolizing DONT WALK) signal**
52 **indication.**

1 Option:

2 Where the pedestrian hybrid beacon is installed adjacent to a roundabout to facilitate crossings by
3 pedestrians with visual disabilities and an engineering study determines that pedestrians without visual
4 disabilities can be allowed to cross the roadway without actuating the pedestrian hybrid beacon, the pedestrian
5 signal heads may be dark (not illuminated) when the pedestrian hybrid beacon faces are dark.

6 Guidance:

7 The duration of the flashing yellow interval should be determined by engineering judgment.

8 **Standard:**

9 **The duration of the steady yellow change interval shall be determined using engineering practices.**

10 Guidance:

11 The steady yellow interval should have a minimum duration of 3 seconds and a maximum duration of 6
12 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches with higher
13 speeds.

1 **Right-of-way for emergency vehicles at signalized locations operating in the steady (stop-and-go)**
2 **mode shall be obtained as ~~specified~~ provided in Section 4D.27.**

3 **As a minimum, the signal indications, sequence, and manner of operation of an emergency-vehicle**
4 **traffic control signal installed at a midblock location shall be as follows:**

- 5 **A. The signal indication, between emergency-vehicle actuations, shall be either ~~steady~~ green or**
6 **flashing yellow. If the flashing yellow signal indication is used instead of the ~~steady~~ green signal**
7 **indication, it shall be displayed in the normal position of the ~~steady~~ green signal indication,**
8 **while the steady red and steady yellow signal indications shall be displayed in their normal**
9 **positions.**
- 10 **B. When an emergency-vehicle actuation occurs, a steady yellow change interval followed by a**
11 **steady red interval shall be displayed to traffic on the major street.**
- 12 **C. A yellow change interval is not required following the green interval for the emergency-vehicle**
13 **driveway.**

14 **Emergency-vehicle traffic control signals located at intersections shall either be operated in the**
15 **flashing mode between emergency-vehicle actuations (see Sections 4D.28 and 4D.30) or be fully ~~actuated~~**
16 **actuated or semi-~~traffic-actuated~~, to accommodate normal vehicular and pedestrian traffic on the**
17 **streets.**

18 **Warning beacons, if used with an emergency-vehicle traffic control signal, shall be flashed only:**

- 19 **A. For an appropriate time in advance of and during the steady yellow change interval for the**
20 **major street; and**
- 21 **B. During the steady red interval for the major street.**

22 **Guidance:**

23 The duration of the steady red interval for traffic on the major street should be determined by on-site test-
24 run time studies, but should not exceed 1.5 times the time required for the emergency vehicle to clear the path
25 of conflicting vehicles.

26 **Option:**

27 An emergency-vehicle traffic control signal sequence may be initiated manually from a local control point
28 such as a fire station or law enforcement headquarters or from an emergency vehicle equipped for remote
29 operation of the signal.

30 **Section 4G.04 Emergency-Vehicle Hybrid Beacons**

31 **Standard:**

32 **Emergency-vehicle hybrid beacons shall be used only in conjunction with signs to warn and control**
33 **traffic at an unsignalized location where emergency vehicles enter or cross a street or highway.**
34 **Emergency-vehicle hybrid beacons shall be actuated only by authorized emergency or maintenance**
35 **personnel.**

36 **Guidance:**

37 **Emergency-vehicle hybrid beacons should only be used when all of the following criteria are satisfied:**

- 38 **A. The conditions justifying an emergency-vehicle traffic control signal (see Section 4G.01) are met; and**
- 39 **B. An engineering study, considering the road width, approach speeds, and other pertinent factors,**
40 **determines that emergency-vehicle hybrid beacons can be designed and located in compliance with**
41 **the requirements contained in this Section and in Section 4L.01, such that they effectively warn and**
42 **control traffic at the location; and**
- 43 **C. The location is not at or within 100 feet from an intersection or driveway where the side road or**
44 **driveway is controlled by a STOP or YIELD sign.**

45 **Standard:**

46 **Except as otherwise provided in this Section, an emergency-vehicle hybrid beacon shall meet the**
47 **requirements of this Manual.**

48 **An emergency-vehicle hybrid beacon face shall consist of three signal sections, with a CIRCULAR**
49 **YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal**
50 **indications (see Figure 4G-1).**

51 **Emergency-vehicle hybrid beacons shall be placed in a dark mode (no indications displayed) during**
52 **periods between actuations.**

1 Upon actuation by authorized emergency personnel, the emergency-vehicle hybrid beacon faces
2 shall each display a flashing yellow signal indication, followed by a steady yellow change interval, prior
3 to displaying two CIRCULAR RED signal indications in an alternating flashing array for a duration of
4 time adequate for egress of the emergency vehicles. The alternating flashing red signal indications shall
5 only be displayed when it is required that drivers on the major street stop and then proceed subject to
6 the rules applicable after making a stop at a STOP sign. Upon termination of the flashing red signal
7 indications, the emergency-vehicle hybrid beacons shall revert to a dark mode (no indications
8 displayed) condition.

9 Guidance:

10 The duration of the flashing yellow interval should be determined by engineering judgment.

11 Standard:

12 The duration of the steady yellow change interval shall be determined using engineering practices.

13 Guidance:

14 The steady yellow change interval should have a minimum duration of 3 seconds and a maximum
15 duration of 6 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches
16 with higher speeds.

17 Option:

18 A steady red clearance interval may be used after the steady yellow change interval.

19 Emergency-vehicle hybrid beacons may be equipped with a light or other display visible to the operator of
20 the egressing emergency vehicle to provide confirmation that the beacons are operating.

21 Emergency-vehicle hybrid beacons may be supplemented with an advance warning sign, which may also
22 be supplemented with a Warning Beacon (see Section 4L.03).

23 Guidance:

24 If a Warning Beacon is used to supplement the advance warning sign, it should be programmed to flash
25 only when the emergency-vehicle hybrid beacon is not in the dark mode.

26 Standard:

27 At least two emergency-vehicle hybrid beacon faces shall be installed for each approach of the
28 major street and a stop line shall be installed for each approach of the major street.

29 Guidance:

30 On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 40 mph, and
31 on approaches having traffic or operating conditions that would tend to obscure visibility of roadside beacon
32 faces, both of the minimum of two emergency-vehicle hybrid beacon faces should be installed over the
33 roadway.

34 On multi-lane approaches having posted or statutory speed limits or 85th-percentile speeds of 40 mph or
35 less, either an emergency-vehicle hybrid beacon face should be installed on each side of the approach (if a
36 median of sufficient width exists) or at least one of the emergency-vehicle hybrid beacon faces should be
37 installed over the roadway.

38 An emergency-vehicle hybrid beacon should comply with the signal face location provisions described in
39 Sections 4D.11 through 4D.16.

40 Standard:

41 Stop lines and EMERGENCY SIGNAL—STOP WHEN FLASHING RED (R10-14 or R10-14a)
42 signs (see Section 2B.53) shall be used with emergency-vehicle hybrid beacons.

43 Option:

44 If needed for extra emphasis, a STOP HERE ON FLASHING RED (R10-14b) sign (see Section 2B.53)
45 may be installed with an emergency-vehicle hybrid beacon.

CHAPTER ~~4H~~ 4I. TRAFFIC CONTROL SIGNALS FOR FREEWAY ENTRANCE RAMPS

Section ~~4H.01~~ 4I.01 Application of Freeway Entrance Ramp Control Signals

Support:

Ramp control signals are traffic control signals that control the flow of traffic entering the freeway facility. This is often referred to as “ramp metering.”

Freeway entrance ramp control signals are sometimes used if controlling traffic entering the freeway could reduce the total expected delay to traffic in the freeway corridor, including freeway ramps and local streets, ~~and if at least one of the following conditions is present:~~

- ~~A. Congestion recurs on the freeway because traffic demand is in excess of the capacity, or congestion recurs or a high frequency of crashes exist at the freeway entrance because of inadequate ramp merging area. A good indicator of recurring freeway congestion is freeway operating speeds less than 50 mph occurring regularly for at least a half hour period. Freeway operating speeds less than 30 mph for a half hour period or more would indicate severe congestion.~~
- ~~B. Controlling traffic entering a freeway assists in meeting local transportation system management objectives identified for freeway traffic flow, such as the following:
 - ~~1. Maintenance of a specific freeway level of service.~~
 - ~~2. Priority treatments with higher levels of service for mass transit and carpools.~~
 - ~~3. Redistribution of freeway access demand to other on ramps.~~~~
- ~~C. Predictable, sporadic congestion occurs on isolated sections of freeway because of short period peak traffic loads from special events or from severe peak loads of recreational traffic.~~

Guidance:

The installation of ramp control signals should be preceded by an engineering study of the physical and traffic conditions on the highway facilities likely to be affected. The study should include the ramps and ramp connections and the surface streets that would be affected by the ramp control, as well as the freeway section concerned. ~~Types of traffic data that should be obtained include, but are not limited to, traffic volumes, traffic crashes, freeway operating speeds, and travel time and delay on the freeway, approaches, ramps, and alternate surface routes.~~

~~Capacities and demand/capacity relationships should be determined for each freeway section. The locations and causes of capacity restrictions and those sections where demand exceeds capacity should be identified. From these and other data, estimates should be made of desirable metering rates, probable reductions in the delay of freeway traffic, likely increases in delay to ramp traffic, and the potential impact on surface streets. The study should include an evaluation of the ramp's storage capacities for vehicles delayed at the signal, the impact of queued traffic on the local street intersection, and the availability of suitable alternate surface routes having adequate capacity to accommodate any additional traffic volume.~~

~~Before installing ramp control signals, consideration should be given to their potential acceptance by the public and the requirements for enforcing ramp control, as well as alternate means of increasing the capacity, reducing the demand, or improving the characteristics of the freeway.~~

Support:

Information on conditions that might justify freeway entrance ramp control signals, factors to be evaluated in traffic engineering studies for ramp control signals, design of ramp control signals, and operation of ramp control signals can be found in the FHWA's “Ramp Management and Control Handbook” (see Section 1A.11).

Section ~~4H.02~~ 4I.02 Design of Freeway Entrance Ramp Control Signals

Standard:

Ramp control signals shall meet all of the standard design specifications for traffic control signals, except as otherwise noted provided herein in this Section.

A. The signal face for freeway entrance ramp control signals shall be either a two-lens section signal face containing red and green signal lenses indications or a three-lens section signal face containing red, yellow, and green signal lenses indications.

B. If only one lane is present on an entrance ramp or if more than one lane is present on an entrance ramp and the ramp control signals are operated such that green signal indications are always displayed

1 simultaneously to all of the lanes on the ramp, then a minimum of two signal faces per ramp shall face
2 entering traffic.

3 If more than one lane is present on an entrance ramp and the ramp control signals are operated
4 such that green signal indications are not always displayed simultaneously to all of the lanes on the
5 ramp, then one signal face shall be provided over the approximate center of each separately-controlled
6 lane.

7 Guidance:

8 Additional side-mounted signal faces should be considered for ramps with two or more separately-
9 controlled lanes.

10 Standard:

11 **Ramp control signals shall be located and designed to minimize their viewing by mainline freeway**
12 **traffic.**

13 Option:

14 ~~☞~~ Ramp control signals ~~faces need not~~ may be ~~illuminated~~ placed in the dark mode (no indications
15 displayed) when not in use. ~~relocated from Standard paragraph~~

16 Ramp control signals may be used to control some, but not all, lanes on a ramp, such as when non-
17 metered HOV bypass lanes are provided on a ramp.

18 The required signal faces, if located at the side of the ramp roadway, may be mounted such that the height
19 above the pavement grade at the center of the ramp roadway to the bottom of the signal housing of the lowest
20 signal face is between 4.5 and 6 feet.

21 For entrance ramps with only one controlled lane, the two required signal faces may both be mounted at
22 the side of the roadway on a single pole, with one face at the normal mounting height and one face mounted
23 lower as provided in Paragraph 9, as a specific exception to the normal 8-foot minimum lateral separation of
24 signal faces required by Section 4D.13.

25 Guidance:

26 Regulatory signs with legends appropriate to the control, such as XX VEHICLE(S) PER GREEN or XX
27 VEHICLE(S) PER GREEN EACH LANE (see Section 2B.56), should be installed adjacent to the ramp
28 control signal faces. When ramp control signals are installed on a freeway-to-freeway ramp, special
29 consideration should be given to assuring adequate visibility of the ramp control signals, and multiple advance
30 warning signs with flashing warning beacons should be installed to warn road users of the metered operation.

31 Section 4L.03 Operation of Freeway Entrance Ramp Control Signals

32 Guidance:

33 Operational strategies for ramp control signals, such as periods of operation, metering rates and
34 algorithms, and queue management, should be determined by the operating agency prior to the installation of
35 the ramp control signals and should be closely monitored and adjusted as needed thereafter.

36 When the ramp control signals are operated only during certain periods of the day, a RAMP METERED
37 WHEN FLASHING (W3-8) sign (see Section 2C.37) should be installed in advance of the ramp control signal
38 near the entrance to the ramp, or on the arterial on the approach to the ramp, to alert road users to the presence
39 and operation of ramp meters.

40 Standard:

41 The RAMP METERED WHEN FLASHING sign shall be supplemented with a warning beacon (see
42 Section 4L.03) that flashes when the ramp control signal is in operation.

1 **CHAPTER ~~4I~~ 4J. TRAFFIC CONTROL FOR MOVABLE BRIDGES**

2 **Section ~~4I.01~~ 4J.01 Application of Traffic Control for Movable Bridges**

3 Support:

4 Traffic control signals for movable bridges are a special type of highway traffic signal installed at
5 movable bridges to notify road users to stop because of a road closure rather than alternately giving the right-
6 of-way to conflicting traffic movements. The signals are operated in coordination with the opening and
7 closing of the movable bridge, and with the operation of movable bridge warning and resistance gates, or
8 other devices and features used to warn, control, and stop traffic.

9 Movable bridge warning gates installed at movable bridges decrease the likelihood of vehicles and
10 pedestrians passing the stop line and entering an area where potential hazards exist because of bridge
11 operations.

12 A movable bridge resistance gate is sometimes used at movable bridges and located downstream of the
13 movable bridge warning gate. A movable bridge resistance gate provides a physical deterrent to road users
14 when placed in the appropriate position. The movable bridge resistance gates are considered a design feature
15 and not a traffic control device; requirements for them are contained in AASHTO’s “Standard Specifications
16 for Movable Highway Bridges” (see Page i for AASHTO’s address).

17 **Standard:**

18 **Traffic control at movable bridges shall include both signals and gates, except in the following**
19 **cases:**

- 20 **A. Neither is required if other traffic control devices or measures considered appropriate are used**
21 **under either of the following conditions:**
22 **1. On low-volume roads (roads of less than 400 vehicles average daily traffic), or**
23 **2. At manually operated bridges if electric power is not available.**
24 **B. Only signals are required in urban areas if intersecting streets or driveways make gates**
25 **ineffective.**
26 **C. Only movable bridge warning gates are required if a traffic control signal that is controlled as**
27 **part of the bridge operations exists within 500 feet of the movable bridge resistance gates and no**
28 **intervening traffic entrances exist.**

29 **Section ~~4I.02~~ 4J.02 Design and Location of Movable Bridge Signals and Gates**

30 **Standard:**

31 The signal ~~heads~~ faces and mountings of movable bridge signals shall ~~follow~~ comply with the
32 provisions of Chapter 4D except as ~~noted~~ provided in this Section.

33 Signal faces with 12-inch diameter signal ~~lenses~~ indications ~~should~~ shall be used for all new movable
34 bridge signals.

35 Option:

36 ~~If prevailing approach speeds are 25 mph or less, Existing~~ signal ~~heads~~ faces with 8-inch diameter lenses
37 may be ~~used~~ retained for the remainder of their useful service life.

38 **Standard:**

39 **Since movable bridge operations cover a variable range of time periods between openings, the**
40 **signal faces shall be one of the following types:**

- 41 **A. Three-section signal faces with red, yellow, and green signal ~~lenses~~ indications; or**
42 **B. Two one-section signal faces with red signal ~~lenses~~ indications in a vertical array separated by a**
43 **STOP HERE ON RED (R10-6) sign (see Section 2B.53).**

44 **Regardless of which signal type is selected, at least two signal faces shall be provided for each**
45 **approach to the movable span and a stop line (see Section 3B.16) shall be installed to indicate the point**
46 **behind which vehicles are required to stop.**

47 Guidance:

48 If movable bridge operation is frequent, the use of three-section signal faces should be considered.

1 Insofar as practical, the height and lateral placement of signal faces should ~~conform to~~ comply with the
2 requirements for other traffic control signals in accordance with ~~Section 4D.15~~ Chapter 4D. They should be
3 located ~~no~~ more than 50 feet in advance of the movable bridge warning gate.

4 Option:

5 Movable bridge signals may be supplemented with audible warning devices to provide additional warning
6 to drivers and pedestrians.

7 **Standard:**

8 A DRAW BRIDGE ~~AHEAD~~-warning (W3-6) sign (see Section 2C.39) shall be used in advance of
9 movable bridge signals and gates to give warning to road users, except in urban conditions where such
10 signing would not be practical.

11 If physical conditions prevent a road user from having a continuous view of at least two signal
12 indications for the distance specified in Table 4D-2, an auxiliary device (either a supplemental signal
13 face or the mandatory DRAW BRIDGE ~~AHEAD~~-warning (W3-6) sign to which has been added a
14 warning beacon that is interconnected with the movable bridge controller unit) shall be provided in
15 advance of movable bridge signals and gates.

16 Option:

17 The DRAW BRIDGE ~~AHEAD~~ (W3-6) sign may be supplemented by a Warning Beacon (see Section
18 4L.03).

19 **Standard:**

20 If two sets of gates (both a warning and a resistance gate) are used for a single direction, highway
21 traffic signals ~~need shall not be required to~~ accompany the resistance gate nearest the span opening, ~~but~~
22 ~~there shall be flashing red lights on the movable bridge warning gate.~~

23 Movable bridge warning gates, if used, shall be at least standard railroad size, striped with 16-inch
24 alternate ~~diagonal~~ vertical, fully reflectorized red and white stripes. Flashing red lights in accordance
25 with the Standards for those on railroad gates (see Section 8C.04) shall be included on the gate arm and
26 they shall only be operated if the gate is closed or in the process of being opened or closed. In the
27 horizontal position, the top of the gate shall be approximately 4 feet above the pavement.

28 Guidance:

29 Movable bridge warning gates should be of lightweight construction. In its normal upright position, the
30 gate arm should provide adequate lateral clearance.

31 Option:

32 The movable bridge resistance gates may be delineated, if practical, in a manner similar to the movable
33 bridge warning gate.

34 **Standard:**

35 Movable bridge warning gates, if used, shall extend at least across the full width of the approach
36 lanes if movable bridge resistance gates are used. On divided highways in which the roadways are
37 separated by a barrier median, movable bridge warning gates, if used, shall extend across all roadway
38 lanes approaching the span openings.

39 Guidance:

40 If movable bridge resistance gates are not used on undivided highways, movable bridge warning gates, if
41 used, should extend across the full width of the roadway.

42 Option:

43 A single full-width gate or two half-width gates may be used.

44 Support:

45 ~~Highway traffic signals need not accompany the gates nearest the span opening.~~

46 The locations of movable bridge signals and gates are determined by the location of the movable bridge
47 resistance gate (if used) rather than by the location of the movable spans. The movable bridge resistance gates
48 for high-speed highways are preferably located 50 feet or more from the span opening except for bascule and
49 lift bridges, where they are often attached to, or are a part of, the structure.

50 **Standard:**

1 Except where physical conditions make it impractical, movable bridge warning gates shall be
2 located 100 feet or more from the movable bridge resistance gates or, if movable bridge resistance gates
3 are not used, 100 feet or more from the movable span.

4 Guidance:

5 On bridges or causeways that cross a long reach of water and that might be hit by large marine vessels,
6 within the limits of practicality, traffic should not be halted on a section of the bridge or causeway that is
7 subject to impact.

8 In cases where it is not practical to halt traffic on a span that is not subject to impact, traffic should be
9 halted at least one span from the opening. If traffic is halted by signals and gates more than 330 feet from the
10 movable bridge warning gates (or from the span opening if movable bridge warning gates are not used), a
11 second set of gates should be installed approximately 100 feet from the gate or span opening.

12 If the movable bridge is close to a ~~highway-rail~~ grade crossing and traffic might possibly be stopped on
13 the crossing as a result of the bridge opening, a traffic control device should notify the road users to not stop
14 on the railroad tracks.

15 Section ~~4I.03~~ 4J.03 Operation of Movable Bridge Signals and Gates

16 Standard:

17 Traffic control devices at movable bridges shall be coordinated with the movable spans, so that the
18 signals, gates, and movable spans are controlled by the bridge tender through an interlocked control.

19 If the three-section type of signal face is used, the green signal indication shall be ~~illuminated~~
20 displayed at all times between bridge openings, except that if the bridge is not expected to open during
21 continuous periods in excess of 5 hours, a flashing yellow signal indication ~~may~~ shall be permitted to be
22 used. The signal shall display a steady red signal indication when traffic is required to stop. The
23 duration of the yellow change interval between the display of the ~~steady~~ green and steady red signal
24 indications, or flashing yellow and steady red signal indications, shall be ~~predetermined~~ using
25 engineering practices (see Section 4D.26).

26 If the vertical array of red signal ~~lenses~~ indications is the type of signal face selected, the red signal
27 ~~lenses~~ indications shall flash alternately only when traffic is required to stop.

28 Guidance:

29 The ~~duration of the~~ yellow change interval should have a ~~range from~~ minimum duration of 3 to 6 seconds
30 and a maximum duration of 6 seconds. The longer intervals should be reserved for use on approaches with
31 higher speeds.

32 Traffic control signals on adjacent streets and highways should be interconnected with the drawbridge
33 control if indicated by engineering judgment. When such interconnection is provided, the traffic control
34 signals at adjacent intersections should be preempted by the operation of the movable bridge in the manner
35 described in Section 4D.27.

1 CHAPTER 4K. HIGHWAY TRAFFIC SIGNALS AT TOLL PLAZAS

2 Section 4K.01 Traffic Signals at Toll Plazas

3 Standard:

4 Traffic control signals or devices that closely resemble traffic control signals that use red or green
5 circular indications shall not be used at toll plazas to indicate the open or closed status of the toll plaza
6 lanes.

7 Guidance:

8 Traffic control signals or devices that closely resemble traffic control signals that use red or green circular
9 indications should not be used for new or reconstructed installations at toll plazas to indicate the success or
10 failure of electronic toll payments or to alternately direct drivers making cash toll payments to stop and then
11 proceed.

12 Section 4K.02 Lane-Use Control Signals at or Near Toll Plazas

13 Standard:

14 Lane-use control signals used at toll plazas shall comply with the provisions of Chapter 4M except
15 as otherwise provided in this Section.

16 At toll plazas with multiple lanes where one or more lanes is sometimes closed to traffic, a lane-use
17 control signal shall be installed above the center of each toll plaza lane to indicate the open or closed
18 status of the controlled lane.

19 Option:

20 The bottom of the signal housing of a lane-use control signal above a toll plaza lane having a canopy may
21 be mounted lower than 15 feet above the pavement, but not lower than the vertical clearance of the canopy
22 structure.

23 Lane-use control signals may also be used to indicate the open or closed status of an Open-Road ETC lane
24 as a supplement to other devices used for the temporary closure of a lane (see Part 6).

25 Section 4K.03 Warning Beacons at Toll Plazas

26 Standard:

27 Warning Beacons used at toll plazas shall comply with the provisions of Chapter 4L except as
28 otherwise provided in this Section.

29 Guidance:

30 Warning Beacons, if used with a toll plaza canopy sign (see Section 2F.16) to assist drivers of such
31 vehicles in locating the dedicated ETC Account-Only lane(s), should be installed in a manner such that the
32 beacons are distinctly separate from the lane-use control signals (see Section 4M.01) for the toll plaza lane.

33 Option:

34 Warning Beacons that are mounted on toll plaza islands, behind impact attenuators in front of toll plaza
35 islands, and/or on toll booth pylons (ramparts) to identify them as objects in the roadway may be mounted at a
36 height that is appropriate for viewing in a toll plaza context, even if that height is lower than the normal
37 minimum of 8 feet above the pavement.

1 CHAPTER ~~4K~~ 4L. FLASHING BEACONS

2 Section ~~4K.01~~ 4L.01 General Design and Operation of Flashing Beacons

3 Support:

4 A Flashing Beacon is a highway traffic signal with one or more signal sections that operates in a flashing
5 mode. It can provide traffic control when used as an intersection control beacon ([see Section 4L.02](#)) or
6 ~~warning in alternative uses~~ [it can provide warning when used in other applications \(see Sections 4L.03, 4L.04,](#)
7 [and 4L.05\).](#)

8 Standard:

9 Flashing Beacon units and their mountings shall ~~follow~~ [comply with](#) the provisions of Chapter 4D,
10 except as otherwise ~~specified~~ [provided herein in this Chapter](#).

11 Beacons shall be flashed at a rate of not less than 50 or more than 60 times per minute. The
12 illuminated period of each flash shall ~~not be less than one-half~~ [a minimum of 1/2](#) and ~~not more than~~
13 ~~two-thirds~~ [a maximum of 2/3](#) of the total cycle.

14 ~~The~~ [A](#) beacon shall not be included within the border of ~~the~~ [a](#) sign except for SCHOOL SPEED
15 LIMIT sign beacons ([see Sections 4L.04 and 7B.15](#)). [relocated from Section 4K.03](#)

16 Guidance:

17 If used to supplement a warning or regulatory sign, the edge of the beacon signal housing should normally
18 be located no closer than 12 inches outside of the nearest edge of the sign.

19 Option:

20 An automatic dimming device may be used to reduce the brilliance of flashing yellow signal indications
21 during night operation.

22 Section ~~4K.02~~ 4L.02 Intersection Control Beacon

23 Standard:

24 An Intersection Control Beacon shall consist of one or more signal faces directed toward each
25 approach to an intersection. Each signal face shall consist of one or more signal sections of a standard
26 traffic signal face, with flashing CIRCULAR YELLOW or CIRCULAR RED signal indications in each
27 signal face. They shall be installed and used only at an intersection to control two or more directions of
28 travel.

29 Application of Intersection Control Beacon signal indications shall be limited to the following:

- 30 A. Yellow on one route (normally the major street) and red for the remaining approaches, and
- 31 B. Red for all approaches (if the warrant [described in Section 2B.07](#) for a multi-way stop is
- 32 satisfied).

33 Flashing yellow signal indications shall not face conflicting vehicular approaches.

34 A STOP sign shall be used on approaches to which a flashing red signal indication is ~~shown~~
35 [displayed](#) on an Intersection Control Beacon (see Section 2B.04).

36 [If two horizontally aligned red signal indications are used on an approach for an Intersection](#)
37 [Control Beacon, they shall be flashed simultaneously to avoid being confused with grade crossing](#)
38 [flashing-light signals. If two vertically aligned red signal indications are used on an approach for an](#)
39 [Intersection Control Beacon, they shall be flashed alternately.](#)

40 Guidance:

41 An Intersection Control Beacon should not be mounted on a pedestal in the roadway unless the pedestal is
42 within the confines of a traffic or pedestrian island.

43 Option:

44 Supplemental signal indications may be used on one or more approaches in order to provide adequate
45 visibility to approaching road users.

46 Intersection Control Beacons may be used at intersections where traffic or physical conditions do not
47 justify conventional traffic control signals but crash rates indicate the possibility of a special need.

48 An Intersection Control Beacon is generally located over the center of an intersection; however, it may be
49 used at other suitable locations.

1 **Section ~~4K.03~~ 4L.03 Warning Beacon**

2 Support:

3 Typical applications of Warning Beacons include the following:

- 4 A. At obstructions in or immediately adjacent to the roadway;
- 5 B. As supplemental emphasis to warning signs;
- 6 C. As emphasis for midblock crosswalks;
- 7 ~~D. On approaches to intersections where additional warning is required, or where special conditions~~
- 8 ~~exist, and~~
- 9 D. As supplemental emphasis to regulatory signs, except STOP, ~~YIELD~~, DO NOT ENTER, WRONG
- 10 WAY, and SPEED LIMIT signs; and
- 11 E. In conjunction with a regulatory or warning sign that includes the phrase WHEN FLASHING in its
- 12 legend to indicate that the regulation is in effect or that the condition is present only at certain times.

13 **Standard:**

14 **A Warning Beacon shall consist of one or more signal sections of a standard traffic signal face with**

15 **a flashing CIRCULAR YELLOW signal indication in each signal section.**

16 **A Warning Beacon shall be used only to supplement an appropriate warning or regulatory sign or**

17 **marker. second sentence was relocated to Section 4L.01**

18 **Warning Beacons, if used at intersections, shall not face conflicting vehicular approaches.**

19 **If a Warning Beacon is suspended over the roadway, the clearance above the pavement shall be ~~at~~**

20 **least a minimum of 15 feet but not more than and a maximum of 19 feet.**

21 **Guidance:**

22 The condition or regulation justifying Warning Beacons should largely govern their location with respect

23 to the roadway.

24 If an obstruction is in or adjacent to the roadway, illumination of the lower portion or the beginning of the

25 obstruction or a sign on or in front of the obstruction, in addition to the beacon, should be considered.

26 Warning Beacons should be operated only during those ~~hours~~ periods or times when the condition or

27 regulation exists.

28 **Option:**

29 Warning Beacons that are actuated by pedestrians, bicyclists, or other road users may be used as

30 appropriate to provide additional warning to vehicles approaching a crossing or other location.

31 If Warning Beacons have more than one signal section, they may be flashed either alternately or

32 simultaneously.

33 A flashing yellow beacon interconnected with a traffic signal controller assembly may be used with a

34 traffic signal warning sign (see Section 2C.36).

35 **Section ~~4K.04~~ 4L.04 Speed Limit Sign Beacon**

36 **Standard:**

37 **A Speed Limit Sign Beacon shall be used only to supplement a Speed Limit sign.**

38 **A Speed Limit Sign Beacon shall consist of one or more signal sections of a standard traffic control**

39 **signal face, with a flashing CIRCULAR YELLOW signal indication in each signal section. The signal**

40 **~~lenses~~ indications shall have a nominal diameter of not less than 8 inches. If two signal lenses**

41 **indications are used, they shall be vertically aligned, except that they ~~may~~ shall be permitted to be**

42 **horizontally aligned if the Speed Limit (R2-1) sign is longer horizontally than vertically. If two signal**

43 **~~lenses~~ indications are used, they shall be alternately flashed.**

44 **Option:**

45 A Speed Limit Sign Beacon may be used with a fixed or variable Speed Limit sign. If applicable, a

46 flashing Speed Limit Sign Beacon (with an appropriate accompanying sign) may be used to indicate that the

47 displayed speed limit ~~shown~~ is in effect.

48 A Speed Limit Sign Beacon may be included within the border of a School Speed Limit (S5-1) sign (see

49 Section 7B.15).

50 ~~Support:~~

1 ~~Section 7B.11 contains additional Options for the use of Speed Limit Sign Beacons with SCHOOL~~
2 ~~SPEED LIMIT signs.~~

3 **Section ~~4K.05~~ 4L.05 Stop Beacon**

4 **Standard:**

5 A Stop Beacon shall be used only to supplement a STOP sign, a DO NOT ENTER sign, or a
6 WRONG WAY sign.

7 A Stop Beacon shall consist of one or more signal sections of a standard traffic signal face with a
8 flashing CIRCULAR RED signal indication in each signal section. If two horizontally aligned signal
9 ~~lenses~~ indications are used for a Stop Beacon, they shall be flashed simultaneously to avoid being
10 confused with ~~a highway-rail~~ grade crossing flashing-light signals. If two vertically aligned signal ~~lenses~~
11 indications are used for a Stop Beacon, they shall be flashed alternately.

12 The bottom of the signal housing of a Stop Beacon shall be not less than 12 inches or more than 24
13 inches above the top of a STOP sign (~~see Section 2B.04~~), a DO NOT ENTER sign, or a WRONG WAY
14 sign.

CHAPTER ~~4J~~ 4M. LANE-USE CONTROL SIGNALS

Section ~~4J.01~~ 4M.01 Application of Lane-Use Control Signals

Support:

Lane-use control signals are special overhead signals that permit or prohibit the use of specific lanes of a street or highway or that indicate the impending prohibition of their use. Lane-use control signals are distinguished by placement of special signal faces over a certain lane or lanes of the roadway and by their distinctive shapes and symbols. Supplementary signs are sometimes used to explain their meaning and intent.

Lane-use control signals are most commonly used for reversible-lane control, but are also used in certain non-reversible ~~freeway~~ lane applications and for toll plaza lanes (see Section 4K.02).

Guidance:

An engineering study should be conducted to determine whether a reversible-lane operation can be controlled satisfactorily by static signs (see Section 2B.26) or whether lane-use control signals are necessary. Lane-use control signals should be used to control reversible-lane operations if any of the following conditions are present:

- A. More than one lane is reversed in direction;
- B. Two-way or one-way left turns are allowed during peak-period reversible operations, but those turns are from a different lane than used during off-peak periods;
- C. Other unusual or complex operations are included in the reversible-lane pattern;
- D. Demonstrated crash experience occurring with reversible-lane operation controlled by static signs that can be corrected by using lane-use control signals at the times of transition between peak and off-peak patterns; and/or
- E. An engineering study indicates that ~~safer~~ the safety and ~~more efficient~~ efficiency of the traffic operations of a reversible-lane system would be ~~provided~~ improved by lane-use control signals.

Standard:

Pavement markings (see Section 3B.03) shall be used in conjunction with reversible-lane control signals. ~~relocated from Section 4J.02~~

Option:

Lane-use control signals ~~also may be used for reversible lane operations at toll booths. They~~ may also be used if there is no intent or need to reverse lanes, but there is a need to indicate the open or closed status of one or more lanes, including such as:

- A. On a freeway, if it is desired to ~~keep traffic out of~~ close certain lanes at certain hours to facilitate the merging of traffic from a ramp or other freeway;
- B. On a freeway, near its terminus, to indicate a lane that ends;
- C. On a freeway or long bridge, to indicate that a lane may be temporarily blocked by a crash, breakdown, construction or maintenance activities, ~~and so forth~~ or similar temporary conditions; and
- D. On a conventional road or driveway, at access or egress points to or from a facility, such as a parking garage, where one or more lanes of the access or egress are opened or closed at various times.

Section ~~4J.02~~ 4M.02 Meaning of Lane-Use Control Signal Indications

Standard:

The meanings of lane-use control signal indications ~~are~~ shall be as follows:

- A. A steady DOWNWARD GREEN ARROW signal indication shall mean that a road user is permitted to drive in the lane over which the arrow signal indication is located.
- B. A steady YELLOW X signal indication shall mean that a road user is to prepare to vacate, ~~in a reasonably safe manner,~~ the lane over which the signal indication is located because a lane control change is being made to a steady RED X signal indication.
- C. A steady WHITE TWO-WAY LEFT-TURN ARROW signal indication (see Figure 4M-1) shall mean that a road user is permitted to use a lane over which the signal indication is located for a left turn, but not for through travel, with the understanding that common use of the lane by oncoming road users for left turns is also permitted.
- D. A steady WHITE ONE WAY LEFT-TURN ARROW signal indication (see Figure 4M-1) shall mean that a road user is permitted to use a lane over which the signal indication is located for a left turn (without opposing turns in the same lane), but not for through travel.

1 E. A steady RED X signal indication shall mean that a road user is not permitted to use the lane
2 over which the signal indication is located and that this signal indication shall modify
3 accordingly the meaning of ~~all~~ other traffic controls present. ~~The road user shall obey all other~~
4 ~~traffic controls and follow normal safe driving practices.~~

5 **Section ~~4J.03~~ 4M.03 Design of Lane-Use Control Signals**

6 **Standard:**

7 All lane-use control signal indications shall be in units with rectangular signal faces and shall have
8 opaque backgrounds. Nominal minimum height and width of each DOWNWARD GREEN ARROW,
9 YELLOW X, and RED X signal face shall be 18 inches for typical applications. The WHITE TWO-
10 WAY LEFT-TURN ARROW and WHITE ONE WAY LEFT-TURN ARROW signal faces shall have a
11 nominal minimum height and width of 30 inches.

12 Each lane to be reversed or closed shall have signal faces with a DOWNWARD GREEN ARROW
13 and a RED X symbol.

14 Each reversible lane that also operates as a two-way or one-way left-turn lane during certain
15 periods shall have signal faces that also include the applicable WHITE TWO-WAY LEFT-TURN
16 ARROW or WHITE ONE WAY LEFT-TURN ARROW symbol.

17 Each non-reversible lane immediately adjacent to a reversible lane shall have signal indications that
18 display a DOWNWARD GREEN ARROW to traffic traveling in the permitted direction and a RED X
19 to traffic traveling in the opposite direction.

20 If in separate signal sections, the relative positions, from left to right, of the signal indications shall
21 be RED X, YELLOW X, DOWNWARD GREEN ARROW, WHITE TWO-WAY LEFT-TURN
22 ARROW, WHITE ONE WAY LEFT-TURN ARROW.

23 The color of lane-use control signal indications shall be clearly visible for 2,300 feet at all times
24 under normal atmospheric conditions, unless otherwise physically obstructed.

25 Lane-use control signal faces shall be located approximately over the center of the lane controlled.

26 If the area to be controlled is more than 2,300 feet in length, or if the vertical or horizontal
27 alignment is curved, intermediate lane-use control signal faces shall be located over each controlled lane
28 at frequent intervals. This location shall be such that road users will at all times be able to see at least
29 one signal indication and preferably two along the roadway, and will have a definite indication of the
30 lanes specifically reserved for their use.

31 All lane-use control signal faces shall be located in a straight line across the roadway approximately
32 at right angles to the roadway alignment.

33 On roadways having intersections controlled by traffic control signals, the lane-use control signal
34 face shall be located sufficiently far in advance of or beyond such traffic control signals to prevent them
35 from being misconstrued as traffic control signals.

36 Except as provided in Paragraph 12, the bottom of the signal housing of any lane-use control signal
37 face shall be ~~at least~~ a minimum of 15 feet ~~but not more than~~ and a maximum of 19 feet above the
38 pavement grade.

39 Option:

40 The bottom of a lane-use control signal housing may be lower than 15 feet above the pavement if it is
41 mounted on a canopy or other structure over the pavement, but not lower than the vertical clearance of the
42 structure.

43 Except for lane-use control signals at toll plazas (see Section 4K.02), in areas with minimal visual clutter
44 and with speeds of less than 40 mph, lane-use control signal faces with nominal height and width of 12 inches
45 may be used for the DOWNWARD GREEN ARROW, YELLOW X, and RED X signal faces, and lane-use
46 control signal faces with nominal height and width of 18 inches may be used for the WHITE TWO-WAY
47 LEFT-TURN ARROW and WHITE ONE-WAY LEFT-TURN ARROW signal faces.

48 Other sizes of lane-use control signal faces larger than 18 inches with message recognition distances
49 appropriate to signal spacing may be used for the DOWNWARD GREEN ARROW, YELLOW X, and RED
50 X signal faces.

1 Non-reversible lanes not immediately adjacent to a reversible lane on any street so controlled may also be
2 provided with signal indications that display a DOWNWARD GREEN ARROW to traffic traveling in the
3 permitted direction and a RED X to traffic traveling in the opposite direction.

4 The signal indications provided for each lane may be in separate signal sections or may be superimposed
5 in the same signal section.

6 **Section ~~4J.04~~ 4M.04 Operation of Lane-Use Control Signals**

7 **Standard:**

8 All lane-use control signals shall be coordinated so that all the signal indications along the
9 controlled section of roadway are operated uniformly and consistently. The lane-use control signal
10 system shall be designed to reliably guard against showing any prohibited combination of signal
11 indications to any traffic at any point in the controlled lanes.

12 For reversible-lane control signals, the following combination of signal indications shall not be
13 ~~shown~~ simultaneously displayed over the same lane to both directions of travel:

- 14 A. DOWNWARD GREEN ARROW in both directions,
- 15 B. YELLOW X in both directions,
- 16 C. WHITE ONE WAY LEFT-TURN ARROW in both directions,
- 17 D. DOWNWARD GREEN ARROW in one direction and YELLOW X in the other direction,
- 18 E. WHITE TWO-WAY LEFT-TURN ARROW or WHITE ONE WAY LEFT-TURN ARROW in
19 one direction and DOWNWARD GREEN ARROW in the other direction,
- 20 F. WHITE TWO-WAY LEFT-TURN ARROW in one direction and WHITE ONE WAY LEFT-
21 TURN ARROW in the other direction, and
- 22 G. WHITE ONE WAY LEFT-TURN ARROW in one direction and YELLOW X in the other
23 direction.

24 A moving condition in one direction shall be terminated either by the immediate display of a RED X
25 signal indication or by a YELLOW X signal indication followed by a RED X signal indication. In either
26 case, the duration of the RED X signal indication shall be sufficient to allow clearance of the lane before
27 any moving condition is allowed in the opposing direction.

28 Whenever a DOWNWARD GREEN ARROW signal indication is changed to a WHITE TWO-
29 WAY LEFT-TURN ARROW signal indication, the RED X signal indication shall continue to be
30 displayed to the opposite direction of travel for an appropriate duration to allow traffic time to vacate
31 the lane being converted to a two-way left-turn lane.

32 If an automatic control system is used, a manual control to override the automatic control shall be
33 provided.

34 **Guidance:**

35 The type of control provided for reversible-lane operation should be such as to permit either automatic or
36 manual operation of the lane-use control signals.

37 **Standard:**

38 If used, lane-use control signals shall be operated continuously, except that lane-use control signals
39 that are used only for special events or other infrequent occurrences and lane-use control signals on
40 non-reversible freeway lanes ~~may~~ shall be permitted to be darkened when not in operation. The change
41 from normal operation to non-operation shall occur only when the lane-use control signals display
42 signal indications that are appropriate for the lane use that applies when the signals are not operated.
43 The lane-use control signals shall display signal indications that are appropriate for the existing lane
44 use when changed from non-operation to normal operations. Also, traffic control devices shall clearly
45 indicate the proper lane use when the lane control signals are not in operation.

46 **Support:**

47 Section 2B.26 contains additional information concerning considerations involving left-turn prohibitions
48 in conjunction with reversible-lane operations.

1 CHAPTER ~~4L~~ 4N. IN-ROADWAY LIGHTS

2 Section ~~4L.01~~ 4N.01 Application of In-Roadway Lights

3 Support:

4 In-Roadway Lights are special types of highway traffic signals installed in the roadway surface to warn
5 road users that they are approaching a condition on or adjacent to the roadway that might not be readily
6 apparent and might require the road users to slow down and/or come to a stop. This includes, ~~but is not~~
7 ~~necessarily limited to~~, situations warning of marked school crosswalks, marked midblock crosswalks, marked
8 crosswalks on uncontrolled approaches, marked crosswalks in advance of roundabouts ~~intersections~~ as
9 described in ~~Sections 3B.24 and 3B.25~~ Chapter 3C, and other roadway situations involving pedestrian
10 crossings.

11 **Standard:**

12 In-Roadway Lights shall not be used for any application that is not described in this Chapter.

13 If used, In-Roadway Lights shall not exceed a height of 3/4 inch above the roadway surface.

14 When used, In-Roadway Lights shall be flashed and shall not be steadily illuminated.

15 Support:

16 Steadily illuminated lights installed in the roadway surface are considered to be internally illuminated
17 raised pavement markers (see Section 3B.11).

18 Option:

19 ~~The flash rate for~~ In-Roadway Lights may be ~~different from the flash rate of standard beacons~~ flashed in a
20 manner that includes a continuous flash of varying intensity and time duration that is repeated to provide a
21 flickering effect (see Section 4N.02).

22 Section ~~4L.02~~ 4N.02 In-Roadway Warning Lights at Crosswalks

23 Option:

24 In-roadway lights may be installed at certain marked crosswalks, based on an engineering study or
25 engineering judgment, to provide additional warning to road users.

26 **Standard:**

27 **If used, In-Roadway Warning Lights at crosswalks shall be installed only at marked crosswalks**
28 **with applicable warning signs. They shall not be used at crosswalks controlled by YIELD signs, STOP**
29 **signs, or traffic control signals.**

30 If In-Roadway Warning Lights are used at a crosswalk, the following requirements shall apply:

31 A. ~~If used, In-Roadway Warning Lights at crosswalks~~ Except as provided in Paragraphs 7 and 8,
32 they shall be installed along both sides of the crosswalk and shall span its entire length.

33 B. ~~If used, In-Roadway Warning Lights at crosswalks~~ They shall initiate operation based on
34 pedestrian actuation and shall cease operation at a predetermined time after the pedestrian
35 actuation or, with passive detection, after the pedestrian clears the crosswalk.

36 C. ~~If used, In-Roadway Warning Lights at crosswalks~~ They shall display a flashing yellow ~~signal-~~
37 indication light when actuated. The flash rate ~~for In-Roadway Warning Lights at crosswalks~~
38 shall be at least 50, but not more than 60, flash periods per minute. ~~The flash rate~~ If they are
39 flashed in a manner that includes a continuous flash of varying intensity and time duration that
40 is repeated to provide a flickering effect, the flickers or pulses shall not ~~be~~ repeat at a rate that is
41 between 5 and 30 ~~flashes~~ per second to avoid frequencies that might cause seizures.

42 D. ~~If used, In-Roadway Warning Lights~~ They shall be installed in the area between the outside
43 edge of the crosswalk line and 10 feet from the outside edge of the crosswalk.

44 E. ~~In-Roadway Warning Lights~~ They shall face away from the crosswalk if unidirectional, or shall
45 face away from and across the crosswalk if bidirectional.

46 **If used on one-lane, one-way roadways, a minimum of two In-Roadway Warning Lights shall be**
47 **installed on the approach side of the crosswalk. If used on two-lane roadways, a minimum of three In-**
48 **Roadway Warning Lights shall be installed along both sides of the crosswalk. If used on roadways with**
49 **more than two lanes, a minimum of one In-Roadway Warning Light per lane shall be installed along**
50 **both sides of the crosswalk.**

51 Guidance:

1 If used, In-Roadway Warning Lights should be installed in the center of each travel lane, at the ~~centerline~~
2 center line of the roadway, at each edge of the roadway or parking lanes, or at other suitable locations away
3 from the normal tire track paths.

4 The location of the In-Roadway Warning Lights within the lanes should be based on engineering
5 judgment.

6 Option:

7 On one-way streets, In-Roadway Warning Lights may be omitted on the departure side of the crosswalk.

8 Based on engineering judgment, the In-Roadway Warning Lights on the departure side of the crosswalk
9 on the left side of a median may be omitted.

10 Unidirectional In-Roadway Warning Lights installed at crosswalk locations may have an optional,
11 additional yellow light indication in each unit that is visible to pedestrians in the crosswalk to indicate to
12 pedestrians in the crosswalk that the In-Roadway Warning Lights are in fact flashing as they cross the street.
13 These yellow lights may flash with and at the same flash rate as the light module in which each is installed.

14 Guidance:

15 If used, the period of operation of the In-Roadway Warning Lights following each actuation should be
16 sufficient to allow a pedestrian crossing in the crosswalk to leave the curb or shoulder and travel at a ~~normal~~
17 walking speed of ~~4~~ 3.5 feet per second to at least the far side of the traveled way or to a median of sufficient
18 width for pedestrians to wait. Where pedestrians who walk slower than ~~normal~~ 3.5 feet per second, or
19 pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than ~~4~~ 3.5 feet per
20 second should be considered in determining the period of operation.

21 Standard:

22 If pedestrian pushbuttons are used to actuate the in-roadway lights, a PUSH BUTTON TO TURN
23 ON WARNING LIGHTS (with pushbutton symbol) (R10-25) sign (see Figure 2B-26) shall be mounted
24 adjacent to or integral with each pedestrian pushbutton.

25 **Where the period of operation is sufficient only for crossing from a curb or shoulder to a median of**
26 **sufficient width for pedestrians to wait, ~~additional measures should be considered, such as~~ median-**
27 **mounted pedestrian actuators shall be provided.**

28 ~~Option:~~

29 ~~In-Roadway Warning Lights at crosswalks may use pedestrian detectors to determine the duration of the~~
30 ~~operation instead of ceasing operation after a predetermined time.~~

1 CHAPTER 5A. GENERAL

2 Section 5A.01 Function

3 Standard:

4 A low-volume road shall be defined for this Part of the Manual as follows:

- 5 A. A low-volume road shall be a facility lying outside of built-up areas of cities, towns, and
- 6 communities, and it shall have a traffic volume of less than 400 AADT.
- 7 B. A low-volume road shall not be a freeway, [an](#) expressway, [an](#) interchange ramp, [a](#) freeway
- 8 service road, ~~or~~ a road on a designated State highway system, [or a residential street in a](#)
- 9 [neighborhood](#). In terms of highway classification, it shall be a variation of a conventional road
- 10 or a special purpose road as defined in Section 1A.13.
- 11 C. A low-volume road shall be classified as either paved or unpaved.

12 Support:

13 Low-volume roads typically include ~~farm to market~~ [agricultural](#), recreational, resource management and

14 development [such as mining and logging and grazing](#), and local roads [in rural areas](#).

15 Guidance:

16 The needs of unfamiliar road users for occasional, recreational, and commercial transportation purposes

17 should be considered.

18 Support:

19 At some locations on low-volume roads, the use of traffic control devices might be needed to provide the

20 road user limited, but essential, information regarding regulation, guidance, and warning.

21 Other Parts of this Manual contain ~~criteria~~ [provisions](#) applicable to all low-volume roads; however, Part 5

22 specifically supplements and references the ~~criteria~~ [provisions](#) for traffic control devices commonly used on

23 low-volume roads.

24 Section 5A.02 Application

25 Support:

26 It is possible, in many cases, to provide essential information to road users on low-volume roads with a

27 limited number of traffic control devices. The focus might be on devices that:

- 28 A. Warn of conditions not normally encountered,
- 29 B. Prohibit unsafe movements, or
- 30 C. Provide minimal destination guidance.

31 ~~As with other roads, the application of traffic control devices on low-volume roads is based on~~

32 ~~engineering judgment or studies.~~

33 Standard:

34 The ~~criteria~~ [provisions](#) contained in Part 5 shall not prohibit the installation or the full application

35 of traffic control devices on a low-volume road where conditions justify their use.

36 Guidance:

37 Additional traffic control devices and ~~criteria~~ [provisions](#) contained in other Parts of the Manual should be

38 considered for use on low-volume roads.

39 Support:

40 [Section 1A.09 contains information regarding the assistance that is available to jurisdictions that do not](#)

41 [have engineers on their staffs who are trained and/or experienced in traffic control devices.](#)

42 Section 5A.03 Design

43 Standard:

44 Traffic control devices for use on low-volume roads shall be designed in accordance with the ~~criteria~~

45 [provisions](#) contained in Part 5, and where required, in other applicable Parts of this Manual.

46 The typical sizes for signs [and plaques](#) installed on low-volume roads shall be as shown in Table 5A-

47 1. The ~~minimum sign~~ sizes [in the minimum column](#) shall only be used on low-volume roads where the

48 85th-percentile speed or posted speed limit is less than 35 mph.

49 Guidance:

1 ~~The oversized sign~~ sizes [in the oversized column](#) should be used where engineering judgment indicates a
2 need based on high vehicle operating speeds, driver expectancy, traffic operations, or roadway conditions.

3 Option:

4 [Signs and plaques larger than those shown in Table 5A-1 may be used \(see Section 2A.11\).](#)

5 **Standard:**

6 All signs shall be retroreflective or illuminated to show the same shape and similar color both day
7 and night, unless specifically stated otherwise in other applicable Parts of this Manual. The
8 requirements for sign illumination shall not be considered to be satisfied by street, highway, or strobe
9 lighting.

10 All markings shall be visible at night and shall be retroreflective unless ambient illumination
11 provides adequate visibility of the markings.

12 **Section 5A.04 Placement**

13 **Standard:**

14 [Except as provided in Paragraph 3](#), the traffic control devices used on low-volume roads shall be
15 placed and positioned ~~in accordance with the criteria contained in Part 5 and, where necessary,~~ in
16 accordance with the lateral, longitudinal, and vertical placement ~~criteria~~ [provisions](#) contained in Part 2
17 and other applicable Sections of this Manual.

18 **Guidance:**

19 The placement of warning signs should ~~conform to~~ [comply with](#) the guidance contained in Section 2C.05
20 and other applicable Sections of this Manual.

21 **Option:**

22 A lateral offset of not less than 2 feet from the roadway edge to the roadside edge of a sign may be used
23 where roadside features such as terrain, shrubbery, and/or trees prevent lateral placement in accordance with
24 Section 2A.19.

25 **Standard:**

26 If located within a clear zone, ~~ground-~~ [post-](#)mounted sign supports shall be yielding, breakaway, or
27 shielded with a longitudinal barrier or crash cushion as required in Section 2A.19.

CHAPTER 5B. REGULATORY SIGNS

Section 5B.01 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.

Section 5B.02 STOP and YIELD Signs (R1-1 and R1-2)

Guidance:

STOP (R1-1) and YIELD (R1-2) signs (see Figure 5B-1) should be considered for use on low-volume roads where engineering judgment or study, consistent with the provisions of Sections 2B.04 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.

Section 5B.03 Speed Limit Signs (R2 Series)

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 ~~shown~~ 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.

Section 5B.04 Traffic Movement and Prohibition Signs (R3, R4, R5, R6, R9, R10, R11, R12, R13, and R14 Series)

Support:

The regulatory signs (see Figure 5B-1) 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:

~~These~~ Signs [for traffic prohibitions or restrictions](#) may be ~~useful~~ [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 ~~reasonably safe~~ transition from the low-volume road to the higher-class facility ~~and~~ [or](#) vice versa.

Section 5B.05 Parking Signs (R8 Series)

Option:

Parking signs (see Figure 5B-2) may be installed selectively on low-volume roads with due consideration of enforcement.

Section 5B.06 Other Regulatory Signs

Standard:

1 Other regulatory signs used on low-volume roads that are not discussed in Part 5 shall ~~conform~~
2 comply with the ~~criteria~~ provisions contained in other Parts of this Manual.

CHAPTER 5C. WARNING SIGNS

Section 5C.01 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 ~~criteria~~ [provisions](#) for warning signs are contained in Chapter 2C and in other Sections of this Manual. ~~Criteria~~ [Provisions](#) for warning signs that are specific to low-volume roads are contained in this Chapter.

Section 5C.02 Horizontal Alignment Signs (W1-1 through W1-8)

Support:

Horizontal Alignment signs (see [Sections 2C.06 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.

Section 5C.03 Intersection Warning Signs (W2-1 through ~~W2-5~~ W2-6)

Support:

Intersection signs (see Figure 5C-1) include the crossroad, side road, T-symbol, ~~and~~ 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.

Section 5C.04 Stop Ahead and Yield Ahead Signs (W3-1, W3-2)

Standard:

A Stop Ahead (W3-1) sign (see Figure 5C-2) 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 (see Figure 5C-2) 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.

~~Option:~~

~~Word message (W3-1a and W3-2a) signs may be used as alternates to symbol signs.~~

Section 5C.05 NARROW BRIDGE Sign (W5-2)

Option:

The NARROW BRIDGE (W5-2) sign (see Figure 5C-2) may be used on an approach to a bridge or culvert that has a clear width less than that of the approach roadway.

Section 5C.06 ONE LANE BRIDGE Sign (W5-3)

Guidance:

A ONE LANE BRIDGE (W5-3) sign (see Figure 5C-2) 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.

1 **Section 5C.07 Hill Sign (W7-1)**

2 Option:

3 An engineering study of vehicles and road characteristics, such as percent grade and length of grade, may
4 be conducted to determine hill signing requirements.

5 ~~The use of the Hill (W7-1) sign (see Figure 5C-2) on low volume roads may be confined to roads where~~
6 ~~commercial or recreational vehicles are anticipated.~~

7 ~~Word messages (W7-1a) may be used as alternates to symbols.~~

8 **Section 5C.08 PAVEMENT ENDS Sign (W8-3)**

9 Option:

10 A PAVEMENT ENDS (W8-3) sign (see Figure 5C-2) may be used to warn road users where a paved
11 surface changes to a gravel or earth road surface.

12 **Section 5C.09 Vehicular Traffic Warning and Non-Vehicular Warning Signs (W11 Series and**
13 **W8-6)**

14 Guidance:

15 Vehicular Traffic [Warning](#) signs (see Figure 5C-2) should be used to alert road users to [locations where](#)
16 frequent unexpected entries into the roadway by trucks, bicyclists, farm vehicles, fire trucks, and other
17 vehicles [might occur](#). Such signs should be used only at locations where the road user's sight distance is
18 restricted or the [condition](#), activity, [or entering traffic](#) would be unexpected.

19 Option:

20 Non-Vehicular [Warning](#) signs (see Figure 5C-2) may be used to alert ~~the~~ road users ~~to frequent~~ [in advance](#)
21 [of locations where](#) unexpected entries into the roadway [or shared use](#) by pedestrians, [large](#) animals, ~~and~~ [or](#)
22 other crossing activities ~~that may cause potential conflicts~~ [might occur](#).

23 A W7-3aP, W16-2P, or W16-9P supplemental plaque (see Figure 5C-2), with the legend NEXT XX
24 MILES, XX FEET, or AHEAD may be installed below a Vehicular Traffic [Warning](#) or Non-Vehicular
25 [Warning](#) sign (see Sections 2C.49 and 2C.50) [to inform road users that they are approaching a portion of the](#)
26 [roadway or a point where crossing activity might occur](#).

27 **Standard:**

28 **When a Non-Vehicular Warning sign is placed at the location of the crossing point, a diagonal**
29 **downward pointing arrow (W16-7P) plaque (see Figure 5C-2) shall be mounted below the sign.**

30 Guidance:

31 If the activity is seasonal or temporary, the sign should be removed or covered when the [condition or](#)
32 ~~crossing~~ activity does not exist.

33 **Section 5C.10 Advisory Speed Plaque (W13-1P)**

34 Option:

35 An Advisory Speed (W13-1P) plaque (see Figure 5C-1) may be mounted below a warning sign when the
36 condition requires a reduced speed.

37 **Section 5C.11 DEAD END or NO OUTLET Signs (W14-1, W14-1a, W14-2, W14-2a)**

38 Option:

39 The DEAD END (W14-1) and NO OUTLET (W14-2) signs (see Figure 5C-2) and the DEAD END
40 (W14-1a) and NO OUTLET (W14-2a) signs (see Figure 5C-2) may be used to warn road users of a road that
41 has no outlet or that terminates in a dead end or cul-de-sac.

42 Guidance:

43 If used, these signs should be placed at a location that gives drivers of large commercial or recreational
44 vehicles an opportunity to select a different route or turn around.

45 **Section 5C.12 NO TRAFFIC SIGNS Sign (W18-1)**

46 Option:

1 A W18-1 warning sign (see Figure 5C-2) with the legend NO TRAFFIC SIGNS may be used only on
2 unpaved, low-volume roads to advise users that no signs are installed along the distance of the road. If used,
3 the sign may be installed at the point where road users would enter the low-volume road or where, based on
4 engineering judgment, the road user ~~may~~ might need this information.

5 A W7-3aP, W16-2P, or W16-9P supplemental plaque (see Figure 5C-2) with the legend NEXT XX
6 MILES, XX FEET, or AHEAD may be installed below the W18-1 sign when appropriate.

7 **Section 5C.13 Other Warning Signs**

8 **Standard:**

9 Other warning signs used on low-volume roads that are not discussed in Part 5, but are in this
10 Manual, shall ~~conform~~ comply with the ~~criteria~~ provisions contained in other Parts of this Manual.
11 Warning signs that are not ~~specified~~ provided in this Manual shall ~~conform to~~ comply with the ~~criteria~~
12 provisions in Sections 2C.02 and 2C.03.

13 **Section ~~5E.05~~ 5C.14 Object Markers and Barricades**

14 Support:

15 The purpose of object markers is to mark obstructions located within or adjacent to the roadway, such as
16 bridge abutments, drainage structures, and other physical objects.

17 Guidance:

18 The end of a low-volume road should be marked with ~~an end-of-roadway~~ a Type 4 object marker in
19 ~~conformance~~ compliance with Section 2C.66.

20 Option:

21 A Type ~~III~~ 3 Barricade may be used where engineering studies or judgment indicates a need for a more
22 visible end-of-roadway treatment (see Section 2B.67).

23 **Standard:**

24 **Barricades used on low-volume roads shall comply with the provisions contained in Section 2B.67.**

CHAPTER 5D. GUIDE SIGNS

1

2 **Section 5D.01 Introduction**

3 Support:

4 The purpose of a guide sign is to inform road users regarding positions, directions, destinations, and
5 routes.

6 The ~~criteria~~ [provisions](#) for guide signs, in general, are contained in Chapters 2D through 2N and in other
7 Sections of this Manual. ~~Criteria~~ [Provisions](#) for guide signs that are specific to low-volume roads are
8 contained in this Chapter.

9 Guidance:

10 The familiarity of the road users with the road should be considered in determining the need for guide
11 signs on low-volume roads.

12 Support:

13 Low-volume roads generally do not require guide signs to the extent that they are needed on higher
14 classes of roads. Because guide signs are typically only beneficial as a navigational aid for road users who are
15 unfamiliar with a low-volume road, guide signs might not be needed on low-volume roads that serve only
16 local traffic.

17 Guidance:

18 If used, destination names should be as specific and descriptive as possible. Destinations such as
19 campgrounds, ranger stations, recreational areas, and the like should be clearly indicated so that they are not
20 interpreted to be communities or locations with road user services.

21 Option:

22 Guide signs may be used at intersections to provide information for road users returning to a higher class
23 of roads.

CHAPTER 5E. MARKINGS

Section 5E.01 Introduction

Support:

The purpose of markings on highways is to provide guidance and information for road users regarding roadway conditions and restrictions.

The ~~criteria provisions~~ for markings, ~~and~~ delineators, ~~and object markers~~, in general, are contained in Part 3 and in other Sections of this Manual. ~~Criteria~~ Provisions for markings that are specific to low-volume roads are contained in this Chapter.

Section 5E.02 ~~Centerline~~ Center Line Markings

Standard:

Where ~~centerline~~ center line markings are installed, no-passing zone markings in ~~conformance~~ compliance with Section 3B.02 shall also be installed.

Guidance:

~~Centerline~~ Center line markings should be used on paved low-volume roads ~~where consistent with the principles of this Manual and with the policies and practices of the road agency and on the basis of either engineering judgment or~~ an engineering study or the application of engineering judgment ~~indicates a need for them.~~

Option:

Center line markings may be placed on highways with or without edge line markings.

Section 5E.03 Edge Line Markings

Support:

The purpose of edge line markings is to delineate the left-hand or right-hand edge of the roadway.

Guidance:

Edge line markings should be considered for use on paved low-volume roads based on engineering judgment or an engineering study.

Option:

Edge line markings may be placed on highways with or without ~~centerline~~ center line markings.

Edge line markings may be placed on paved low-volume roads for roadway features such as horizontal curves, narrow bridges, pavement width transitions, curvilinear alignment, and at other locations based on engineering judgment or an engineering study.

Section 5E.04 Delineators

Support:

The purpose of delineators is to enhance driver safety where it is desirable to call attention to a changed or changing condition such as abrupt roadway narrowing or curvature.

Option:

Delineators may be used on low-volume roads based on engineering judgment, such as for curves, T-intersections, and abrupt changes in the roadway width. In addition, they may be used to mark the location of driveways or other minor roads entering the low-volume road.

~~Section 5E.05 Object Markers~~ relocated to Section 5C.14

Section ~~5E.06~~ 5E.05 Other Markings

Standard:

Other markings, such as stop lines, crosswalks, pavement legends, ~~barriades~~, channelizing devices, and islands, used on low-volume roads shall ~~conform~~ comply with the ~~criteria~~ provisions contained in this Manual.

CHAPTER 5F. TRAFFIC CONTROL FOR HIGHWAY-RAIL GRADE CROSSINGS

Section 5F.01 Introduction

Support:

The [criteria provisions](#) for highway-rail grade crossing traffic control devices are contained in Part 8 and in other Sections of this Manual.

Traffic control for highway-rail grade crossings includes all signs, signals, markings, illumination, and other warning devices and their supports along roadways either approaching or at highway-rail grade crossings. The [function purpose](#) of this traffic control is to ~~permit~~ [promote reasonably](#) a safer and [more](#) efficient operation of both rail and ~~road~~ [highway](#) traffic at highway-rail grade crossings.

Section 5F.02 Highway-Rail Grade Crossing (Crossbuck) Sign and Number of Tracks Plaque (R15-1, R15-2P)

[Support:](#)

[In most States, the Grade Crossing \(Crossbuck\) \(R15-1\) sign \(see Figure 5F-1\) requires road users to yield the right-of-way to rail traffic at a highway-rail grade crossing.](#)

Standard:

The ~~Highway-Rail Grade Crossing (Crossbuck)~~ (R15-1) sign (~~see Figure 5F-1~~) shall be used at all highway-rail grade crossings, [except as otherwise provided in Section 8B.03](#). For all low-volume roads, Crossbuck signs shall be used on the [right-hand](#) side of each approach. If there are two or more tracks, the supplemental Number of Tracks (R15-2P) [sign plaque](#) (see Figure 5F-1) shall display the number of tracks and shall be installed below the Crossbuck sign.

A strip of retroreflective white material not less than 2 inches in width shall be used on the back of each blade of each Crossbuck sign for the length of each blade, at all highway-rail grade crossings, except those where Crossbuck signs have been installed back-to-back.

A [vertical](#) strip of retroreflective white material, not less than 2 inches in width, shall be used on each support at passive highway-rail grade crossings for the full length of the front and back of the support from the Crossbuck sign or Number of Tracks [sign plaque](#) to within 2 feet above the ~~edge of the roadway ground~~, except on the side of those supports where a STOP (R1-1) or YIELD (R1-2) sign or flashing lights have been installed or on the back side of supports for Crossbuck signs installed on one-way streets.

Section 5F.03 Highway-Rail Grade Crossing Advance Warning Signs (W10 Series)

Standard:

Except as [noted provided in the Option Paragraph 2](#), a ~~Highway-Rail~~ Grade Crossing Advance Warning (W10-1) sign (see Figure 5F-1) shall be used on all low-volume roads in advance of every highway-rail grade crossing.

Option:

The ~~Highway-Rail~~ Grade Crossing Advance Warning sign may be omitted for highway-rail grade crossings that are flagged by train crews.

The W10-2, W10-3, and W10-4 signs (see Figure 5F-1) may be used on low-volume roads that run parallel to railroad tracks to warn road users making a turn that they will encounter a highway-rail grade crossing soon after making the turn.

Section 5F.04 STOP and YIELD Signs (R1-1, R1-2)

~~Option:~~

~~STOP (R1-1) or YIELD (R1-2) signs may be used at low-volume highway-rail grade crossings, at the discretion of the responsible jurisdiction, for crossings without automatic traffic control devices, consistent with the provisions of Sections 2B.04 to 2B.10.~~

Standard:

[The use and application at passive highway-rail grade crossings on low-volume roads of Crossbuck Assemblies with YIELD \(R1-2\) signs or STOP \(R1-1\) signs shall comply with the provisions of Section 8B.04.](#)

1 ~~A Stop Ahead (W3-1) sign or Yield Ahead (W3-2) sign shall be used in advance of a STOP or~~
2 ~~YIELD sign at a highway rail grade crossing if the STOP or YIELD sign is not visible for a distance~~
3 ~~that enables the road user to bring the vehicle to a reasonably safe stop at the highway rail grade~~
4 ~~crossing.~~

5 At all highway-rail grade crossings where YIELD or STOP signs are installed, Yield Ahead (W3-2)
6 or Stop Ahead (W3-1) signs shall also be installed if the criteria for their installation in Section 2C.36 is
7 met.

8 **Section 5F.05 Pavement Markings**

9 Guidance:

10 Pavement markings at highway-rail grade crossings should be used on paved low-volume roads,
11 particularly if they are already deployed at most other highway-rail grade crossings within the immediate
12 vicinity, or when the roadway has ~~centerline~~ center line markings.

13 **Section 5F.06 Other Traffic Control Devices**

14 **Standard:**

15 Other traffic control devices that are used at highway-rail grade crossings on low-volume roads,
16 such as other signs, signals, and illumination that are not in this Chapter, shall ~~conform~~ comply with
17 the ~~criteria~~ provisions contained in Part 8 and other applicable Parts of this Manual.

CHAPTER 5G. TEMPORARY TRAFFIC CONTROL ZONES

Section 5G.01 Introduction

Guidance:

The safety of road users, including pedestrians and bicyclists, as well as personnel in work zones, should be an integral and high priority element of every project in the planning, design, maintenance, and construction phases. Part 6 should be reviewed for additional criteria, specific details, and more complex temporary traffic control zone requirements. The following principles should be applied to temporary traffic control zones:

- A. Traffic movement should be disrupted as little as possible.
- B. Road users should be guided in a clear and positive manner while approaching and within construction, maintenance, and utility work areas.
- C. Routine inspection and maintenance of traffic control elements should be performed both day and night.
- D. Both the contracting agency and the contractor should assign at least one person on each project to have day-to-day responsibility for assuring that the traffic control elements are operating effectively and any needed operational changes are brought to the attention of their supervisors.

Traffic control in temporary traffic control zones should be designed on the assumption that road users will only reduce their speeds if they clearly perceive a need to do so, and then only in small increments of speed. Temporary traffic control zones should not present a surprise to the road user. Frequent and/or abrupt changes in geometrics and other features should be avoided. Transitions should be well delineated and long enough to accommodate driving conditions at the speeds vehicles are realistically expected to travel.

A [temporary](#) traffic control plan (see Section 6C.01) should be used for a temporary traffic control zone on a low-volume road to specify particular traffic control devices and features, or to reference typical drawings such as those contained in Part 6.

Support:

Applications of speed reduction countermeasures and enforcement can be effective in reducing traffic speeds in temporary traffic control zones.

Section 5G.02 Applications

Guidance:

Planned work phasing and sequencing should be the basis for the use of traffic control devices for temporary traffic control zones. Part 6 should be consulted for specific traffic control requirements and examples where construction or maintenance work is planned.

~~Option~~ [Support](#):

Maintenance activities ~~may~~ [might](#) not require extensive temporary traffic control if the traffic volumes and speeds are low.

[Option](#):

The traffic applications shown in Figures 6H-1, [6H-10](#), 6H-11, [6H-13](#), 6H-15, ~~and~~ 6H-16, [and 6H-18](#) of Part 6 are among those that may be used on low-volume roads.

[Support](#):

[Table 6H-3 provides distances for the advance placement of the traffic control devices shown in the typical applications.](#)

[Option](#):

[For low-volume roadways with speeds of 30 miles per hour or less, a minimum distance of 100 feet may be used for the advance placement distance and the distance between signs shown in the typical applications.](#)

For temporary traffic control zones on low-volume roads that require flaggers, a single flagger may be adequate if the flagger is visible to approaching traffic from all appropriate directions.

Section 5G.03 Channelization Devices

Standard:

Channelization devices for nighttime use shall have the same retroreflective requirements as specified for higher-volume roadways.

1 Option:

2 To alert, guide, and direct road users ~~reasonably safely~~ through temporary traffic control zones on low-
3 volume roads, tapers may be used to move a road user out of the traffic lane and around the work space using
4 the spacing of devices that is described in Section 6F.63.

5 **Section 5G.04 Markings**

6 Guidance:

7 Pavement markings should be considered for temporary traffic control zones on paved low-volume roads,
8 especially roads that had existing pavement markings or that have a surfaced detour or temporary roadway.

9 Option:

10 Interim pavement markings may be omitted in a temporary traffic control zone ~~may if they are~~ not ~~be~~
11 needed based on the criteria for these markings in Section 6F.78.

12 **Section 5G.05 Other Traffic Control Devices**

13 **Standard:**

14 **Other traffic control devices, such as other signs, signals, and illumination that are used on low-**
15 **volume roads in temporary traffic control zones, but are not described in Part 5, shall ~~conform~~ comply**
16 **with the ~~criteria~~ provisions contained in other Parts of this Manual.**

17 Support:

18 Some of the signs that might be applicable in a temporary traffic control zone on a low-volume road are
19 shown in Figure 5G-1.

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CHAPTER 5H. TRAFFIC CONTROL FOR SCHOOL AREAS

Section 5H.01 Introduction

Support:

The provisions for school traffic control devices are contained in Part 7 of this Manual.

Standard:

The sizes of school signs and plaques on low-volume roads shall be in accordance with Section 7B.01 and Table 7B-1.

CHAPTER 6A. GENERAL

Section 6A.01 General

Support:

Whenever the acronym “TTC” is used in ~~this Chapter~~ [Part 6](#), it refers to “temporary traffic control.”

Standard:

The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, [or on private roads open to public travel \(see definition in Section 1A.13\)](#), including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.

Support:

When the normal function of the roadway, [or a private road open to public travel](#), is suspended, TTC planning provides for continuity of the movement of motor vehicle, bicycle, and pedestrian traffic (including accessible passage); transit operations; and access (and accessibility) to property and utilities.

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

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

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

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

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

[Operational improvements might be realized by using intelligent transportation systems \(ITS\) in work zones. The use in work zones of ITS technology, such as portable camera systems, highway advisory radio, variable speed limits, ramp metering, traveler information, merge guidance, and queue detection information, is aimed at increasing safety for both workers and road users and helping to ensure a more efficient traffic flow. The use in work zones of ITS technologies has been found to be effective in providing traffic monitoring and management, data collection, and traveler information.](#)

Standard:

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

Support:

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

Guidance:

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

4 Option:

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

7 Support:

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

13 [The determination as to whether a particular facility at a particular time of day can be considered to be a](#)
14 [high-volume roadway or can be considered to be a low-volume roadway is made by the public agency or](#)
15 [official having jurisdiction.](#)

CHAPTER 6B. FUNDAMENTAL PRINCIPLES

Section 6B.01 Fundamental Principles of Temporary Traffic Control

~~Support:~~

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

~~Standard:~~

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

Support:

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

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

During TTC activities, commercial vehicles might need to follow a different route from passenger vehicles because of bridge, weight, clearance, or geometric restrictions. Also, vehicles carrying hazardous materials might need to follow a different route from other vehicles. The Hazardous Materials and National Network signs are included in Sections 2B.62 and 2B.63, respectively.

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

Guidance:

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

Support:

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

Guidance:

[The following are the seven fundamental principles of TTC:](#)

1. General plans or guidelines should be developed to provide safety for motorists, bicyclists, pedestrians, workers, enforcement/emergency officials, and equipment, with the following factors being considered:
 - A. The basic safety principles governing the design of permanent roadways and roadsides should also govern the design of TTC zones. The goal should be to route road users through such zones using roadway geometrics, roadside features, and TTC devices as nearly as possible comparable to those for normal highway situations.
 - B. A TTC plan, in detail appropriate to the complexity of the work project or incident, should be prepared and understood by all responsible parties before the site is occupied. Any changes in the TTC plan should be approved by an official [who is](#) knowledgeable (for example, trained and/or certified) in proper TTC practices.
2. Road user movement should be inhibited as little as practical, based on the following considerations:
 - A. TTC at work and incident sites should be designed on the assumption that drivers will only reduce their speeds if they clearly perceive a need to do so (see Section 6C.01).
 - B. Frequent and abrupt changes in geometrics such as lane narrowing, dropped lanes, or main roadway transitions that require rapid maneuvers, should be avoided.

- 1 C. ~~Provisions Work~~ should be ~~made for the reasonably safe operation of work, particularly on high-~~
2 ~~speed, high-volume roadways~~ scheduled in a manner that minimizes the need for lane closures or
3 alternate routes, while still getting the work completed quickly and the lanes or roadway open to
4 traffic as soon as possible.
- 5 D. Attempts should be made to reduce the volume of traffic using the roadway or freeway to match
6 the restricted capacity conditions. Road users should be encouraged to use alternative routes ~~that~~
7 ~~do not include TTC zones.~~ For high-volume roadways and freeways, the closure of selected
8 entrance ramps or other access points and the use of signed diversion routes should be evaluated.
- 9 E. Bicyclists and pedestrians, including those with disabilities, should be provided with access and
10 reasonably safe passage through the TTC zone.
- 11 F. ~~Roadway occupancy~~ If work operations permit, lane closures on high-volume streets and
12 highways should be scheduled during off-peak hours, and, if necessary, Night work should be
13 considered if the work can be accomplished with a series of short-term operations.
- 14 G. Early coordination with officials having jurisdiction over the affected cross streets and providing
15 emergency services should occur ~~before roadway or ramp closings~~ if significant impacts to
16 roadway operations are anticipated.

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

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

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

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

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

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

55 6. Each person whose actions affect TTC zone safety, from the upper-level management through the
56 field workers, should receive training appropriate to the job decisions each individual is required to

1 make. Only those individuals who are trained in proper TTC practices and have a basic understanding
2 of the principles (established by applicable standards and guidelines, including those of this Manual)
3 should supervise the selection, placement, and maintenance of TTC devices used for TTC zones and
4 for incident management.

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

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

18 **Standard:**

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

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

CHAPTER 6C. TEMPORARY TRAFFIC CONTROL ELEMENTS

Section 6C.01 Temporary Traffic Control Plans

~~Support:~~

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

~~Standard:~~

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

Support:

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

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

Guidance:

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

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

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

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

Option:

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

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

Guidance:

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

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

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

1 Reduced speed limits should be used only in the specific portion of the TTC zone where conditions or
2 restrictive features are present. However, frequent changes in the speed limit should be avoided. A TTC plan
3 should be designed so that vehicles can ~~reasonably safely~~ travel through the TTC zone with a speed limit
4 reduction of no more than 10 mph.

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

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

11 Support:

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

16 **Section 6C.02 Temporary Traffic Control Zones**

17 Support:

18 A TTC zone is an area of a highway where road user conditions are changed because of a work zone, ~~or~~
19 an incident [zone, or a planned special event](#) through the use of TTC devices, uniformed law enforcement
20 officers, or other authorized personnel.

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

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

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

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

34 Support:

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

38 **Section 6C.04 Advance Warning Area**

39 Support:

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

42 Option:

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

45 Guidance:

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

49 On urban streets, the effective placement of the first warning sign in feet should range from 4 to 8 times
50 the speed limit in mph, with the high end of the range being used when speeds are relatively high. When a
51 single advance warning sign is used (in cases such as low-speed residential streets), the advance warning area

1 can be as short as 100 feet. When two or more advance warning signs are used on higher-speed streets, such
2 as major arterials, the advance warning area should extend a greater distance (see Table 6C-1).

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

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

10 Support:

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

15 Option:

16 Advance warning may be eliminated when the activity area is sufficiently removed from the road users'
17 path so that it does not interfere with the normal flow.

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

19 Support:

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

23 **Standard:**

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

26 ~~Support:~~

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

28 Option:

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

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

34 Support:

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

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

40 Option:

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

42 Guidance:

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

45 Support:

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

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

49 Guidance:

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

1 Option:

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

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

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

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

9 Support:

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

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

14 Option:

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

18 Guidance:

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

20 Option:

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

24 ~~Guidance:~~

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

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

28 ~~Standard~~ Support:

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

32 Option:

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

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

37 **Section 6C.08 Tapers**

38 Option:

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

42 Support:

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

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

49 Guidance:

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

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

4 Support:

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

7 Guidance:

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

11 Support:

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

15 Guidance:

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

17 Support:

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

22 Guidance:

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

26 ~~Option~~ Support:

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

29 Guidance:

30 ~~When~~ If used, a downstream taper should have a minimum length of ~~approximately~~ 50 feet and a
31 maximum length of 100 feet ~~per lane~~ with devices placed at a spacing of approximately 20 feet.

32 Support:

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

35 Guidance:

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

40 Support:

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

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

43 Support:

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

45 Guidance:

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

48 Support:

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

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

2 **Standard:**

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

5 **Guidance:**

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

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

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

12 ~~Support:~~

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

15 Option:

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

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

20 **Guidance:**

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

25 **Option:**

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

28 **Guidance:**

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

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

34 **Support:**

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

40 **Guidance:**

41 The flag transfer method should be employed only where the one-way traffic is confined to a relatively
42 short length of a road, usually ~~not~~ more than 1 mile in length.

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

44 **Option:**

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

46 **Guidance:**

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

1 **Standard:**

2 The PILOT CAR FOLLOW ME (G20-4) sign (see ~~Figure 6F-4, Sheet 4 of 4~~ [Section 6F.58](#)) shall be
3 mounted ~~at a conspicuous location~~ on the rear of the [pilot](#) vehicle.

4 [A flagger shall be stationed on the approach to the activity area to control vehicular traffic until the](#)
5 [pilot vehicle is available.](#) this sentence was relocated from Section 6F.54

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

8 Option:

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

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

12 Option:

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

16 Guidance:

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

CHAPTER 6D. PEDESTRIAN AND WORKER SAFETY

Section 6D.01 Pedestrian Considerations

~~Support:~~

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

~~Standard:~~

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

Support:

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

~~The most desirable way to provide information to pedestrians with visual disabilities that is equivalent to visual signage for notification of sidewalk closures is a speech message provided by an audible information device. Devices that provide speech messages in response to passive pedestrian actuation are the most desirable. Other devices that continuously emit a message, or that emit a message in response to use of a pushbutton, are also acceptable. Signage information can also be transmitted to personal receivers, but currently such receivers are not likely to be carried or used by pedestrians with visual disabilities in TTC zones. Audible information devices might not be needed if detectable channelizing devices make an alternate route of travel evident to pedestrians with visual disabilities.~~ **relocated to Section 6D.02**

~~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.~~ **relocated to Section 6D.02**

Standard:

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

Advance notification of sidewalk closures shall be provided **to by** the maintaining agency. ~~Where pedestrians with visual disabilities normally use the closed sidewalk, a barrier that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.~~ **relocated to Section 6D.02**

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.** **this paragraph was relocated from Section 6G.11**

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.

Support:

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

Guidance:

~~Adequate provisions should be made for persons with disabilities as determined by an engineering study or by engineering judgment. Because printed signs and surface delineation are not usable by pedestrians with visual disabilities, blocked routes, alternate crossings, and sign and signal information should be communicated to pedestrians with visual disabilities by providing audible information devices, accessible pedestrian signals, and barriers and channelizing devices that are detectable to pedestrians traveling with the aid of a long cane or who have low vision.~~ **relocated to Section 6D.02**

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

- 2 A. Pedestrians should not be led into conflicts with ~~worksite~~ vehicles, equipment, and operations.
- 3 B. Pedestrians should not be led into conflicts with vehicles moving through or around the worksite.
- 4 C. Pedestrians should be provided with a ~~reasonably safe,~~ convenient, and accessible path that replicates
5 as nearly as practical the most desirable characteristics of the existing sidewalk(s) or footpath(s).
6 ~~Where pedestrians who have visual disabilities encounter worksites that require them to cross the~~
7 ~~roadway to find an accessible route, instructions should be provided using an audible information~~
8 ~~device. Accessible pedestrian signals (see Section 4E.06) with accessible pedestrian detectors (see~~
9 ~~Section 4E.09) might be needed to enable pedestrians with visual disabilities to cross wide or heavily~~
10 ~~traveled roadways.~~

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

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

19 Support:

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

22 Guidance:

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

28 To accommodate the needs of pedestrians, including those with disabilities, the following considerations
29 should be addressed when temporary pedestrian pathways in TTC zones are designed or modified: **relocated**
30 **from Section 6D.02 and sequence of items has been revised**

- 31 A. Provisions for continuity of accessible paths for pedestrians should be incorporated into the TTC
32 ~~process plan. Pedestrians should be provided with a reasonably safe, convenient, and accessible path~~
33 ~~that replicates as much as practical the desirable characteristics of the existing pedestrian facilities.~~
- 34 B. Access to ~~temporary~~ transit stops should be ~~provided~~ **maintained**.
- 35 C. A smooth, continuous hard surface should be provided throughout the entire length of the temporary
36 pedestrian facility. There should be no curbs or abrupt changes in grade or terrain that could cause
37 tripping or be a barrier to wheelchair use. The geometry and alignment of the facility should meet the
38 applicable requirements of the “Americans with Disabilities Act Accessibility Guidelines for
39 Buildings and Facilities (ADAAG)” (see Section 1A.11).
- 40 D. The width of the existing pedestrian facility should be provided for the temporary facility if practical.
41 Traffic control devices and other construction materials and features should not intrude into the usable
42 width of the sidewalk, temporary pathway, or other pedestrian facility. When it is not possible to
43 maintain a minimum width of 60 inches throughout the entire length of the pedestrian pathway, a 60 x
44 60-inch passing space should be provided at least every 200 feet to allow individuals in wheelchairs to
45 pass.
- 46 E. Blocked routes, alternate crossings, and sign and signal information should be communicated to
47 pedestrians with visual disabilities by providing devices such as audible information devices,
48 accessible pedestrian signals, or barriers and channelizing devices that are detectable to the
49 pedestrians traveling with the aid of a long cane or who have low vision. Where pedestrian traffic is
50 detoured to a TTC signal, engineering judgment should be used to determine if pedestrian signals or
51 accessible pedestrian signals should be considered for crossings along an alternate route.
- 52 F. When channelization is used to delineate a pedestrian pathway, a continuous detectable edging should
53 be provided throughout the length of the facility such that pedestrians using a long cane can follow it.
54 These detectable edgings should ~~adhere to~~ **comply with** the provisions of Section 6F.74.

1 G. Signs and other devices mounted lower than 7 feet above the temporary pedestrian pathway should
2 not project more than 4 inches into accessible pedestrian facilities.

3 Option:

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

6 ~~Support:~~

7 ~~Maintaining a detectable, channelized pedestrian route is much more useful to pedestrians who have~~
8 ~~visual disabilities than closing a walkway and providing audible directions to an alternate route involving~~
9 ~~additional crossings and a return to the original route. Braille is not useful in conveying such information~~
10 ~~because it is difficult to find. Audible instructions might be provided, but the extra distance and additional~~
11 ~~street crossings might add complexity to a trip.~~ relocated to Section 6D.02

12 Guidance:

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

17 ~~Standard:~~

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

21 ~~Guidance:~~

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

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

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

31 Option:

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

34 Guidance:

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

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

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

40 Support:

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

44 **Standard:**

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

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

3 Option:

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

7 Support:

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

10 Guidance:

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

13 Support:

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

16 Guidance:

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

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

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

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

26 Support:

27 Additional information on the design and construction of accessible temporary facilities is found in
28 publications listed in Section 1A.11 (see ~~Documents~~ [Publications](#) 12, 38, 39, and 42).

29 Guidance:

30 The extent of pedestrian needs should be determined through engineering judgment or by the individual
31 responsible for each TTC zone situation. ~~This individual should be aware that the absence of a continuous~~
32 ~~pathway, including curb ramps and other accessible features, might preclude the use of the facility by~~
33 [Adequate provisions should be made for](#) pedestrians with disabilities.

34 **Standard:**

35 **When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary**
36 **facilities shall be detectable and include accessibility features consistent with the features present in the**
37 **existing pedestrian facility. Where pedestrians with visual disabilities normally use the closed sidewalk,**
38 **a barrier that is detectable by a person with a visual disability traveling with the aid of a long cane shall**
39 **be placed across the full width of the closed sidewalk.** **relocated from Section 6D.01**

40 Support:

41 Maintaining a detectable, channelized pedestrian route is much more useful to pedestrians who have
42 visual disabilities than closing a walkway and providing audible directions to an alternate route involving
43 additional crossings and a return to the original route. Braille is not useful in conveying such information
44 because it is difficult to find. Audible instructions might be provided, but the extra distance and additional
45 street crossings might add complexity to a trip. **relocated from Section 6D.01**

46 Guidance:

47 Because printed signs and surface delineation are not usable by pedestrians with visual disabilities,
48 blocked routes, alternate crossings, and sign and signal information should be communicated to pedestrians
49 with visual disabilities by providing audible information devices, accessible pedestrian signals, and barriers
50 and channelizing devices that are detectable to pedestrians traveling with the aid of a long cane or who have
51 low vision. **relocated from Section 6D.01**

1 Support:

2 The most desirable way to provide information to pedestrians with visual disabilities that is equivalent to
3 visual signing for notification of sidewalk closures is a speech message provided by an audible information
4 device. Devices that provide speech messages in response to passive pedestrian actuation are the most
5 desirable. Other devices that continuously emit a message, or that emit a message in response to use of a
6 pushbutton, are also acceptable. Signing information can also be transmitted to personal receivers, but
7 currently such receivers are not likely to be carried or used by pedestrians with visual disabilities in TTC
8 zones. Audible information devices might not be needed if detectable channelizing devices make an alternate
9 route of travel evident to pedestrians with visual disabilities. **relocated from Section 6D.01**

10 Guidance:

11 If a pushbutton is used to provide equivalent TTC information to pedestrians with visual disabilities, the
12 pushbutton should be equipped with a locator tone to notify pedestrians with visual disabilities that a special
13 accommodation is available, and to help them locate the pushbutton. **relocated from Section 6D.01**

14 ~~To accommodate the needs of pedestrians, including those with disabilities, the following considerations~~
15 ~~should be addressed when temporary pedestrian pathways in TTC zones are designed or modified:~~ **relocated**
16 **to Section 6D.01**

- 17 ~~A. Provisions for continuity of accessible paths for pedestrians should be incorporated into the TTC~~
18 ~~process. Pedestrians should be provided with a reasonably safe, convenient, and accessible path that~~
19 ~~replicates as much as practical the desirable characteristics of the existing pedestrian facilities.~~
- 20 ~~B. Access to temporary transit stops should be provided.~~
- 21 ~~C. Blocked routes, alternate crossings, and sign and signal information should be communicated to~~
22 ~~pedestrians with visual disabilities by providing devices such as audible information devices,~~
23 ~~accessible pedestrian signals, or barriers and channelizing devices that are detectable to the~~
24 ~~pedestrians traveling with the aid of a long cane or who have low vision. Where pedestrian traffic is~~
25 ~~detoured to a TTC signal, engineering judgment should be used to determine if pedestrian signals or~~
26 ~~accessible pedestrian signals should be considered for crossings along an alternate route.~~
- 27 ~~D. When channelization is used to delineate a pedestrian pathway, a continuous detectable edging should~~
28 ~~be provided throughout the length of the facility such that pedestrians using a long cane can follow it.~~
29 ~~These detectable edgings should adhere to the provisions of Section 6F.68.~~
- 30 ~~E. A smooth, continuous hard surface should be provided throughout the entire length of the temporary~~
31 ~~pedestrian facility. There should be no curbs or abrupt changes in grade or terrain that could cause~~
32 ~~tripping or be a barrier to wheelchair use. The geometry and alignment of the facility should meet the~~
33 ~~applicable requirements of the "Americans with Disabilities Act Accessibility Guidelines for~~
34 ~~Buildings and Facilities (ADAAG)" (see Section 1A.11).~~
- 35 ~~F. The width of the existing pedestrian facility should be provided for the temporary facility if practical.~~
36 ~~Traffic control devices and other construction materials and features should not intrude into the usable~~
37 ~~width of the sidewalk, temporary pathway, or other pedestrian facility. When it is not possible to~~
38 ~~maintain a minimum width of 60 inches throughout the entire length of the pedestrian pathway, a 60 x~~
39 ~~60-inch passing space should be provided at least every 200 feet to allow individuals in wheelchairs to~~
40 ~~pass.~~
- 41 ~~G. Signs and other devices mounted lower than 7 feet above the temporary pedestrian pathway should~~
42 ~~not project more than 4 inches into accessible pedestrian facilities.~~

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

44 Support:

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

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

54 Guidance:

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

- 3 A. Training—all workers should be trained on how to work next to motor vehicle traffic in a way that
4 minimizes their vulnerability. Workers having specific TTC responsibilities should be trained in TTC
5 techniques, device usage, and placement.
- 6 ~~B. Worker Safety Apparel—all workers exposed to the risks of moving roadway traffic or construction
7 equipment should wear high-visibility safety apparel meeting the requirements of ISEA “American
8 National Standard for High-Visibility Safety Apparel” (see Section 1A.11), or equivalent revisions,
9 and labeled as ANSI 107-1999 standard performance for Class 1, 2, or 3 risk exposure. A competent
10 person designated by the employer to be responsible for the worker safety plan within the activity area
11 of the job site should make the selection of the appropriate class of garment.~~ replaced by Standard
12 below
- 13 B. Temporary Traffic Barriers—temporary traffic barriers should be placed along the work space
14 depending on factors such as lateral clearance of workers from adjacent traffic, speed of traffic,
15 duration and type of operations, time of day, and volume of traffic.
- 16 C. Speed Reduction—reducing the speed of vehicular traffic, mainly through regulatory speed zoning,
17 funneling, lane reduction, or the use of uniformed law enforcement officers or flaggers, should be
18 considered.
- 19 D. Activity Area—planning the internal work activity area to minimize backing-up maneuvers of
20 construction vehicles should be considered to minimize the exposure to risk.
- 21 E. Worker Safety Planning—a ~~competent~~ trained person designated by the employer should conduct a
22 basic hazard assessment for the worksite and job classifications required in the activity area. This
23 safety professional should determine whether engineering, administrative, or personal protection
24 measures should be implemented. This plan should be in accordance with the Occupational Safety
25 and Health Act of 1970, as amended, “General Duty Clause” Section 5(a)(1) - Public Law 91-596, 84
26 Stat. 1590, December 29, 1970, as amended, and with the requirement to assess worker risk exposures
27 for each job site and job classification, as per 29 CFR 1926.20 (b)(2) of “Occupational Safety and
28 Health Administration Regulations, General Safety and Health Provisions” (see Section 1A.11).

29 **Standard:**

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

38 **Option:**

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

43 **Standard:**

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

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

49 **Option:**

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

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

- 1 A. Shadow Vehicle—in the case of mobile and constantly moving operations, such as pothole patching
2 and striping operations, a shadow vehicle, equipped with appropriate lights and warning signs, may be
3 used to protect the workers from impacts by errant vehicles. The shadow vehicle may be equipped
4 with a rear-mounted impact attenuator.
- 5 B. Road Closure—if alternate routes are available to handle road users, the road may be closed
6 temporarily. This may also facilitate project completion and thus further reduce worker vulnerability.
- 7 C. Law Enforcement Use—in highly vulnerable work situations, particularly those of relatively short
8 duration, law enforcement units may be stationed to heighten the awareness of passing vehicular
9 traffic and to improve safety through the TTC zone.
- 10 D. Lighting—for nighttime work, the TTC zone and approaches may be lighted.
- 11 E. Special Devices—these include rumble strips, changeable message signs, hazard identification
12 beacons, flags, and warning lights. Intrusion warning devices may be used to alert workers to the
13 approach of errant vehicles.

14 Support:

15 Judicious use of the special devices described in Item E ~~above~~ [in Paragraph 9](#) might be helpful for certain
16 difficult TTC situations, but misuse or overuse of special devices or techniques might lessen their
17 effectiveness.

CHAPTER 6E. FLAGGER CONTROL

Section 6E.01 Qualifications for Flaggers

~~Support:~~

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

~~Standard:~~

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

Guidance:

Because flaggers are responsible for public safety and make the greatest number of contacts with the public of all highway workers, they should be trained in safe traffic control practices and public contact techniques. Flaggers should be able to satisfactorily demonstrate the following abilities:

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

Section 6E.02 High-Visibility Safety Apparel

Standard:

For daytime and nighttime activity, flaggers shall wear high-visibility safety apparel ~~meeting 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) and labeled as meeting the ANSI ~~107-1999~~ 107-2004 standard performance for Class 2 or 3 risk exposure. The apparel background (outer) material color shall be ~~either~~ fluorescent orange-red, or fluorescent yellow-green, or a combination of the two as defined in the ANSI standard. The retroreflective material shall be ~~either~~ orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 feet. The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.

Guidance:

For nighttime activity, high-visibility safety apparel ~~meeting 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) and labeled as meeting the ANSI ~~107-1999~~ 107-2004 standard performance for Class 3 risk exposure should be considered for flagger wear (~~instead of the Class 2 safety apparel in the Standard above~~).

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 ~~should be worn by the law enforcement officer~~.

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.

Section 6E.03 Hand-Signaling Devices

~~Support:~~

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

Guidance:

1 The STOP/SLOW paddle should be the primary and preferred hand-signaling device because the
2 STOP/SLOW paddle gives road users more positive guidance than red flags. Use of flags should be limited to
3 emergency situations.

4 **Standard:**

5 The STOP/SLOW paddle shall have an octagonal shape on a rigid handle. STOP/SLOW paddles
6 shall be at least 18 inches wide with letters at least 6 inches high ~~and should be fabricated from light~~
7 ~~semi-rigid material.~~ The ~~background of the~~ STOP (R1-1) face shall ~~be red with~~ have white letters and a
8 ~~white border on a red background.~~ The ~~background of the~~ SLOW (W20-8) face shall ~~be orange with~~
9 ~~have~~ black letters and a ~~black border on an orange background.~~ When used at night, the STOP/SLOW
10 paddle shall be retroreflectORIZED.

11 Guidance:

12 The STOP/SLOW paddle should be fabricated from light semi-rigid material. ~~relocated from previous~~
13 ~~paragraph~~

14 Support:

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

18 **Option:**

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

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

35 **Standard:**

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

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

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

43 **Flags, when used, shall be red or fluorescent orange/red in color, shall be a minimum of 24 inches**
44 **square, ~~made of a good grade of red material,~~ and shall be securely fastened to a staff that is**
45 **approximately 36 inches in length.**

46 **Guidance:**

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

48 **Standard:**

49 **When used at nighttime, flags shall be retroreflectORIZED red.**

50 Option:

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

1 **Standard:**

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

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

15 **Section 6E.04 Automated Flagger Assistance Devices**

16 **Support:**

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

21 **There are two types of AFADs:**

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

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

- 28 **A. Bridge maintenance;**
29 **B. Haul road crossings; and**
30 **C. Pavement patching.**

31 **Standard:**

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

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

35 **Guidance:**

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

37 **Standard:**

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

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

41 **Guidance:**

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

44 **Standard:**

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

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

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

- A. An AFAD at each end of the TTC zone (Method 1), or
- B. An AFAD at one end of the TTC zone and a flagger at the opposite end (Method 2).

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

Option:

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

- A. The flagger has an unobstructed view of the AFAD(s), and
- B. The flagger has an unobstructed view of approaching traffic in both directions.

Guidance:

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

Standard:

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

Guidance:

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

- A. Conditions applicable for the use of Method 1 and Method 2 AFAD operation,
- B. Volume criteria,
- C. Maximum distance between AFADs,
- D. Conflicting lenses/indications monitoring requirements,
- E. Fail safe procedures,
- F. Additional signing and pavement markings,
- G. Application consistency,
- H. Larger signs or lenses to increase visibility, and
- I. Use of backplates.

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

Standard:

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

The AFAD's STOP/SLOW sign shall have an octagonal shape, shall be fabricated of rigid material, and shall be mounted with the bottom of the sign a minimum of 6 feet above the pavement on an appropriate support. The size of the STOP/SLOW sign shall be at least 24 x 24 inches with letters at least 8 inches high. The background of the STOP face shall be red with white letters and border. The background of the SLOW face shall be diamond shaped and orange with black letters and border. Both faces of the STOP/SLOW sign shall be retroreflectorized.

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

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

- A. White or red flashing lights within the STOP face and white or yellow flashing lights within the SLOW face meeting the provisions contained in Section 6E.03; or
- B. A Stop Beacon (see Section 4L.05) mounted a maximum of 24 inches above the STOP face and a Warning Beacon (see Section 4L.03) mounted a maximum of 24 inches above, below, or to the side of the SLOW face. The Stop Beacon shall not be flashed or illuminated when the SLOW face is displayed, and the Warning Beacon shall not be flashed or illuminated when the STOP face is displayed. Except for the mounting locations, the beacons shall comply with the provisions of Chapter 4L.

1 Option:

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

4 Standard:

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

7 Option:

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

10 Standard:

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

13 Guidance:

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

17 Option:

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

21 Standard:

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

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

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

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

29 Option:

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

32 Standard:

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

38 To inform road users to stop, the AFAD shall display the STOP face and the red or white lights, if
39 used, within the STOP face shall flash or the Stop Beacon shall flash. To inform road users to proceed,
40 the AFAD shall display the SLOW face and the yellow or white lights, if used, within the SLOW face
41 shall flash or the Warning Beacon or the Type B warning lights shall flash.

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

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

47 Standard:

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

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

8 Option:

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

12 Standard:

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

- 19 A. The minimum vertical aspect of the arm and sheeting shall be 2 inches; and
- 20 B. The end of the arm shall reach at least to the center of the lane being controlled.

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

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

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

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

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

39 Guidance:

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

43 **Section ~~6E.04~~ 6E.07 Flagger Procedures**

44 **Support:**

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

46 **Standard:**

47 Flaggers shall use a STOP/SLOW paddle, a flag, or an Automated Flagger Assistance Device
48 (AFAD) to control road users approaching a TTC zone. The use of hand movements alone without a
49 paddle, flag, or AFAD to control road users shall be prohibited except for law enforcement personnel or
50 emergency responders at incident scenes as described in Section 6L01.

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

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

11 Option:

12 To further alert or slow traffic, the flagger holding the SLOW paddle face toward road users may motion

13 up and down with the free hand, palm down.

14 **Standard:**

15 **The following methods of signaling with a flag shall be used:**

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

27 Guidance:

28 The flagger should stand either on the shoulder adjacent to the road user being controlled or in the closed

29 lane prior to stopping road users. A flagger should only stand in the lane being used by moving road users

30 after road users have stopped. The flagger should be clearly visible to the first approaching road user at all

31 times. The flagger also should be visible to other road users. The flagger should be stationed sufficiently in

32 advance of the workers to warn them (for example, with audible warning devices such as horns or whistles) of

33 approaching danger by out-of-control vehicles. The flagger should stand alone, ~~never permitting a group of~~

34 ~~away from other workers, to congregate around the flagger station~~ **work vehicles, or equipment.** **this**

35 **paragraph was relocated from Section 6E.05**

36 Option:

37 ~~At a spot constriction, the flagger may have to take a position on the shoulder opposite the closed section~~

38 ~~in order to operate effectively.~~ **this paragraph was relocated from Section 6E.05**

39 At spot lane closures where adequate sight distance is available for the reasonably safe handling of traffic,

40 the use of one flagger may be sufficient. **this paragraph was relocated from Section 6E.05**

41 Guidance:

42 When a single flagger is used, the flagger should be stationed on the shoulder opposite the spot lane

43 closure or work space, or in a position where good visibility and traffic control can be maintained at all times.

44 **Section ~~6E.05~~ 6E.08 Flagger Stations**

45 **Standard:**

46 **Flagger stations shall be located such that approaching road users will have sufficient distance to**

47 **stop at an intended stopping point.**

48 Option:

49 The distances shown in Table 6E-1, which provides information regarding the stopping sight distance as a

50 function of speed, may be used for the location of a flagger station. These distances may be increased for

51 downgrades and other conditions that affect stopping distance.

52 Guidance:

1 Flagger stations should be located such that an errant vehicle has additional space to stop without entering
2 the work space. [The flagger should identify an escape route that can be used to avoid being struck by an](#)
3 [errant vehicle.](#)

4 **Standard:**

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

CHAPTER 6F. TEMPORARY TRAFFIC CONTROL ZONE DEVICES

Section 6F.01 Types of Devices

~~Support:~~

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

~~Standard:~~

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

Guidance:

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

Support:

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

[Various Sections of the MUTCD require certain traffic control devices, their supports, and/or related appurtenances to be crashworthy. Such MUTCD crashworthiness provisions apply to all streets, highways, and private roads open to public travel. Also, State Departments of Transportation and local agencies might also have expanded the NCHRP Report 350 crashworthy criteria to apply to other highways in addition to the National Highway System certain other roadside appurtenances.](#)

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

As ~~stated in Definition 17~~ [defined](#) in Section 1A.13, “crashworthy” is a characteristic of a roadside appurtenance that has been successfully crash tested in accordance with a national standard such as the ~~National Cooperative Highway Research Program~~ [NCHRP](#) Report 350, “Recommended Procedures for the Safety Performance Evaluation of Highway Features.”

Standard:

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

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

Section 6F.02 General Characteristics of Signs

Support:

TTC zone signs convey both general and specific messages by means of words, ~~or~~ symbols, [and/or arrows](#) and have the same three categories as all road user signs: regulatory, warning, and guide.

Standard:

The colors for regulatory signs shall follow the Standards for regulatory signs in Table 2A-5 and Chapter 2B. Warning signs in TTC zones shall have a black legend and border on an orange background, except for the ~~Highway-Rail~~ Grade Crossing Advance Warning (W10-1) sign which shall have a black legend and border on a yellow background, and except for signs that are ~~permitted~~ [required or recommended](#) in Parts 2 or 7 to have fluorescent yellow-green backgrounds. Colors for

1 **guide signs shall follow the Standards in Table 2A-5 and Chapter 2D, except for guide signs as ~~noted~~**
2 **otherwise provided in Section 6F.55.**

3 Option:

4 Where the color orange is required, the fluorescent ~~red-orange or fluorescent yellow-orange~~ color~~s~~ may
5 also be used.

6 Support:

7 The fluorescent version~~s~~ of orange provides higher conspicuity than standard orange, especially during
8 twilight.

9 Option:

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

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

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

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

17 **Standard:**

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

20 **Except as provided in Section 2A.11, the sizes for TTC signs and plaques shall be as shown in Table**
21 **6F-1. The sizes in the minimum column shall only be used on local streets or roadways where the 85th-**
22 **percentile speed or posted speed limit is less than 35 mph.**

23 Option:

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

26 **Standard:**

27 **Deviations from standard sizes as prescribed herein in this Manual shall be in 6-inch increments.**

28 Support:

29 Sign design details are contained in the “Standard Highway Signs and Markings” book (see Section
30 1A.11).

31 Section 2A.06 contains additional information regarding the design of signs, including an Option allowing
32 the development of special word message signs if a standard word message or symbol sign is not available to
33 convey the necessary regulatory, warning, or guidance information.

34 **Standard:**

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

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

39 Option:

40 Sign illumination may be either internal or external.

41 Signs may be made of rigid or flexible material.

42 **Section 6F.03 Sign Placement**

43 Guidance:

44 Signs should be located on the right-hand side of the roadway unless otherwise ~~specified~~ provided in this
45 Manual.

46 Option:

47 Where special emphasis is needed, signs may be placed on both the left-hand and right-hand sides of the
48 roadway. Signs mounted on portable supports may be placed within the roadway itself. Signs may also be
49 mounted on or above barricades.

1 Support:

2 The provisions of this Section regarding mounting height apply unless ~~specifically stated~~ otherwise
3 provided for a particular sign elsewhere in this Manual.

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

5 **Standard:**

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

11 The minimum height, measured vertically from the bottom of the sign to the elevation of the near
12 edge of the pavement, of signs installed at the side of the road in rural areas shall be 5 feet (see Figure
13 6F-1).

14 The minimum height, measured vertically from the bottom of the sign to the top of the curb, or in
15 the absence of curb, measured vertically from the bottom of the sign to the elevation of the near edge of
16 the traveled way, of signs installed at the side of the road in business, commercial, or residential areas
17 where parking or pedestrian movements are likely to occur, or where the view of the sign might be
18 obstructed, shall be 7 feet (see Figure 6F-1).

19 The minimum height, measured vertically from the bottom of the sign to the sidewalk, of signs
20 installed above sidewalks shall be 7 feet.

21 Option:

22 ~~A 7-foot mounting height may be used in rural areas for increased visibility.~~

23 The height to the bottom of a secondary sign mounted below another sign may be 1 foot less than the
24 ~~appropriate~~ height ~~specified~~ provided above in Paragraphs 4 through 6.

25 Guidance:

26 Neither portable nor permanent sign supports should be located on sidewalks, bicycle facilities, or areas
27 designated for pedestrian or bicycle traffic. ~~Signs~~ If the bottom of a secondary sign that is mounted below
28 another sign is mounted lower than 7 feet above a pedestrian sidewalk or pathway (see Section 6D.02), the
29 secondary sign should not project more than 4 inches into the pedestrian ~~facilities~~ facility.

30 **Standard:**

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

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

35 Guidance:

36 Except as ~~noted~~ provided in ~~the Option~~ Paragraph 12, signs mounted on portable sign supports that do not
37 meet the minimum mounting heights provided in Paragraphs 4 through 6 should not be used for a duration of
38 more than 3 days.

39 Option:

40 The R9-8 through R9-11a series, R11 series, W1-6 through W1-8 series, M4-10, E5-1, or other similar
41 type signs (see Figures 6F-3, 6F-4, and 6F-5) may be used on portable sign supports that do not meet the
42 minimum mounting heights provided in Paragraphs 4 through 6 for longer than 3 days.

43 Support:

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

45 Guidance:

46 Signs mounted on Type ~~III~~ 3 Barricades should not cover more than 50 percent of the top two rails or 33
47 percent of the total area of the three rails.

48 **Standard:**

49 **Sign supports shall be crashworthy. Where large signs having an area exceeding 50 square feet ~~that~~
50 are installed on multiple breakaway posts, the clearance from the ground to the bottom of the sign shall
51 be mounted a minimum of at least 7 feet above the ground.**

1 The bottom of a signs mounted on a barricades, or other portable supports, shall be ~~no less than~~ at
2 least 1 foot above the traveled way.

3 Option:

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

7 ~~Guidance:~~

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

10 Support:

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

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

14 ~~Standard~~ Guidance:

15 Signs ~~shall~~ should be properly maintained for cleanliness, visibility, and correct positioning.

16 Signs that have lost significant legibility ~~shall~~ should be promptly replaced.

17 Support:

18 Section 2A.08 contains information regarding the retroreflectivity of signs, including the signs that are
19 used in TTC zones.

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

21 Support:

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

24 **Standard:**

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

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

28 **Standard:**

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

31 Support:

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

34 Option:

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

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

37 **Standard:**

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

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

43 Guidance:

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

47 Option:

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

3 Guidance:

4 The ROAD (STREET) CLOSED sign should be installed at or near the center of the roadway on or above
5 a Type ~~H~~ 3 Barricade that closes the roadway (see Section 6F.68).

6 **Standard:**

7 **The ROAD (STREET) CLOSED sign shall not be used where road user flow is maintained through
8 the TTC zone with a reduced number of lanes on the existing roadway or where the actual closure is
9 some distance beyond the sign.**

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

11 Guidance:

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

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

17 Option:

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

20 In urban areas, a word message that includes the name of an intersecting street name or well-known
21 destination may be substituted for the words XX MILES AHEAD on the R11-3a sign where applicable.

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

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

25 **Standard:**

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

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

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

32 Option:

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

36 **Section 6F.12 Work Zone and Higher Fines Signs and Plaques**

37 Option:

38 A WORK ZONE (G20-5aP) plaque (see Figure 6F-3) may be mounted above a Speed Limit sign to
39 emphasize that a reduced speed limit is in effect within a TTC zone. An END WORK ZONE SPEED LIMIT
40 (R2-12) sign (see Figure 6F-3) may be installed at the downstream end of the reduced speed limit zone.

41 Guidance:

42 A BEGIN HIGHER FINES ZONE (R2-10) sign (see Figure 6F-3) should be installed at the upstream end
43 of a work zone where increased fines are imposed for traffic violations, and an END HIGHER FINES ZONE
44 (R2-11) sign (see Figure 6F-3) should be installed at the downstream end of the work zone.

45 Option:

46 Alternate legends such as BEGIN (or END) DOUBLE FINES ZONE may also be used for the R2-10 and
47 R2-11 signs.

1 [A FINES HIGHER, FINES DOUBLE, or \\$XX FINE plaque \(see Section 2B.17 and Figure 6F-3\) may be](#)
2 [mounted below the Speed Limit sign if increased fines are imposed for traffic violations within the TTC zone.](#)
3 [Individual signs and plaques for work zone speed limits and higher fines may be combined into a single](#)
4 [sign or may be displayed as an assembly of signs and plaques.](#)

5 **Section ~~6F.12~~ [6F.13](#) PEDESTRIAN CROSSWALK Sign (R9-8)**

6 Option:

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

9 **Standard:**

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

12 **Section ~~6F.13~~ [6F.14](#) SIDEWALK CLOSED Signs (R9-9, R9-10, R9-11, R9-11a)**

13 Guidance:

14 SIDEWALK CLOSED signs (see Figure 6F-3, ~~Sheet 2 of 2~~) should be used where pedestrian flow is
15 restricted. Bicycle/Pedestrian Detour (M4-9a) signs or Pedestrian Detour (M4-9b) signs should be used where
16 pedestrian flow is rerouted (see Section 6F.59).

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

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

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

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

26 Support:

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

33 **Section ~~6F.14~~ [6F.15](#) Special Regulatory Signs**

34 Option:

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

37 Guidance:

38 Special regulatory signs should ~~conform to~~ [comply with](#) the general requirements of color, shape, and
39 alphabet size and series. The sign message should be brief, legible, and clear.

40 ~~Support:~~

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

43 **Section ~~6F.15~~ [6F.16](#) Warning Sign Function, Design, and Application**

44 Support:

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

47 **Standard:**

1 TTC warning signs shall ~~conform to~~ comply with the Standards for warning signs presented in Part
2 2 and in FHWA's "Standard Highway Signs and Markings" book (see Section 1A.11). Except as ~~noted~~
3 provided in ~~the Option below~~ Paragraph 3, TTC warning signs shall be diamond-shaped with a black
4 legend and border on an orange background, except for the W10-1 sign which shall have a black legend
5 and border on a yellow background, and except for signs that are ~~permitted~~ required or recommended
6 in Parts 2 or 7 to have fluorescent yellow-green backgrounds.

7 Option:

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

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

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

13 Guidance:

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

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

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

20 Support:

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

23 Option:

24 Advance warning signs may be used singly or in combination.

25 ~~Standard:~~

26 ~~Because of their importance, advance warning signs for higher speed locations shall have a size of~~
27 ~~48 x 48 inches (see Part 2).~~

28 ~~For freeways and expressways, the size of diamond-shaped TTC warning signs shall be a minimum~~
29 ~~of 48 x 48 inches.~~

30 ~~Option:~~

31 ~~Where speeds and volumes are moderately low, a minimum size of 36 x 36 inches may be used for~~
32 ~~advance warning signs.~~

33 ~~On secondary roads or city streets where speeds are very low, signs smaller than the standard size, but not~~
34 ~~less than 24 x 24 inches, may be used for warning signs having short word messages or clear symbols.~~

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

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

39 **Section ~~6F.16~~ 6F.17 Position of Advance Warning Signs**

40 Guidance:

41 Where highway conditions permit, warning signs should be placed in advance of the TTC zone at varying
42 distances depending on roadway type, condition, and posted speed. Table 6C-1 contains information
43 regarding the spacing of advance warning signs. Where a series of two or more advance warning signs is
44 used, the closest sign to the TTC zone should be placed approximately 100 feet for low-speed urban streets to
45 1,000 feet or more for freeways and expressways.

46 Where multiple advance warning signs are needed on the approach to a TTC zone, the ROAD WORK
47 AHEAD (W20-1) sign should be the first advance warning sign encountered by road users.

48 Support:

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

1 Option:

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

3 Support:

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

6 Option:

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

9 Guidance:

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

12 **Section ~~6F.17~~ 6F.18 ROAD (STREET) WORK Sign (W20-1)**

13 Guidance:

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

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

19 **Standard:**

20 **The ROAD (STREET) WORK (W20-1) sign shall have the legend ROAD (STREET) WORK, XX**
21 **FEET, XX MILES, or AHEAD.**

22 **Section ~~6F.18~~ 6F.19 DETOUR Sign (W20-2)**

23 Guidance:

24 The DETOUR (W20-2) sign (see Figure 6F-4, ~~Sheet 3 of 4~~) should be used in advance of a road user
25 detour over a different roadway or route.

26 **Standard:**

27 **The DETOUR sign shall have the legend DETOUR, XX FEET, XX MILES, or AHEAD.**

28 **Section ~~6F.19~~ 6F.20 ROAD (STREET) CLOSED Sign (W20-3)**

29 Guidance:

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

32 **Standard:**

33 **The ROAD (STREET) CLOSED sign shall have the legend ROAD (STREET) CLOSED, XX FEET,**
34 **XX MILES, or AHEAD.**

35 **Section ~~6F.20~~ 6F.21 ONE LANE ROAD Sign (W20-4)**

36 **Standard:**

37 **The ONE LANE ROAD (W20-4) sign (see Figure 6F-4, ~~Sheet 3 of 4~~) shall be used only in advance of**
38 **that point where motor vehicle traffic in both directions must use a common single lane (see Section**
39 **6C.10). It shall have the legend ONE LANE ROAD, XX FEET, XX MILES, or AHEAD.**

40 **Section ~~6F.21~~ 6F.22 Lane(s) Closed Signs (W20-5, W20-5a)**

41 **Standard:**

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

44 **For a single lane closure, the Lane Closed (W20-5) sign (see Figure 6F-4, ~~Sheet 3 of 4~~) shall have the**
45 **legend RIGHT (LEFT) LANE CLOSED, XX FEET, XX MILES, or AHEAD. Where two adjacent**
46 **lanes are closed, the W20-5a sign (see Figure 6F-4, ~~Sheet 3 of 4~~) shall have the legend 2 RIGHT (LEFT)**
47 **~~TWO~~ LANES CLOSED, XX FEET, XX MILES, or AHEAD.**

1 **Section ~~6F.22~~ 6F.23 CENTER LANE CLOSED AHEAD Signs (W9-3, ~~W9-3a~~)**

2 Guidance:

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

6 **Option:**

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

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

10 **Guidance:**

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

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

16 **Option:**

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

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

21 **Guidance:**

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

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

25 **Guidance:**

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

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

29 **Option:**

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

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

35 **Option:**

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

40 **Guidance:**

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

43 **Section 6F.29 EXIT ONLY Sign (E5-3)**

44 **Option:**

45 An EXIT ONLY (E5-3) sign (see Figure 6F-5) may be used to supplement other warning signs where
46 work is being conducted in the vicinity of an exit ramp and where the exit maneuver for vehicular traffic using
47 the ramp is different from the normal condition.

1 **Section 6F.30 NEW TRAFFIC PATTERN AHEAD Sign (W23-2)**

2 **Option:**

3 A NEW TRAFFIC PATTERN AHEAD (W23-2) sign (see Figure 6F-4) may be used on the approach to
4 an intersection or along a section of roadway to provide advance warning of a change in traffic patterns, such
5 as revised lane usage, roadway geometry, or signal phasing.

6 **Guidance:**

7 To retain its effectiveness, the W23-2 sign should be displayed for up to 2 weeks, and then it should be
8 covered or removed until it is needed again.

9 **Section ~~6F.29~~ 6F.31 Flagger Signs (W20-7a, W20-7a)**

10 **Guidance:**

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

13 **Option:**

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

17 The FLAGGER (W20-7a) word message sign with distance legends may be substituted for the Flagger
18 (W20-7a) symbol sign.

19 **~~Standard:~~**

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

22 **Section ~~6F.30~~ 6F.32 Two-Way Traffic Sign (W6-3)**

23 **Guidance:**

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

28 **Section ~~6F.31~~ 6F.33 Workers Signs (W21-1, W21-1a)**

29 **Option:**

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

32 **Guidance:**

33 In the absence of other warning devices, a Workers symbol sign should be used when workers are in the
34 roadway.

35 **Option:**

36 The WORKERS (W21-1a) word message sign may be used as an alternate to the Workers (W21-1a)
37 symbol sign.

38 **Section ~~6F.32~~ 6F.34 FRESH OIL (TAR) Sign (W21-2)**

39 **Guidance:**

40 The FRESH OIL (TAR) (W21-2) sign (see Figure 6F-4, ~~Sheet 3 of 4~~) should be used to warn road users
41 of the surface treatment.

42 **Section ~~6F.33~~ 6F.35 ROAD MACHINERY AHEAD Sign (W21-3)**

43 **Option:**

44 The ROAD MACHINERY AHEAD (W21-3) sign (see Figure 6F-4, ~~Sheet 3 of 4~~) may be used to warn of
45 machinery operating in or adjacent to the roadway.

46 **Section ~~6F.34~~ 6F.36 Motorized Traffic Signs (W8-6, W11-10)**

1 Option:

2 Motorized Traffic (W8-6, W11-10) signs may be used to alert road users to locations where unexpected
3 travel on the roadway or entries into or departures from the roadway by construction vehicles might occur.
4 The TRUCK CROSSING (W8-6) word message sign may be used as an alternate to the Truck Crossing
5 (W11-10) symbol sign (see Figure 6F-4, ~~Sheet 2 of 4~~) where there is an established construction vehicle
6 crossing of the roadway.

7 Support:

8 These locations might be relatively confined or might occur randomly over a segment of roadway.

9 **Section ~~6F.35~~ 6F.37 Shoulder Work Signs (W21-5, W21-5a, W21-5b)**

10 Support:

11 Shoulder Work signs (see Figure 6F-4, ~~Sheets 3 and 4 of 4~~) warn of maintenance, reconstruction, or utility
12 operations on the highway shoulder where the roadway is unobstructed.

13 **Standard:**

14 **The Shoulder Work sign shall have the legend SHOULDER WORK (W21-5), RIGHT (LEFT)**
15 **SHOULDER CLOSED (W21-5a), or RIGHT (LEFT) SHOULDER CLOSED XX~~X~~ FT or AHEAD**
16 **(W21-5b).**

17 Option:

18 The Shoulder Work sign may be used in advance of the point on a non-limited access highway where
19 there is shoulder work. It may be used singly or in combination with a ROAD WORK NEXT XX MILES or
20 ROAD WORK AHEAD sign.

21 Guidance:

22 On freeways and expressways, the RIGHT (LEFT) SHOULDER CLOSED XX~~X~~ FT or AHEAD (W21-
23 5b) sign followed by RIGHT (LEFT) SHOULDER CLOSED (W21-5a) sign should be used in advance of the
24 point where the shoulder work occurs and should be preceded by a ROAD WORK AHEAD sign.

25 **Section ~~6F.36~~ 6F.38 SURVEY CREW Sign (W21-6)**

26 Guidance:

27 The SURVEY CREW (W21-6) sign (see Figure 6F-4, ~~Sheet 4 of 4~~) should be used to warn of surveying
28 crews working in or adjacent to the roadway.

29 **Section ~~6F.37~~ 6F.39 UTILITY WORK Sign (W21-7)**

30 Option:

31 The UTILITY WORK (W21-7) sign (see Figure 6F-4, ~~Sheet 4 of 4~~) may be used as an alternate to the
32 ROAD (STREET) WORK (W20-1) sign for utility operations on or adjacent to a highway.

33 Support:

34 Typical examples of where the UTILITY WORK sign is used appear in Figures 6H-4, 6H-6, 6H-10, 6H-
35 15, 6H-18, 6H-21, 6H-22, 6H-26, and 6H-33.

36 **Standard:**

37 **The UTILITY WORK sign shall carry the legend UTILITY WORK, XX FEET, XX MILES, or**
38 **AHEAD.**

39 **Section ~~6F.38~~ 6F.40 Signs for Blasting Areas**

40 Support:

41 Radio-Frequency (RF) energy can cause the premature firing of electric detonators (blasting caps) used in
42 TTC zones.

43 **Standard:**

44 **Road users shall be warned to turn off mobile radio transmitters and cellular telephones where**
45 **blasting operations occur. A sequence of signs shall be prominently displayed to direct operators of**
46 **mobile radio equipment, including cellular telephones, to turn off transmitters in a blasting area. These**
47 **signs shall be covered or removed when there are no explosives in the area or the area is otherwise**
48 **secured.**

1 **Section ~~6F.39~~ 6F.41 BLASTING ZONE AHEAD Sign (W22-1)**

2 **Standard:**

3 The BLASTING ZONE AHEAD (W22-1) sign (see Figure 6F-4, ~~Sheet 4 of 4~~) shall be used in
4 advance of any TTC zone where explosives are being used. The TURN OFF 2-WAY RADIO AND
5 CELL PHONE and END BLASTING ZONE signs shall be used in sequence with this sign.

6 **Section ~~6F.40~~ 6F.42 TURN OFF 2-WAY RADIO AND CELL PHONE Sign (W22-2)**

7 **Standard:**

8 The TURN OFF 2-WAY RADIO AND CELL PHONE (W22-2) sign (see Figure 6F-4, ~~Sheet 4 of 4~~)
9 shall follow the BLASTING ZONE AHEAD sign and shall be placed at least 1,000 feet before the
10 beginning of the blasting zone.

11 **Section ~~6F.41~~ 6F.43 END BLASTING ZONE Sign (W22-3)**

12 **Standard:**

13 The END BLASTING ZONE (W22-3) sign (see Figure 6F-4, ~~Sheet 4 of 4~~) shall be placed a
14 minimum of 1,000 feet past the blasting zone.

15 **Option:**

16 The END BLASTING ZONE sign may be placed either with or preceding the END ROAD WORK sign.

17 **Section ~~6F.42~~ 6F.44 Shoulder Signs and Plaque (W8-4, W8-9, ~~W8-9a~~ W8-17, and W8-17P)**

18 **Option:**

19 The SOFT SHOULDER (W8-4) sign (see Figure 6F-4, ~~Sheet 2 of 4~~) may be used to warn of a soft
20 shoulder condition.

21 The LOW SHOULDER (W8-9) sign (see Figure 6F-4, ~~Sheet 2 of 4~~) may be used to warn of a shoulder
22 condition where there is an elevation difference of ~~less than~~ 3 inches or less between the shoulder and the
23 travel lane.

24 **Guidance:**

25 The ~~SHOULDER DROP-OFF~~ Shoulder Drop Off (~~W8-9a~~ W8-17) sign (see Figure 6F-4, ~~Sheet 2 of 4~~)
26 should be used when an unprotected shoulder drop-off, adjacent to the travel lane, exceeds 3 inches in depth
27 for a continuous length along the roadway, based on engineering judgment.

28 **Option:**

29 A SHOULDER DROP-OFF (W8-17P) supplemental plaque (see Figure 6F-4) may be mounted below the
30 W8-17 sign.

31 **Section ~~6F.43~~ 6F.45 UNEVEN LANES Sign (W8-11)**

32 **Guidance:**

33 The UNEVEN LANES (W8-11) sign (see Figure 6F-4, ~~Sheet 2 of 4~~) should be used during operations
34 that create a difference in elevation between adjacent lanes that are open to travel.

35 **Section 6F.46 STEEL PLATE AHEAD Sign (W8-24)**

36 **Option:**

37 A STEEL PLATE AHEAD (W8-24) sign (see Figure 6F-4) may be used to warn road users that the
38 presence of a temporary steel plate(s) might make the road surface uneven and might create slippery
39 conditions during wet weather.

40 **Section ~~6F.44~~ 6F.47 NO CENTER ~~STRIPE~~ LINE Sign (W8-12)**

41 **Guidance:**

42 The NO CENTER ~~STRIPE~~ LINE (W8-12) sign (see Figure 6F-4, ~~Sheet 2 of 4~~) should be used when the
43 work obliterates the ~~centerline~~ center line pavement markings. This sign should be placed at the beginning of
44 the TTC zone and repeated at 2-mile intervals in long TTC zones.

45 **Support:**

46 Section 6F.78 contains information regarding temporary markings.

1 **Section 6F.48 Reverse Curve Signs (W1-4 Series)**

2 Guidance:

3 In order to give road users advance notice of a lane shift, a Reverse Curve (W1-4, W1-4b, or W1-4c) sign
4 (see Figure 6F-4) should be used when a lane (or lanes) is being shifted to the left or right. If the design speed
5 of the curves is 30 mph or less, a Reverse Turn (W1-3) sign should be used.

6 Standard:

7 If a Reverse Curve (or Turn) sign is used, the direction of the reverse curve (or turn) shall be
8 appropriately illustrated. Except as provided in Paragraph 3, the number of lanes illustrated on the
9 sign shall be the same as the number of through lanes available to road users.

10 Option:

11 Where two or more lanes are being shifted, a W1-4 (or W1-3) sign with an ALL LANES (W24-1cP)
12 plaque (see Figure 6F-4) may be used instead of a sign that illustrates the number of lanes.

13 Where more than three lanes are being shifted, the Reverse Curve (or Turn) sign may be rectangular.

14 **Section ~~6F.45~~ 6F.49 Double Reverse Curve Signs (W24-1 Series)**

15 Option:

16 The Double Reverse Curve (W24-1, W24-1a, or W24-1b) sign (see Figure 6F-4, ~~Sheet 4 of 4~~) may be
17 used where the tangent distance between two reverse curves is less than 600 feet, thus making it difficult for a
18 second Reverse Curve (W1-4 series) sign to be placed between the curves. If the design speed of the curves is
19 30 mph or less, Double Reverse Turn signs should be used.

20 Standard:

21 If a Double Reverse Curve (or Turn) sign is used, the ~~number of lanes illustrated on the sign shall~~
22 ~~be the same as the number of through lanes available to road users, and the~~ direction of the double
23 reverse curve (or turn) shall be appropriately illustrated. Except as provided in Paragraph 3, the
24 number of lanes illustrated on the sign shall be the same as the number of through lanes available to
25 road users.

26 Option:

27 Where two or more lanes are being shifted, a W24-1 (or Double Reverse Turn sign showing one lane)
28 sign with an ALL LANES (W24-1cP) plaque (see Figure 6F-4) may be used instead of a sign that illustrates
29 the number of lanes.

30 Where more than three lanes are being shifted, the Double Reverse Curve (or Turn) sign may be
31 rectangular.

32 **Section ~~6F.46~~ 6F.50 Other Warning Signs**

33 Option:

34 Advance warning signs may be used by themselves or with other advance warning signs.

35 Besides the warning signs specifically related to TTC zones, several other warning signs in Part 2 may
36 apply in TTC zones.

37 Standard:

38 Except as ~~noted~~ provided in Section 6F.02, other warning signs that are used in TTC zones shall
39 have black legends and borders on an orange background.

40 **Section ~~6F.47~~ 6F.51 Special Warning Signs**

41 Option:

42 Special warning signs may be used based on engineering judgment.

43 Guidance:

44 Special warning signs should ~~conform to~~ comply with the general requirements of color, shape, and
45 alphabet size and series. The sign message should be brief, legible, and clear.

46 **Section ~~6F.48~~ 6F.52 Advisory Speed Plaque (W13-1P)**

47 Option:

1 In combination with a warning sign, an Advisory Speed (W13-1P) plaque (see Figure 6F-4, ~~Sheet 2 of 4~~)
2 may be used to indicate a recommended ~~safe~~ speed through the TTC zone.

3 **Standard:**

4 **The Advisory Speed plaque shall not be used in conjunction with any sign other than a warning**
5 **sign, nor shall it be used alone. When used with orange TTC zone signs, this plaque shall have a black**
6 **legend and border on an orange background. The sign shall be at least 24 x 24 inches in size when used**
7 **with a sign that is 36 x 36 inches or larger. Except in emergencies, an Advisory Speed plaque shall not**
8 **be mounted until the recommended speed is determined by the highway agency.**

9 **Section ~~6F.49~~ 6F.53 Supplementary Distance Plaque (W7-3aP)**

10 **Option:**

11 In combination with a warning sign, a Supplementary Distance (W7-3aP) plaque (see Figure 6F-4) with
12 the legend NEXT XX MILES may be used to indicate the length of highway over which a work activity is
13 being conducted, or over which a condition exists in the TTC zone.

14 In long TTC zones, Supplementary Distance plaques with the legend NEXT XX MILES may be placed in
15 combination with warning signs at regular intervals within the zone to indicate the remaining length of
16 highway over which the TTC work activity or condition exists.

17 **Standard:**

18 **The Supplementary Distance plaque with the legend NEXT XX MILES shall not be used in**
19 **conjunction with any sign other than a warning sign, nor shall it be used alone. When used with orange**
20 **TTC zone signs, this plaque shall have a black legend and border on an orange background. The sign**
21 **shall be at least 30 x 24 inches in size when used with a sign that is 36 x 36 inches or larger.**

22 **Guidance:**

23 When used in TTC zones, the Supplementary Distance plaque with the legend NEXT XX MILES should
24 be placed below the initial warning sign designating that, within the approaching zone, a temporary work
25 activity or condition exists.

26 **Section 6F.54 Motorcycle Plaque (W8-15P)**

27 **Option:**

28 A Motorcycle (W8-15P) plaque (see Figure 6F-4) may be mounted below a LOOSE GRAVEL (W8-7)
29 sign, a GROOVED PAVEMENT (W8-15) sign, a METAL BRIDGE DECK (W8-16) sign, or a STEEL
30 PLATE AHEAD (W8-24) sign if the warning is intended to be directed primarily to motorcyclists.

31 **Section ~~6F.50~~ 6F.55 Guide Signs**

32 **Support:**

33 Guide signs along highways provide road users with information to help them along their way through the
34 TTC zone. The design of guide signs is presented in Part 2.

35 **Guidance:**

36 The following guide signs should be used in TTC zones as needed:

- 37 A. Standard route markings, where temporary route changes are necessary,
- 38 B. Directional signs and street name signs, and
- 39 C. Special guide signs relating to the condition or work being done.

40 **Standard:**

41 **If additional temporary guide signs are used in TTC zones, they shall have a black legend and**
42 **border on an orange background.**

43 **Option:**

44 Guide signs used in TTC incident management situations may have a black legend and border on a
45 fluorescent pink background.

46 When directional signs and street name signs are used in conjunction with detour routing, these signs may
47 have a black legend and border on an orange background.

48 When permanent directional signs or permanent street name signs are used in conjunction with detour
49 signing, they may have a white legend on a green background.

1 **Section ~~6F.54~~ 6F.56 ROAD WORK NEXT XX MILES Sign (G20-1)**

2 Guidance:

3 The ROAD WORK NEXT XX MILES (G20-1) sign (see Figure 6F-4, ~~Sheet 4 of 4~~) should be installed in
4 advance of TTC zones that are more than 2 miles in length.

5 Option:

6 The ROAD WORK NEXT XX MILES sign may be mounted on a Type ~~H~~ 3 Barricade. The sign may
7 also be used for TTC zones of shorter length.

8 **Standard:**

9 **The distance ~~shown~~ displayed on the ROAD WORK NEXT XX MILES sign shall be stated to the**
10 **nearest whole mile.**

11 **Section ~~6F.52~~ 6F.57 END ROAD WORK Sign (G20-2)**

12 Guidance:

13 When used, the END ROAD WORK (G20-2) sign (see Figure 6F-4, ~~Sheet 4 of 4~~) should be placed near
14 the downstream end of the termination area, as determined by engineering judgment.

15 Option:

16 The END ROAD WORK sign may be installed on the back of a warning sign facing the opposite
17 direction of road users or on the back of a Type ~~H~~ 3 Barricade.

18 **Section ~~6F.54~~ 6F.58 PILOT CAR FOLLOW ME Sign (G20-4)**

19 **Standard:**

20 **The PILOT CAR FOLLOW ME (G20-4) sign (see Figure 6F-4, ~~Sheet 4 of 4~~) shall be mounted in a**
21 **conspicuous position on the rear of a vehicle used for guiding one-way vehicular traffic through or**
22 **around a TTC zone (see Section 6C.13). ~~A flagger shall be stationed on the approach to the activity~~**
23 **~~area to stop vehicular traffic until the pilot vehicle is available.~~ this sentence was relocated to Section**
24 **6C.13**

25 **Section ~~6F.53~~ 6F.59 Detour Signs (M4-8, M4-8a, M4-8b, M4-9, M4-9a, M4-9b, M4-9c, and M4-**
26 **10)**

27 **Standard:**

28 **Each detour shall be adequately marked with standard temporary route signs and destination signs.**

29 Option:

30 Detour signs in TTC incident management situations may have a black legend and border on a fluorescent
31 pink background.

32 The Detour Arrow (M4-10) sign (see Figure 6F-5) may be used where a detour route has been established.

33 The DETOUR (M4-8) sign (see Figure 6F-5) may be mounted at the top of a route sign assembly to mark
34 a temporary route that detours from a highway, bypasses a section closed by a TTC zone, and rejoins the
35 highway beyond the TTC zone.

36 Guidance:

37 The Detour Arrow (M4-10) sign should normally be mounted just below the ROAD CLOSED (R11-2,
38 R11-3a, or R11-4) sign. The Detour Arrow sign should include a horizontal arrow pointed to the right or left
39 as required.

40 The DETOUR (M4-9) sign (see Figure 6F-5) should be used for unnumbered highways, for emergency
41 situations, for periods of short durations, or where, over relatively short distances, road users are guided along
42 the detour and back to the desired highway without route signs.

43 A Street Name sign should be placed above, or the street name should be incorporated into, a DETOUR
44 (M4-9) sign to indicate the name of the street being detoured.

45 Option:

46 The END DETOUR (M4-8a) or END (M4-8b) sign (see Figure 6F-5) may be used to indicate that the
47 detour has ended.

48 Guidance:

1 When the END DETOUR sign is used on a numbered highway, the sign should be mounted above a [route](#)
2 sign after the [downstream](#) end of the detour.

3 The Pedestrian/Bicycle Detour (M4-9a) sign (see Figure 6F-5) should be used where a pedestrian/bicycle
4 detour route has been established because of the closing of a pedestrian/bicycle facility to through traffic.

5 **Standard:**

6 **If used, the Pedestrian/Bicycle Detour sign shall have an arrow pointing in the appropriate**
7 **direction.**

8 Option:

9 The arrow on a Pedestrian/Bicycle Detour sign may be on the sign face or on a supplemental plaque.

10 The Pedestrian Detour (M4-9b) sign or Bicycle Detour (M4-9c) sign (see Figure 6F-5) may be used where
11 a pedestrian or bicycle detour route (not both) has been established because of the closing of the pedestrian or
12 bicycle facility to through traffic.

13 **Section ~~6F.55~~ 6F.60 Portable Changeable Message Signs**

14 ~~Standard~~ Support:

15 Portable changeable message signs (PCMS) ~~shall be~~ are TTC devices [installed for temporary use](#) with the
16 flexibility to display a variety of messages. ~~Each character module shall use at least a five wide and seven~~
17 ~~high pixel matrix.~~ [In most cases, portable changeable message signs follow the same provisions for design](#)
18 [and application as those given for changeable message signs in Chapter 2L. The information in this Section](#)
19 [describes situations where the provisions for portable changeable message signs differ from those given in](#)
20 [Chapter 2L.](#)

21 ~~Support:~~

22 Portable changeable message signs are used most frequently on high-density urban freeways, but have
23 applications on all types of highways where highway alignment, road user routing problems, or other pertinent
24 conditions require advance warning and information.

25 Portable changeable message signs have a wide variety of applications in TTC zones including: roadway,
26 lane, or ramp closures; ~~crash or emergency~~ incident management; width restriction information; speed control
27 or reductions; advisories on work scheduling; road user management and diversion; warning of adverse
28 conditions or special events; and other operational control.

29 The primary purpose of portable changeable message signs in TTC zones is to advise the road user of
30 unexpected situations. [Portable changeable message signs are particularly useful as they are capable of:](#)

- 31 [A. Conveying complex messages,](#)
32 [B. Displaying real time information about conditions ahead, and](#)
33 [C. Providing information to assist road users in making decisions prior to the point where actions must](#)
34 [be taken.](#)

35 Some typical applications include the following:

- 36 A. Where the speed of vehicular traffic is expected to drop substantially;
37 B. Where significant queuing and delays are expected;
38 C. Where adverse environmental conditions are present;
39 D. Where there are changes in alignment or surface conditions;
40 E. Where advance notice of ramp, lane, or roadway closures is needed;
41 F. Where crash or incident management is needed; and/or
42 G. Where changes in the road user pattern occur.

43 Guidance:

44 The components of a portable changeable message sign should include: a message sign ~~panel~~, control
45 systems, a power source, and mounting and transporting equipment. The front face of the sign should be
46 covered with a protective material. the 2nd sentence was relocated from a later paragraph

47 **Standard:**

48 **Portable changeable message signs ~~should shall subscribe to~~ comply with the [applicable design and](#)**
49 **[application](#) principles established in ~~Section 2A.07 and other sections~~ [Chapter 2A of this Manual and,](#)**
50 **~~to the extent practical, with the design (that is, color, letter size and shape, and borders) and~~**
51 **~~applications prescribed in this Manual, except that the reverse colors for the letters and the background~~**

1 ~~are considered acceptable.~~ Portable changeable message signs shall display only traffic operational,
2 regulatory, warning, and guidance information, and shall not be used for advertising messages.

3 Support:

4 Section 2L.02 contains information regarding overly simplistic or vague messages that is also applicable
5 to portable changeable message signs.

6 Standard:

7 ~~The color of the elements should be yellow or orange on a black background.~~ The colors used for
8 legends on portable changeable message signs shall comply with those shown in Table 2A-5.

9 Support:

10 Section 2L.04 contains information regarding the luminance, luminance contrast, and contrast orientation
11 that is also applicable to portable changeable message signs.

12 Guidance:

13 Portable changeable message signs should be visible from 1/2 mile under both day and night conditions.

14 Support:

15 Section 2B.13 contains information regarding the design of portable changeable message signs that are
16 used to display speed limits that change based on operational conditions, or are used to display the speed at
17 which approaching drivers are traveling.

18 Guidance:

19 A ~~phase shall consist of up~~ portable changeable message sign should be limited to three lines of eight
20 characters per line or should consist of a full matrix display. [this sentence was relocated from the 1st paragraph

21 ~~For a trailer or large truck mounted sign,~~ Except as provided in Paragraph 15, the letter height used for
22 portable changeable message sign messages should be a minimum of 18 inches.

23 Option:

24 For portable changeable message signs mounted on service patrol trucks or other incident response
25 vehicles, the a letter height ~~should be a minimum of~~ as short as 10 inches may be used. Shorter letter sizes
26 may also be used on a portable changeable message sign used on low speed facilities provided that the
27 message is legible from at least 650 feet.

28 The portable changeable message sign ~~panel~~ may vary in size.

29 ~~Standard~~ Guidance:

30 ~~Each~~ Messages on a portable changeable message sign ~~shall~~ should consist of ~~either one or~~ no more than
31 two phases, and a phase should consist of no more than three lines of text. Each phase should be capable of
32 being understood by itself, regardless of the order in which it is read. Messages should be centered within
33 each line of legend. If more than one portable changeable message sign is simultaneously legible to road
34 users, then only one of the signs should display a sequential message at any given time.

35 Support:

36 Road users have difficulties in reading messages displayed in more than two phases on a typical three-line
37 portable changeable message sign.

38 Standard:

39 Techniques of message display such as animation, rapid flashing, dissolving, exploding, scrolling,
40 travelling horizontally or vertically across the face of the sign, or other dynamic elements shall not be
41 used. ~~The text of the messages shall not scroll or travel horizontally or vertically across the face of the~~
42 ~~sign.~~ [the 2nd sentence was relocated from a later paragraph]

43 Guidance:

44 ~~The message panel should have adjustable display rates (minimum of 3 seconds per phase), so that the~~
45 ~~entire message can be read at least twice at the posted speed, the off-peak 85th percentile speed prior to work~~
46 ~~starting, or the anticipated operating speed.~~

47 When a message is divided into two phases, the display time for each phase should be at least 2 seconds,
48 and the sum of the display times for both of the phases should be a maximum of 8 seconds.

49 All messages should be designed with consideration given to the principles provided in this Section and
50 also taking into account the following factors:

51 ~~A. Each phase should convey a single thought.~~

~~B. If the message can be displayed in one phase, the top line should present the problem, the center line should present the location or distance ahead, and the bottom line should present the recommended driver action.~~

A. The message should be as brief as possible and should contain three thoughts (with each thought preferably shown on its own line) that convey:

1. The problem or situation that the road user will encounter ahead,
2. The location of or distance to the problem or situation, and
3. The recommended driver action.

B. ~~When a message is longer~~ If more than two phases are needed to display a message, additional portable changeable message signs should be used. When multiple portable changeable message signs are needed, they should be placed on the same side of the roadway and they should be separated from each other by a distance of at least 1,000 feet on freeways and expressways, and by a distance of at least 500 feet on other types of highways.

~~C. When abbreviations are used, they should be easily understood (see Section 1A.15).~~

Option:

~~Smaller letter sizes may be used on a Portable Changeable Message sign mounted on a trailer or large truck provided that the message is legible from at least 650 feet, or mounted on a service patrol truck provided that the message is legible from at least 330 feet.~~

~~Two Portable Changeable Message signs may be used for the purpose of allowing the entire message to be read twice at the posted speed.~~

Standard:

When the word messages shown in Tables 1A-1 or 1A-2 need to be abbreviated on a portable changeable message sign, the provisions described in Section 1A.15 shall be followed.

In order to maintain legibility, portable changeable message signs shall automatically adjust their brightness under varying light conditions, ~~to maintain legibility.~~

The control system shall include a display screen upon which messages can be reviewed before being displayed on the message sign. The control system shall be capable of maintaining memory when power is unavailable.

Portable changeable message signs shall be equipped with a power source and a battery back-up to provide continuous operation when failure of the primary power source occurs.

The mounting of portable changeable message signs on a trailer, a large truck, or a service patrol truck shall be such that the bottom of the message sign ~~panel~~ shall be a minimum of 7 feet above the roadway in urban areas and 5 feet above the roadway in rural areas when it is in the operating mode.

Guidance:

Portable changeable message signs should be used as a supplement to and not as a substitute for conventional signs and pavement markings.

When portable changeable message signs are used for route diversion, they should be placed far enough in advance of the diversion to allow road users ample opportunity to perform necessary lane changes, to adjust their speed, or to exit the affected highway.

~~The~~ Portable changeable message signs should be sited and aligned to provide maximum legibility and to allow time for road users to respond appropriately to the portable changeable Message sign message. ~~Multiple Portable Changeable Message signs should be placed on the same side of the roadway, separated from each other at distances based on Table 6C-1.~~

Portable changeable message signs should be placed ~~on off~~ the shoulder of the roadway ~~or and behind a traffic barrier,~~ if practical, ~~further from the traveled lane.~~ Where a traffic barrier is not available to shield the portable changeable message sign, it should be placed off the shoulder and outside of the clear zone. ~~They~~ If a portable changeable message sign has to be placed on the shoulder of the roadway or within the clear zone, it should be delineated with retroreflective TTC devices.

When portable changeable message signs are used in TTC zones, they should display only TTC messages.

When portable changeable message signs are not being used to display TTC messages, they should be ~~removed~~ relocated such that they are outside of the clear zone or, if not removed, they should be shielded behind a traffic barrier and turned away from traffic. ~~or~~ If the previous two options are relocation or shielding is not feasible practical, they should be delineated with retroreflective TTC devices.

1 Portable changeable message sign trailers should be delineated on a permanent basis by affixing
2 retroreflective material, known as conspicuity material, in a continuous line on the face of the trailer as seen
3 by oncoming road users.

4 **Section ~~6F-56~~ 6F.61 Arrow Panels Boards**

5 **Standard:**

6 An arrow ~~panel~~ board shall be a sign with a matrix of elements capable of either flashing or
7 sequential displays. This sign shall provide additional warning and directional information to assist in
8 merging and controlling road users through or around a TTC zone.

9 **Guidance:**

10 An arrow ~~panel~~ board in the arrow or chevron mode should be used to advise approaching traffic of a lane
11 closure along major multi-lane roadways in situations involving heavy traffic volumes, high speeds, and/or
12 limited sight distances, or at other locations and under other conditions where road users are less likely to
13 expect such lane closures.

14 If used, an arrow ~~panel~~ board should be used in combination with appropriate signs, channelizing devices,
15 or other TTC devices.

16 An arrow ~~panel~~ board should be placed on the shoulder of the roadway or, if practical, farther from the
17 traveled lane. It should be delineated with retroreflective TTC devices. When an arrow ~~panel~~ board is not
18 being used, it should be removed; if not removed, it should be shielded; or if the previous two options are not
19 feasible, it should be delineated with retroreflective TTC devices.

20 **Standard:**

21 **Arrow ~~panels~~ boards shall meet the minimum size, legibility distance, number of elements, and**
22 **other specifications shown in Figure 6F-6.**

23 **Support:**

24 Type A arrow ~~panels~~ boards are appropriate for use on low-speed urban streets. Type B arrow ~~panels~~
25 boards are appropriate for intermediate-speed facilities and for maintenance or mobile operations on high-
26 speed roadways. Type C arrow ~~panels~~ boards are intended to be used on high-speed, high-volume motor
27 vehicle traffic control projects. Type D arrow ~~panels~~ boards are intended for use on vehicles authorized
28 ~~vehicles~~ by the State or local agency.

29 **Standard:**

30 **Type A, B, and C arrow ~~panels~~ boards shall have solid rectangular appearances. A Type D arrow**
31 **~~panel~~ board shall conform to the shape of the arrow.**

32 **All arrow ~~panels~~ boards shall be finished in non-reflective black. The arrow ~~panel~~ board shall be**
33 **mounted on a vehicle, a trailer, or other suitable support.**

34 **Guidance:**

35 The minimum mounting height, measured vertically from the bottom of the board to the roadway below it
36 or to the elevation of the near edge of the roadway, of an arrow ~~panel~~ board should be 7 feet ~~from the roadway~~
37 ~~to the bottom of the panel~~, except on vehicle-mounted ~~panels~~ arrow boards, which should be as high as
38 practical.

39 A vehicle-mounted arrow ~~panel~~ board should be provided with remote controls.

40 **Standard:**

41 **Arrow ~~panel~~ board elements shall be capable of at least a 50 percent dimming from full brilliance.**
42 **The dimmed mode shall be used for nighttime operation of arrow ~~panels~~ boards.**

43 **Guidance:**

44 Full brilliance should be used for daytime operation of arrow ~~panels~~ boards.

45 **Standard:**

46 **The arrow ~~panel~~ board shall have suitable elements capable of the various operating modes. The**
47 **color presented by the elements shall be yellow.**

48 **Guidance:**

49 If an arrow ~~panel~~ board consisting of a bulb matrix is used, the elements should be recess-mounted or
50 equipped with an upper hood of not less than 180 degrees.

1 **Standard:**

2 The minimum element on-time shall be 50 percent for the flashing mode, with equal intervals of 25
3 percent for each sequential phase. The flashing rate shall be not less than 25 or more than 40 flashes
4 per minute.

5 An arrow ~~panel~~ board shall have the following three mode selections:

- 6 A. A Flashing Arrow, Sequential Arrow, or Sequential Chevron mode;
- 7 B. A flashing Double Arrow mode; and
- 8 C. A flashing Caution or Alternating Diamond mode.

9 An arrow ~~panel~~ board in the arrow or chevron mode shall be used only for stationary or moving
10 lane closures on multi-lane roadways.

11 For shoulder work, blocking the shoulder, for roadside work near the shoulder, or for temporarily
12 closing one lane on a two-lane, two-way roadway, an arrow ~~panel~~ board shall be used only in the
13 caution mode.

14 **Guidance:**

15 For a stationary lane closure, the arrow ~~panel~~ board should be located on the shoulder at the beginning of
16 the merging taper.

17 Where the shoulder is narrow, the arrow ~~panel~~ board should be located in the closed lane.

18 **Standard:**

19 When arrow ~~panels~~ boards are used to close multiple lanes, a separate arrow ~~panel~~ board shall be
20 used for each closed lane.

21 **Guidance:**

22 When arrow ~~panels~~ boards are used to close multiple lanes, if the first arrow ~~panel~~ board is placed on the
23 shoulder, the second arrow ~~panel~~ board should be placed in the first closed lane at the beginning upstream end
24 of the second merging taper (see Figure 6H-37). When the first arrow ~~panel~~ board is placed in the first closed
25 lane, the second arrow ~~panel~~ board should be placed in the second closed lane at the downstream end of the
26 second merging taper.

27 For mobile operations where a lane is closed, the arrow ~~panel~~ board should be located to provide adequate
28 separation from the work operation to allow for appropriate reaction by approaching drivers.

29 **Standard:**

30 A vehicle displaying an arrow ~~panel~~ board shall be equipped with high-intensity rotating, flashing,
31 oscillating, or strobe lights.

32 Arrow boards shall only be used to indicate a lane closure. Arrow ~~panel(s)~~ boards shall not be used
33 to ~~laterally indicate a lane~~ shift traffic.

34 **Option:**

35 A portable changeable message sign may be used to simulate an arrow ~~panel~~ board display.

36 **Section ~~6F-57~~ 6F.62 High-Level Warning Devices (Flag Trees)**

37 **Option:**

38 A high-level warning device (flag tree) may supplement other TTC devices in TTC zones.

39 **Support:**

40 A high-level warning device is designed to be seen over the top of typical passenger cars. A typical high-
41 level warning device is shown in Figure 6F-2.

42 **Standard:**

43 A high-level warning device shall consist of a minimum of two flags with or without a Type B high-
44 intensity flashing warning light. The distance from the roadway to the bottom of the lens of the light
45 and to the lowest point of the flag material shall be not less than 8 feet. The flag shall be 16 inches
46 square or larger and shall be orange or fluorescent red-orange in color.

47 **Option:**

48 An appropriate warning sign may be mounted below the flags.

49 **Support:**

1 High-level warning devices are most commonly used in high-density road user situations to warn road
2 users of short-term operations.

3 **Section ~~6F.58~~ 6F.63 Channelizing Devices**

4 **Standard:**

5 **Designs of various channelizing devices shall be as shown in Figure 6F-7. All channelizing devices**
6 **shall be crashworthy.**

7 Support:

8 The function of channelizing devices is to warn road users of conditions created by work activities in or
9 near the roadway and to guide road users. Channelizing devices include cones, tubular markers, vertical
10 panels, drums, barricades, and ~~temporary raised islands~~ longitudinal channelizing devices.

11 Channelizing devices provide for smooth and gradual vehicular traffic flow from one lane to another, onto
12 a bypass or detour, or into a narrower traveled way. They are also used to ~~separate~~ channelize vehicular
13 traffic away from the work space, pavement drop-offs, pedestrian or shared-use paths, or opposing directions
14 of vehicular traffic.

15 **Standard:**

16 **Devices used to channelize pedestrians shall be detectable to users of long canes and visible to**
17 **persons having low vision.**

18 Where ~~barricades~~ channelizing devices are used to channelize pedestrians, there shall be continuous
19 detectable bottom and top ~~rails~~ surfaces with no gaps between individual barricades to be detectable to
20 users of long canes. The bottom of the bottom ~~rail~~ surface shall be no higher than ~~6~~ 2 inches above the
21 ground ~~surface~~. The top of the top ~~rail~~ surface shall be no lower than ~~36~~ 32 inches above the ground
22 ~~surface~~.

23 Option:

24 A gap not exceeding ~~6~~ 2 inches between the bottom rail and the ground surface may be used to facilitate
25 drainage.

26 ~~Standard:~~

27 ~~If drums, cones, or tubular markers are used to channelize pedestrians, they shall be located such~~
28 ~~that there are no gaps between the bases of the devices, in order to create a continuous bottom, and the~~
29 ~~height of each individual drum, cone, or tubular marker shall be no less than 36 inches to be detectable~~
30 ~~to users of long canes.~~

31 Guidance:

32 Where multiple channelizing devices are aligned to form a continuous pedestrian channelizer, connection
33 points should be smooth to optimize long-cane and hand trailing.

34 ~~Channelizing devices should be constructed and ballasted to perform in a predictable manner when~~
35 ~~inadvertently struck by a vehicle. Channelizing devices should be crashworthy. Fragments or other debris~~
36 ~~from the device or the ballast should not pose a significant hazard to road users or workers.~~

37 The spacing ~~of~~ between channelizing devices cones, tubular markers, vertical panels, drums, and
38 barricades should not exceed a distance in feet equal to 1.0 times the speed limit in mph when used for taper
39 channelization, and a distance in feet equal to 2.0 times the speed limit in mph when used for tangent
40 channelization.

41 When channelizing devices have the potential of leading vehicular traffic out of the intended vehicular
42 traffic space as shown in Figure 6H-39, the channelizing devices should be extended a distance in feet of 2.0
43 times the speed limit in mph beyond the downstream end of the transition area.

44 Option:

45 Warning lights (see Section 6F.83) may be added to channelizing devices in areas with frequent fog,
46 snow, or severe roadway curvature, or where visual distractions are present.

47 **Standard:**

48 **Warning lights shall flash when placed on channelizing devices used alone or in a cluster to warn of**
49 **a condition. Except for the sequential flashing warning lights discussed in Paragraphs 12 and 13,**
50 **warning lights placed on channelizing devices used in a series to channelize road users shall be steady-**
51 **burn.**

1 Option:

2 A series of sequential flashing warning lights may be placed on channelizing devices that form a merging
3 taper in order to increase driver detection and recognition of the merging taper.

4 Standard:

5 When used, the successive flashing of the sequential warning lights shall occur from the upstream
6 end of the merging taper to the downstream end of the merging taper in order to identify the desired
7 vehicle path. Each warning light in the sequence shall be flashed at a rate of not less than 55 nor more
8 than 75 times per minute.

9 **The retroreflective material used on channelizing devices shall have a smooth, sealed outer surface**
10 **that will display a similar color day or night.**

11 Option:

12 The name and telephone number of the highway agency, contractor, or supplier may be ~~shown~~ displayed
13 on the non-retroreflective surface of all types of channelizing devices.

14 **Standard:**

15 **The letters and numbers of the name and telephone number shall be non-retroreflective and not**
16 **over 2 inches in height.**

17 Guidance:

18 Particular attention should be given to maintaining the channelizing devices to keep them clean, visible,
19 and properly positioned at all times.

20 **Standard:**

21 **Devices that are damaged or have lost a significant amount of their retroreflectivity and**
22 **effectiveness shall be replaced.**

23 **Section ~~6F.59~~ 6F.64 Cones**

24 **Standard:**

25 **Cones (see Figure 6F-7, ~~Sheet 1 of 2~~) shall be predominantly orange and shall be made of a material**
26 **that can be struck without causing damage to the impacting vehicle. For daytime and low-speed**
27 **roadways, cones shall be not less than 18 inches in height. When cones are used on freeways and other**
28 **high-speed highways or at night on all highways, or when more conspicuous guidance is needed, cones**
29 **shall be a minimum of 28 inches in height.**

30 **For nighttime use, cones shall be retroreflectorized or equipped with lighting devices for maximum**
31 **visibility. Retroreflectorization of cones that are 28 to 36 inches in height shall be provided by a 6-inch**
32 **wide white band located 3 to 4 inches from the top of the cone and an additional 4-inch wide white band**
33 **located approximately 2 inches below the 6-inch band.**

34 **Retroreflectorization of cones that are more than 36 inches in height shall be provided by**
35 **horizontal, circumferential, alternating orange and white retroreflective stripes that are 4 to 6 inches**
36 **wide. Each cone shall have a minimum of two orange and two white stripes with the top stripe being**
37 **orange. Any non-retroreflective spaces between the orange and white stripes shall not exceed 3 inches**
38 **in width.**

39 Option:

40 Traffic cones may be used to channelize road users, divide opposing vehicular traffic lanes, divide lanes
41 when two or more lanes are kept open in the same direction, and delineate short duration maintenance and
42 utility work.

43 Guidance:

44 Steps should be taken to minimize the possibility of cones being blown over or displaced by wind or
45 moving vehicular traffic.

46 ~~Cones should not be used for pedestrian channelization or as pedestrian barriers in TTC zones on or along~~
47 ~~sidewalks unless they are continuous between individual devices and detectable to users of long canes.~~

48 Option:

49 Cones may be doubled up to increase their weight.

50 Support:

1 Some cones are constructed with bases that can be filled with ballast. Others have specially weighted
2 bases, or weight such as sandbag rings that can be dropped over the cones and onto the base to provide added
3 stability.

4 Guidance:

5 Ballast should be kept to the minimum amount needed.

6 Section ~~6F.60~~ 6F.65 Tubular Markers

7 Standard:

8 Tubular markers (see Figure 6F-7, ~~Sheet 1 of 2~~) shall be predominantly orange and shall be not less
9 than 18 inches high and 2 inches wide facing road users. They shall be made of a material that can be
10 struck without causing damage to the impacting vehicle.

11 Tubular markers shall be a minimum of 28 inches in height when they are used on freeways and
12 other high-speed highways, on all highways during nighttime, or whenever more conspicuous guidance
13 is needed.

14 For nighttime use, tubular markers shall be retroreflectorized. Retroreflectorization of ~~28-inch or~~
15 ~~larger~~ tubular markers that have a height of less than 42 inches shall be provided by two 3-inch wide
16 white bands placed a maximum of 2 inches from the top with a maximum of 6 inches between the
17 bands. Retroreflectorization of tubular markers that have a height of 42 inches or more shall be
18 provided by four 4- to 6-inch wide alternating orange and white stripes with the top stripe being
19 orange.

20 Guidance:

21 ~~Tubular markers should not be used for pedestrian channelization or as pedestrian barriers in TTC zones~~
22 ~~on or along sidewalks unless they are continuous between individual devices and detectable to users of long~~
23 ~~eanes.~~

24 Tubular markers have less visible area than other devices and should be used only where space restrictions
25 do not allow for the use of other more visible devices.

26 Tubular markers should be stabilized by affixing them to the pavement, by using weighted bases, or
27 weights such as sandbag rings that can be dropped over the tubular markers and onto the base to provide
28 added stability. Ballast should be kept to the minimum amount needed.

29 Option:

30 Tubular markers may be used effectively to divide opposing lanes of road users, divide vehicular traffic
31 lanes when two or more lanes of moving ~~motor vehicle~~ vehicular traffic are kept open in the same direction,
32 and to delineate the edge of a pavement drop off where space limitations do not allow the use of larger
33 devices.

34 Standard:

35 ~~When a noncylindrical tubular marker is used, it shall be attached to the pavement in a manner~~
36 ~~such that the width facing road users meets the minimum requirements.~~

37 A tubular marker shall be attached to the pavement to display the minimum 2-inch width to the
38 approaching road users.

39 Section ~~6F.64~~ 6F.66 Vertical Panels

40 Standard:

41 Vertical panels (see Figure 6F-7, ~~Sheet 1 of 2~~) shall be have retroreflective striped material that is 8
42 to 12 inches in width and at least 24 inches in height. They shall have orange and white diagonal stripes
43 and be retroreflectorized. Markings for vertical panels shall be alternating diagonal orange and white
44 retroreflective stripes sloping downward at an angle of 45 degrees in the direction vehicular traffic is to
45 pass. ~~Vertical panels used on freeways, expressways, and other high-speed roadways shall have a~~
46 ~~minimum of 270 square inches of retroreflective area facing vehicular traffic.~~

47 ~~Vertical panels shall be mounted with the top a minimum of 36 inches above the roadway.~~

48 Where the height of the retroreflective material on the vertical panel ~~itself~~ is 36 inches or greater
49 more, a panel stripe width of 6 inches shall be used.

50 Option:

1 Where the height of the retroreflective material on the vertical panel ~~itself~~ is less than 36 inches, a ~~panel~~
2 stripe width of 4 inches may be used.

3 Where space is limited, vertical panels may be used to channelize vehicular traffic, divide opposing lanes,
4 or replace barricades.

5 **Section ~~6F.62~~ 6F.67 Drums**

6 **Standard:**

7 **Drums (see Figure 6F-7, ~~Sheet 1 of 2~~) used for road user warning or channelization shall be**
8 **constructed of lightweight, deformable materials. They shall be a minimum of 36 inches in height and**
9 **have at least an 18-inch minimum width regardless of orientation. Metal drums shall not be used. The**
10 **markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective**
11 **stripes 4 to 6 inches wide. Each drum shall have a minimum of two orange and two white stripes with**
12 **the top stripe being orange. Any non-retroreflectorized spaces between the horizontal orange and white**
13 **stripes shall not exceed 3 inches wide. Drums shall have closed tops that will not allow collection of**
14 **construction debris or other debris.**

15 **Support:**

16 Drums are highly visible, have good target value, give the appearance of being formidable obstacles and,
17 therefore, command the respect of road users. They are portable enough to be shifted from place to place
18 within a TTC zone in order to accommodate changing conditions, but are generally used in situations where
19 they will remain in place for a prolonged period of time.

20 **Option:**

21 Although drums are most commonly used to channelize or delineate road user flow, they may also be used
22 alone or in groups to mark specific locations.

23 **Guidance:**

24 ~~Drums should not be used for pedestrian channelization or as pedestrian barriers in TTC zones on or along~~
25 ~~sidewalks unless they are continuous between individual devices and detectable to users of long canes.~~

26 Drums should not be weighted with sand, water, or any material to the extent that would make them
27 hazardous to road users or workers when struck. Drums used in regions susceptible to freezing should have
28 drain holes in the bottom so that water will not accumulate and freeze causing a hazard if struck by a road
29 user.

30 **Standard:**

31 **Ballast shall not be placed on the top of a drum.**

32 **Section ~~6F.63~~ 6F.68 Type ~~I, II, or III~~ 1, 2, or 3 Barricades** Roman numeral designations deleted 33 throughout this Section

34 **Support:**

35 A barricade is a portable or fixed device having from one to three rails with appropriate markings and is
36 used to control road users by closing, restricting, or delineating all or a portion of the right-of-way.

37 As shown in Figure 6F-7, ~~Sheet 2 of 2~~, barricades are classified as ~~either~~ Type 1, Type 2, or Type 3.

38 **Standard:**

39 **Stripes on barricade rails shall be alternating orange and white retroreflective stripes sloping**
40 **downward at an angle of 45 degrees in the direction road users are to pass. Except as ~~noted~~ provided in**
41 **~~the Option Paragraph 4~~, the stripes shall be 6 inches wide.**

42 **Option:**

43 When rail lengths are less than 36 inches, 4-inch wide stripes may be used.

44 **Standard:**

45 **The minimum length for Type 1 and Type 2 Barricades shall be 24 inches, and the minimum length**
46 **for Type 3 Barricades shall be 48 inches. Each barricade rail shall be 8 to 12 inches wide. Barricades**
47 **used on freeways, expressways, and other high-speed roadways shall have a minimum of 270 square**
48 **inches of retroreflective area facing road users.**

49 **Guidance:**

1 Where barricades extend entirely across a roadway, the stripes should slope downward in the direction
2 toward which road users must turn.

3 Where both right and left turns are provided, the barricade stripes should slope downward in both
4 directions from the center of the barricade or barricades.

5 Where no turns are intended, the stripes should be positioned to slope downward toward the center of the
6 barricade or barricades.

7 Barricade rails should be supported in a manner that will allow them to be seen by the road user, and in a
8 manner that provides a stable support that is not easily blown over or displaced.

9 The width of the existing pedestrian facility should be provided for the temporary facility if practical.
10 Traffic control devices and other construction materials and features should not intrude into the usable width
11 of the sidewalk, temporary pathway, or other pedestrian facility. When it is not possible to maintain a
12 minimum width of 60 inches throughout the entire length of the pedestrian pathway, a 60 x 60-inch passing
13 space should be provided at least every 200 feet to allow individuals in wheelchairs to pass.

14 Barricade rail supports should not project into pedestrian circulation routes more than 4 inches from the
15 support between 27 and 80 inches from the surface as described in Section 4.4.1 of the “Americans with
16 Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).

17 Option:

18 For Type 1 Barricades, the support may include other unstriped horizontal ~~panels~~ rails necessary to
19 provide stability.

20 Guidance:

21 ~~Barricades should be crashworthy as they are located adjacent to vehicular traffic flow and are subject to~~
22 ~~impact by errant vehicles.~~

23 On high-speed expressways or in other situations where barricades may be susceptible to overturning in
24 the wind, ballasting should be used.

25 Option:

26 Sandbags may be placed on the lower parts of the frame or the stays of barricades to provide the required
27 ballast.

28 ~~Standard:~~

29 ~~Ballast shall not be placed on top of any striped rail. Barricades shall not be ballasted by~~
30 ~~nondeformable objects such as rocks or chunks of concrete. Ballast shall not extend into the accessible~~
31 ~~passage width of 60 inches.~~

32 Support:

33 Type 1 or Type 2 Barricades are intended for use in situations where road user flow is maintained through
34 the TTC zone.

35 Option:

36 Barricades may be used alone or in groups to mark a specific condition or they may be used in a series for
37 channelizing road users.

38 Type 1 Barricades may be used on conventional roads or urban streets.

39 Guidance:

40 Type 2 or Type 3 Barricades should be used on freeways and expressways or other high-speed roadways.
41 Type 3 Barricades should be used to close or partially close a road.

42 Option:

43 Type 3 Barricades used at a road closure may be placed completely across a roadway or from curb to
44 curb.

45 Guidance:

46 Where provision is made for access of authorized equipment and vehicles, the responsibility for Type 3
47 Barricades should be assigned to a person who will provide proper closure at the end of each work day.

48 Support:

49 When a highway is legally closed but access must still be allowed for local road users, barricades usually
50 are not extended completely across the roadway.

51 **Standard:**

1 A sign (~~see Section 6F.09~~) shall be installed with the appropriate legend concerning permissible use
2 by local road users ([see Section 6F.09](#)). Adequate visibility of the barricades from both directions shall
3 be provided.

4 Option:

5 Signs may be installed on barricades (see Section 6F.03).

6 **Section ~~6F.64~~ [6F.69](#) Direction Indicator Barricades**

7 **Standard:**

8 The Direction Indicator Barricade (see Figure 6F-7, ~~Sheet 2 of 2~~) shall consist of a One-Direction
9 Large Arrow (W1-6) sign mounted above a diagonal striped, horizontally aligned, retroreflective rail.

10 The One-Direction Large Arrow (W1-6) sign shall be black on an orange background. The stripes
11 on the bottom rail shall be alternating orange and white retroreflective stripes sloping downward at an
12 angle of 45 degrees in the direction road users are to pass. The stripes shall be 4 inches wide. The One-
13 Direction Large Arrow (W1-6) sign shall be 24 x 12 inches. The bottom rail shall have a length of 24
14 inches and a height of 8 inches.

15 **Guidance:**

16 ~~The Direction Indicator Barricade, including any associated ballast or lights, should be crashworthy.~~

17 Option:

18 The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific
19 directional guidance to drivers is necessary.

20 Guidance:

21 If used, Direction Indicator Barricades should be used in series to direct the driver through the transition
22 and into the intended travel lane.

23 **Section ~~6F.65~~ [6F.70](#) Temporary Traffic Barriers as Channelizing Devices**

24 Support:

25 Temporary traffic barriers are not TTC devices in themselves; however, when placed in a position
26 identical to a line of channelizing devices and marked and/or equipped with appropriate channelization
27 features to provide guidance and warning both day and night, they serve as TTC devices.

28 **Standard:**

29 Temporary traffic barriers serving as TTC devices shall ~~conform to~~ [comply with](#) requirements for
30 such devices as set forth throughout Part 6.

31 Temporary traffic barriers ([see Section 6F.85](#)) shall not be used solely to channelize road users, but
32 also to protect the work space (~~see Section 6F.81~~). If used to channelize vehicular traffic, the temporary
33 traffic barrier shall be supplemented with delineation, pavement markings, or channelizing devices for
34 improved daytime and nighttime visibility.

35 Guidance:

36 Temporary traffic barriers should not be used for a merging taper except in low-speed urban areas.

37 ~~Temporary traffic barriers should not be used for a constricted/restricted TTC zone.~~

38 When it is necessary to use a temporary traffic barrier for a merging taper in low-speed urban areas or for
39 a constricted/restricted TTC zone, the taper ~~shall be delineated and the taper~~ length should be designed to
40 optimize road user operations considering the available geometric conditions.

41 **Standard:**

42 [When it is necessary to use a temporary traffic barrier for a merging taper in low-speed urban
43 areas or for a constricted/restricted TTC zone, the taper shall be delineated.](#)

44 **Guidance:**

45 When used for channelization, temporary traffic barriers should be of a light color for increased visibility.

46 **Section ~~6F.66~~ [6F.71](#) Longitudinal Channelizing ~~Barricades~~ Devices**

47 Support:

1 Longitudinal channelizing ~~barricades devices~~ are lightweight, deformable ~~channelizing~~ devices that ~~can be~~
2 ~~used singly as Type I, II, or III barricades, or connected so they~~ are highly visible, ~~and~~ have good target value,
3 ~~and can be connected together.~~

4 **Guidance Standard:**

5 ~~When If~~ used ~~as a barricade~~ singly as Type 1, 2, or 3 barricades, longitudinal channelizing
6 ~~barricades devices~~ should shall conform to comply with the general size, color, stripe pattern,
7 retroreflectivity, and placement characteristics established for the devices described in this Chapter 6F.

8 Guidance:

9 If used to channelize vehicular traffic at night, longitudinal channelizing devices should be supplemented
10 with retroreflective material or delineation for improved nighttime visibility.

11 Option:

12 Longitudinal channelizing ~~barricades devices~~ may be used instead of a line of cones, drums, or barricades.

13 Longitudinal channelizing ~~barricades devices~~ may be hollow and filled with water as a ballast.

14 Longitudinal channelizing ~~barricades devices~~ may be used ~~to channelize pedestrians~~ for pedestrian traffic
15 control.

16 **Guidance Standard:**

17 If used for pedestrian traffic control, longitudinal channelizing ~~barricades devices~~ ~~should shall~~ be
18 interlocked to delineate or channelize flow ~~including pedestrian traffic control~~. The interlocking
19 ~~barricade wall devices~~ should shall not have gaps that allow pedestrians ~~or vehicles~~ to stray from the
20 channelizing path.

21 ~~Support:~~

22 ~~Longitudinal channelizing barricades are often located adjacent to traffic and therefore are subject to~~
23 ~~impact by errant vehicles.~~

24 Guidance:

25 ~~Because of their vulnerable position, longitudinal channelizing barricades should be constructed of~~
26 ~~lightweight materials and be crashworthy.~~

27 ~~Although~~ Longitudinal channelizing ~~barricades devices~~ ~~might give the appearance of being formidable~~
28 ~~obstacles, they~~ have not met the crashworthy requirements for temporary traffic barriers and, ~~therefore,~~ should
29 not be used to shield obstacles or provide positive protection for pedestrians, ~~including or~~ workers, ~~from~~
30 ~~vehicle impacts or obstacles.~~

31 **Section 6F.72 Temporary Lane Separators**

32 Option:

33 Temporary lane separators may be used to channelize road users, to divide opposing vehicular traffic
34 lanes, to divide lanes when two or more lanes are open in the same direction, and to provide continuous
35 pedestrian channelization.

36 **Standard:**

37 Temporary lane separators shall be crashworthy. Temporary lane separators shall have a
38 maximum height of 4 inches and a maximum width of 1 foot, and shall have sloping sides in order to
39 facilitate crossover by emergency vehicles.

40 Option:

41 Temporary lane separators may be supplemented with any of the approved channelizing devices contained
42 in this Chapter, such as tubular markers, vertical panels, and opposing traffic lane dividers.

43 **Standard:**

44 If appropriate channelizing devices are used to supplement a temporary lane separator, the
45 channelizing devices shall be retroreflectorized to provide nighttime visibility. If channelizing devices
46 are not used, the temporary lane separator shall contain retroreflectorization to enhance its visibility.

47 Guidance:

48 A temporary lane separator should be stabilized by affixing it to the pavement in a manner suitable to its
49 design, while allowing the unit to be shifted from place to place within the TTC zone in order to accommodate
50 changing conditions.

1 **Standard:**

2 **At pedestrian crossing locations, temporary lane separators shall have an opening or be shortened**
3 **to provide a pathway that is at least 60 inches wide for crossing pedestrians.**

4 **Section ~~6F.67~~ 6F.73 Other Channelizing Devices**

5 Option:

6 Channelizing devices other than those described in this Chapter may be used in special situations based on
7 an engineering study.

8 Guidance:

9 Other channelizing devices should ~~conform to~~ comply with the general size, color, stripe pattern,
10 retroreflection, and placement characteristics established for the devices described in this Chapter.

11 **Section ~~6F.68~~ 6F.74 Detectable Edging for Pedestrians**

12 Support:

13 Individual channelizing devices, tape or rope used to connect individual devices, other discontinuous
14 barriers and devices, and pavement markings are not detectable by persons with visual disabilities and are
15 incapable of providing detectable path guidance on temporary or realigned sidewalks or other pedestrian
16 facilities.

17 Guidance:

18 When it is determined that a facility should be accessible to and detectable by pedestrians with visual
19 disabilities, a continuously detectable edging should be provided throughout the length of the facility such that
20 it can be followed by pedestrians using long canes for guidance. This edging should protrude at least 6 inches
21 above the surface of the sidewalk or pathway, with the bottom of the edging a maximum of 2.5 inches above
22 the surface. This edging should be continuous throughout the length of the facility except for gaps at
23 locations where pedestrians or vehicles will be turning or crossing. This edging should consist of a
24 prefabricated or formed-in-place curbing or other continuous device that is placed along the edge of the
25 sidewalk or walkway. This edging should be firmly attached to the ground or to other devices. Adjacent
26 sections of this edging should be interconnected such that the edging is not displaced by pedestrian or
27 vehicular traffic or work operations, and such that it does not constitute a hazard to pedestrians, workers, or
28 other road users.

29 Support:

30 Examples of detectable edging for pedestrians include:

- 31 A. Prefabricated lightweight sections of plastic, metal, or other suitable materials that are interconnected
32 and fixed in place to form a continuous edge.
- 33 B. Prefabricated lightweight sections of plastic, metal, or other suitable materials that are interconnected,
34 fixed in place, and placed at ground level to provide a continuous connection between channelizing
35 devices located at intervals along the edge of the sidewalk or walkway.
- 36 C. Sections of lumber interconnected and fixed in place to form a continuous edge.
- 37 D. Formed-in-place asphalt or concrete curb.
- 38 E. Prefabricated concrete curb sections that are interconnected and fixed in place to form a continuous
39 edge.
- 40 F. Continuous temporary traffic barrier or longitudinal channelizing barricades placed along the edge of
41 the sidewalk or walkway that provides a pedestrian edging at ground level.
- 42 G. Chain link or other fencing equipped with a continuous bottom rail.

43 Guidance:

44 Detectable pedestrian edging should be orange, white, or yellow and should match the color of the
45 adjacent channelizing devices or traffic control devices, if any are present.

46 **Section ~~6F.69~~ 6F.75 Temporary Raised Islands**

47 **Standard:**

48 **Temporary raised islands shall be used only in combination with pavement striping and other**
49 **suitable channelizing devices.**

50 Option:

1 A temporary raised island may be used to separate vehicular traffic flows in two-lane, two-way operations
2 on roadways having a vehicular traffic volume range of 4,000 to 15,000 average daily traffic (ADT) and on
3 freeways having a vehicular traffic volume range of 22,000 ADT to 60,000 ADT.

4 Temporary raised islands also may be used in other than two-lane, two-way operations where physical
5 separation of vehicular traffic from the TTC zone is not required.

6 Guidance:

7 Temporary raised islands should have the basic dimensions of 4 inches high by at least ~~18~~ 12 inches wide
8 and have rounded or chamfered corners.

9 The temporary raised islands should not be designed in such a manner that they would cause a motorist to
10 lose control of the vehicle if the vehicle inadvertently strikes the temporary raised island. If struck, pieces of
11 the island should not be dislodged to the extent that they could penetrate the occupant compartment or involve
12 other vehicles.

13 **Standard:**

14 **At pedestrian crossing locations, temporary raised islands shall have an opening or be shortened to**
15 **provide at least a 60-inch wide pathway for the crossing pedestrian.**

16 **Section ~~6F.70~~ 6F.76 Opposing Traffic Lane Divider and Sign (W6-4)**

17 Support:

18 Opposing traffic lane dividers are delineation devices used as center lane dividers to separate opposing
19 vehicular traffic on a two-lane, two-way operation.

20 **Standard:**

21 **Opposing traffic lane dividers shall not be placed across pedestrian crossings.**

22 **The Opposing Traffic Lane Divider (W6-4) sign (see Figure 6F-4, ~~Sheet 2 of 4~~) is shall be an**
23 **upright, retroreflective orange-colored sign placed on a flexible support and sized at least 12 inches**
24 **wide by 18 inches high.**

25 **Section ~~6F.74~~ 6F.77 Pavement Markings**

26 Support:

27 ~~The intended vehicle~~ Pavement markings are installed or existing markings are maintained or enhanced in
28 TTC zones to provide road users with a clearly defined path ~~should be defined~~ for travel through the TTC
29 zone in day, night, and twilight periods under both wet and dry pavement conditions.

30 Guidance:

31 The work should be planned and staged to provide for the placement and removal of the pavement
32 markings in a way that minimizes the disruption to traffic flow approaching and through the TTC zone during
33 the placement and removal process.

34 **Standard:**

35 ~~The provisions of this Section shall not be considered applicable for short term, mobile, or incident-~~
36 ~~management TTC zones.~~

37 Existing pavement markings shall be maintained ~~along paved streets and highways~~ in all long ~~and~~
38 ~~intermediate~~-term stationary (see Section 6G.02) TTC zones. ~~All pavement markings shall be in~~
39 ~~accordance with Chapters 3A and 3B, except as~~ otherwise indicated provided for temporary pavement
40 markings in Section 6F.78. Pavement markings shall match the alignment of the markings in place at
41 both ends of the TTC zone. Pavement markings shall be placed along the entire length of any ~~surfaced~~
42 paved detour or temporary roadway prior to the detour or roadway being opened to road users.

43 ~~Warning signs, channelizing devices, and delineation shall be used to indicate required road user~~
44 ~~paths in TTC zones where it is not possible to provide a clear path by pavement markings. All~~
45 ~~pavement markings and devices used to delineate road user paths shall be carefully reviewed during~~
46 ~~daytime and nighttime periods.~~

47 For long-term stationary operations, pavement markings in the temporary traveled way that are no
48 longer applicable shall be removed or obliterated as soon as practical. Pavement marking obliteration
49 shall ~~leave a minimum of pavement scars and shall~~ remove the old non-applicable pavement marking
50 material, and the obliteration method shall minimize pavement scarring. Painting over existing

1 pavement markings with black paint or spraying with asphalt shall not be accepted as a substitute for
2 removal or obliteration.

3 ~~Guidance:~~

4 ~~Road users should be provided pavement markings within a TTC zone comparable to the pavement~~
5 ~~markings normally maintained along such roadways, particularly at either end of the TTC zone.~~

6 ~~Markings should be provided in intermediate-term stationary work zones.~~

7 Option:

8 Removable, non-reflective, preformed tape [that is approximately the same color as the pavement surface](#)
9 may be used where markings need to be covered temporarily.

10 **Section ~~6F.72~~ [6F.78](#) Temporary Pavement Markings**

11 Support:

12 Temporary ~~pavement~~ markings are those [pavement markings or devices](#) that are ~~allowed to remain in~~
13 ~~place until the earliest date when it is practical and possible to install pavement markings that meet the Part 3~~
14 ~~standards for pavement markings~~ [placed within TTC zones to provide road users with a clearly defined path of](#)
15 [travel through the TTC zone when the permanent markings are either removed or obliterated during the work](#)
16 [activities. Temporary markings are typically needed during the reconstruction of a road while it is open to](#)
17 [traffic, such as overlays or surface treatments or where lanes are temporarily shifted on pavement that is to](#)
18 [remain in place.](#)

19 Guidance:

20 [Unless justified based on engineering judgment,](#) temporary pavement markings should not ~~be remain~~ in
21 place for more than ~~2-weeks~~ [14 days after the application of the pavement surface treatment or the](#)
22 [construction of the final pavement surface on new roadways or over existing pavements](#) ~~unless justified by an~~
23 ~~engineering study.~~

24 The temporary use of edge lines, channelizing lines, lane-reduction transitions, gore markings, and other
25 longitudinal markings, and the various non-longitudinal markings (such as stop lines, railroad crossings,
26 crosswalks, words, ~~or~~ symbols, [or arrows](#)) should be in accordance with the State's or highway agency's
27 policy.

28 **Standard:**

29 **Warning signs, channelizing devices, and delineation shall be used to indicate required road user**
30 **paths in TTC zones where it is not possible to provide a clear path by pavement markings.** **relocated**
31 **from Section 6F.71**

32 [Except as otherwise provided in this Section,](#) all temporary pavement markings, ~~including~~
33 ~~pavement markings~~ for no-passing zones, shall ~~conform to~~ [comply with](#) the requirements of Chapters
34 3A and 3B. All temporary broken-line pavement markings shall use the same cycle length as
35 permanent markings and ~~be~~ [shall have line segments that are](#) at least 2 feet long.

36 [Guidance:](#)

37 All pavement markings and devices used to delineate road user paths ~~shall~~ [should](#) be ~~carefully~~
38 during daytime and nighttime periods. **relocated from Section 6F.71**

39 Option:

40 Half-cycle lengths with a minimum of 2-foot stripes may be used on roadways with severe curvature (see
41 Section 3A.06) for [broken line](#) ~~centerlines~~ [center lines](#) in passing zones and for lane lines.

42 For temporary situations of ~~3 14 calendar~~ days or less, for a two- or three-lane road, no-passing zones may
43 be identified by using DO NOT PASS (R4-1), PASS WITH CARE (R4-2), and NO PASSING ZONE (W14-
44 3) signs (see Sections 2B.28, 2B.29, and 2C.45) rather than pavement markings. Also, DO NOT PASS, PASS
45 WITH CARE, and NO PASSING ZONE signs may be used instead of pavement markings on roads with low
46 volumes for longer periods in accordance with the State's or highway agency's policy.

47 Guidance:

48 If used, the DO NOT PASS, PASS WITH CARE, and NO PASSING ZONE signs should be placed in
49 accordance with Sections 2B.28, 2B.29, and 2C.45.

50 [If used, the NO CENTER LINE sign should be placed in accordance with Section 6F.47.](#)

51 **Section ~~6F.73~~ [6F.79](#) Temporary Raised Pavement Markers**

1 Option:

2 Retroreflective or internally illuminated raised pavement markers, or non-retroreflective raised pavement
3 markers supplemented by retroreflective or internally illuminated markers, may be substituted for markings of
4 other types in TTC zones.

5 **Standard:**

6 If used, the color and pattern of the raised pavement markers shall simulate the color and pattern
7 of the markings for which they substitute.

8 If temporary raised pavement markers are used to substitute for broken line segments, ~~at least two~~
9 ~~retroreflective markers shall be placed, one at each end of a segment of 2 to 5 feet in length. For~~
10 ~~segments longer than 5 feet,~~ a group of at least three retroreflective markers shall be equally spaced at
11 no greater than N/8 (see Section 3B.14). The value of N for a broken or dotted line shall equal the
12 length of one line segment plus one gap.

13 If temporary raised pavement markers are used to substitute for solid lines, the markers shall be
14 equally spaced at no greater than N/4, with retroreflective or internally illuminated units at a spacing
15 no greater than N/2. The value of N referenced for solid lines shall equal the N for the broken or dotted
16 lines that might be adjacent to or might extend the solid lines (see Sections 3B.11 ~~and 3B.14~~).

17 Option:

18 Temporary raised pavement markers may be used to substitute for broken line segments by using at least
19 two retroreflective markers placed at each end of a segment of 2 to 5 feet in length, using the same cycle
20 length as permanent markings.

21 **Guidance:**

22 Temporary raised pavement markers used on 2- to 5-foot segments to substitute for broken line segments
23 should not be in place for more than 14 days unless justified by engineering judgment.

24 Raised pavement markers should be considered for use along surfaced detours or temporary roadways,
25 and other changed or new travel-lane alignments.

26 **Option:**

27 Retroreflective or internally illuminated raised pavement markers, or non-retroreflective raised pavement
28 markers supplemented by retroreflective or internally illuminated markers, may ~~replace or~~ also be used in
29 TTC zones to supplement markings as prescribed in Chapters 3A and 3B.

30 **Section ~~6F.74~~ 6F.80 Delineators**

31 **Standard:**

32 **When used, delineators shall combine with or supplement other TTC devices. They shall be**
33 **mounted on crashworthy supports so that the reflecting unit is approximately 4 feet above the near**
34 **roadway edge. The standard color for delineators used along both sides of two-way streets and**
35 **highways and the right-hand side of one-way roadways shall be white. Delineators used along the left-**
36 **hand side of one-way roadways shall be yellow.**

37 **Guidance:**

38 Spacing along roadway curves should be as set forth in Section 3F.04 and should be such that several
39 delineators are ~~always~~ constantly visible to the driver.

40 **Option:**

41 Delineators may be used in TTC zones to indicate the alignment of the roadway and to outline the
42 required vehicle path through the TTC zone.

43 **Section ~~6F.75~~ 6F.81 Lighting Devices**

44 **Guidance:**

45 Lighting devices should be provided in TTC zones based on engineering judgment.

46 When used to supplement channelization, the maximum spacing for warning lights should be identical to
47 the channelizing device spacing requirements.

48 **Support:**

49 ~~Four types of lighting devices are commonly used in TTC zones. They are floodlights, flashing warning~~
50 ~~beacons, warning lights, and steady-burn electric lamps.~~

1 Option:

2 Lighting devices may be used to supplement retroreflectorized signs, barriers, and channelizing devices.
3 During normal daytime maintenance operations, the functions of flashing warning beacons may be
4 provided by high-intensity rotating, flashing, oscillating, or strobe lights on a maintenance vehicle.

5 **Standard:**

6 **Although vehicle hazard warning lights are permitted to be used to supplement high-intensity**
7 **rotating, flashing, oscillating, or strobe lights, they shall not be used instead of high-intensity rotating,**
8 **flashing, oscillating, or strobe lights.**

9 **Section ~~6F.76~~ 6F.82 Floodlights**

10 Support:

11 Utility, maintenance, or construction activities on highways are frequently conducted during nighttime
12 periods when vehicular traffic volumes are lower. Large construction projects are sometimes operated on a
13 double-shift basis requiring night work (see Section 6G.19).

14 Guidance:

15 When nighttime work is being performed, floodlights should be used to illuminate the work area,
16 equipment crossings, and other areas.

17 **Standard:**

18 **Except in emergency situations, flagger stations shall be illuminated at night.**

19 **Floodlighting shall not produce a disabling glare condition for approaching road users, flaggers, or**
20 **workers.**

21 Guidance:

22 The adequacy of the floodlight placement and elimination of potential glare should be determined by
23 driving through and observing the floodlighted area from each direction on all approaching roadways after the
24 initial floodlight setup, at night, and periodically.

25 Support:

26 Desired illumination levels vary depending upon the nature of the task involved. An average horizontal
27 luminance of 5 foot candles can be adequate for general activities. Tasks requiring high levels of precision
28 and extreme care can require an average horizontal luminance of 20 foot candles.

29 ~~**Section 6F.77 Flashing Warning Beacons**~~

30 ~~Support:~~

31 ~~Flashing warning beacons are often used to supplement a TTC device.~~

32 ~~**Standard:**~~

33 ~~**Flashing warning beacons shall comply with the provisions of Chapter 4K. A flashing warning**~~
34 ~~**beacon shall be a flashing yellow light with a minimum nominal diameter of 8 inches.**~~

35 ~~Guidance:~~

36 ~~Flashing warning beacons should be operated 24 hours per day.~~

37 ~~Support:~~

38 ~~The temporary terminus of a freeway is an example of a location where flashing warning beacons alert~~
39 ~~drivers to the changing roadway conditions and the need to reduce speed in transitioning from the freeway to~~
40 ~~another roadway type.~~

41 **Section ~~6F.78~~ 6F.83 Warning Lights**

42 Support:

43 Type A, Type B, Type C, and Type D 360-degree warning lights are portable, powered, yellow, lens-
44 directed, enclosed lights.

45 **Standard:**

46 **Warning lights shall be in accordance with the current ITE “Purchase Specification for Flashing**
47 **and Steady-Burn Warning Lights” (see Section 1A.11).**

1 **When warning lights are used, they shall be mounted on signs or channelizing devices in a manner**
2 **that, if hit by an errant vehicle, they will not be likely to penetrate the windshield.**

3 Guidance:

4 The maximum spacing for warning lights should be identical to the channelizing device spacing
5 requirements.

6 Support:

7 The light weight and portability of warning lights are advantages that make these devices useful as
8 supplements to the retroreflectorization on signs and channelizing devices. The flashing lights are effective in
9 attracting road users' attention.

10 Option:

11 Warning lights may be used in either a steady-burn or flashing mode.

12 **Standard:**

13 Except for the sequential flashing warning lights that are described in Paragraphs 8 and 9, flashing
14 warning lights shall not be used for delineation, as a series of flashers fails to identify the desired vehicle
15 path.

16 Option:

17 A series of sequential flashing warning lights may be placed on channelizing devices that form a merging
18 taper in order to increase driver detection and recognition of the merging taper.

19 **Standard:**

20 If a series of sequential flashing warning lights is used, the successive flashing of the lights shall
21 occur from the upstream end of the merging taper to the downstream end of the merging taper in order
22 to identify the desired vehicle path. Each flashing warning light in the sequence shall be flashed at a
23 rate of not less than 55 or more than 75 times per minute.

24 Type A Low-Intensity Flashing warning lights, Type C Steady-Burn warning lights, and Type D
25 360-degree Steady-Burn warning lights shall be maintained so as to be capable of being visible on a
26 clear night from a distance of 3,000 feet. Type B High-Intensity Flashing warning lights shall be
27 maintained so as to be capable of being visible on a sunny day when viewed without the sun directly on
28 or behind the device from a distance of 1,000 feet.

29 Warning lights shall have a minimum mounting height of 30 inches to the bottom of the lens.

30 Support:

31 Type A Low-Intensity Flashing warning lights are used to warn road users during nighttime hours that
32 they are approaching or proceeding in a potentially hazardous area.

33 Option:

34 Type A warning lights may be mounted on channelizing devices.

35 Support:

36 Type B High-Intensity Flashing warning lights are used to warn road users during both daylight and
37 nighttime hours that they are approaching a potentially hazardous area.

38 Option:

39 Type B warning lights are designed to operate 24 hours per day and may be mounted on advance warning
40 signs or on independent supports.

41 Type C Steady-Burn warning lights and Type D 360-degree Steady-Burn warning lights may be used
42 during nighttime hours to delineate the edge of the traveled way.

43 Guidance:

44 When used to delineate a curve, Type C and Type D 360-degree warning lights should only be used on
45 devices on the outside of the curve, and not on the inside of the curve.

46 ~~Section 6F.79 Steady-Burn Electric Lamps~~

47 ~~Support:~~

48 ~~Steady-Burn electric lamps are a series of low-wattage, yellow, electric lamps, generally hard-wired to a~~
49 ~~110-volt external power source.~~

50 ~~Option:~~

~~Steady-Burn electric lamps may be used in place of Type C Steady-Burn warning lights (see Section 6F.78).~~

Section ~~6F.80~~ **6F.84** Temporary Traffic Control Signals

Standard:

Temporary traffic control signals (see Section 4D.32) used to control road user movements through TTC zones and in other TTC situations shall ~~meet~~ comply with the applicable provisions of Part 4.

Support:

Temporary traffic control signals are typically used in TTC zones such as temporary haul road crossings; temporary one-way operations along a one-lane, two-way highway; temporary one-way operations on bridges, reversible lanes, and intersections.

Standard:

~~One-lane, two-way vehicular traffic flow (see Chapter 4G) requires an all-red interval of sufficient duration for road users to clear the portion of the TTC zone controlled by the traffic control signals. Safeguards shall be incorporated to avoid the possibility of conflicting signal indications at each end of the TTC zone.~~ A temporary traffic control signal that is used to control traffic through a one-lane, two-way section of roadway shall comply with the provisions of Section 4H.02.

Guidance:

Where pedestrian traffic is detoured to a temporary traffic control signal, engineering judgment should be used to determine if pedestrian signals or accessible pedestrian signals (see Section 4E.09) are needed for crossing along an alternate route.

When temporary traffic control signals are used, conflict monitors typical of traditional traffic control signal operations should be used.

Option:

Temporary traffic control signals may be portable or temporarily mounted on fixed supports.

~~Standard:~~

~~The supports for temporary traffic control signals shall not encroach into the minimum required width of a "pedestrian access route" of 48 inches or an "alternate circulation path" of 36 inches.~~

Guidance:

Temporary traffic control signals should only be used in situations where temporary traffic control signals are preferable to other means of traffic control, such as changing the work staging or work zone size to eliminate one-way vehicular traffic movements, using flaggers to control one-way or crossing movements, using STOP or YIELD signs, and using warning devices alone.

Support:

Factors related to the design and application of temporary traffic control signals include the following:

- A. Safety and road user needs;
- B. Work staging and operations;
- C. The feasibility of using other TTC strategies (for example, flaggers, providing space for two lanes, or detouring road users, including bicyclists and pedestrians);
- D. Sight distance restrictions;
- E. Human factors considerations (for example, lack of driver familiarity with temporary traffic control signals);
- F. Road-user volumes including roadway and intersection capacity;
- G. Affected side streets and driveways;
- H. Vehicle speeds;
- I. The placement of other TTC devices;
- J. Parking;
- K. Turning restrictions;
- L. Pedestrians;
- M. The nature of adjacent land uses (such as residential or commercial);
- N. Legal authority;
- O. Signal phasing and timing requirements;
- P. Full-time or part-time operation;

- 1 Q. Actuated, fixed-time, or manual operation;
- 2 R. Power failures or other emergencies;
- 3 S. Inspection and maintenance needs;
- 4 T. Need for detailed placement, timing, and operation records; and
- 5 U. Operation by contractors or by others.

6 Although temporary traffic control signals can be mounted on trailers or lightweight portable supports,
7 fixed supports offer superior resistance to displacement or damage by severe weather, vehicle impact, and
8 vandalism.

9 Guidance:

10 Other TTC devices should be used to supplement temporary traffic control signals, including warning and
11 regulatory signs, pavement markings, and channelizing devices.

12 Temporary traffic control signals not in use should be covered or removed.

13 ~~The design and placement of temporary traffic control signals should include interconnection to other~~
14 ~~traffic control signals along the subject roadway. If a temporary traffic control signal is located within 1/2~~
15 ~~mile of an adjacent traffic control signal, consideration should be given to interconnected operation.~~ paragraph
16 **relocated**

17 **Standard:**

18 Temporary traffic control signals shall not be located within 200 feet of a grade crossing unless the
19 temporary traffic control signal is provided with preemption in accordance with Section 4D.27, or
20 unless a uniformed officer or flagger is provided at the crossing to prevent vehicles from stopping
21 within the crossing.

22 **Section ~~6F.84~~ 6F.85 Temporary Traffic Barriers**

23 Support:

24 Temporary traffic barriers, including shifting portable or movable barriers, are devices designed to help
25 prevent penetration by vehicles while minimizing injuries to vehicle occupants, and ~~are designed~~ to protect
26 workers, bicyclists, and pedestrians.

27 The four primary functions of temporary traffic barriers are:

- 28 A. To keep vehicular traffic from entering work areas, such as excavations or material storage sites;
- 29 B. To separate workers, bicyclists, and pedestrians from motor vehicle traffic;
- 30 C. To separate opposing directions of vehicular traffic; and
- 31 D. To separate vehicular traffic, bicyclists, and pedestrians from the work area such as false work for
32 bridges and other exposed objects.

33 Option:

34 Temporary traffic barriers, ~~including shifting portable or movable barrier installations to accommodate~~
35 ~~varying directional vehicular traffic demands~~, may be used to separate two-way vehicular traffic.

36 Guidance:

37 Because the protective requirements of a TTC situation have priority in determining the need for
38 temporary traffic barriers, their use should be based on an engineering study. ~~When serving the additional~~
39 ~~function of channelizing vehicular traffic (see Section 6F.65), temporary traffic barriers should be a light color~~
40 ~~for increased visibility.~~

41 **Standard:**

42 **Temporary traffic barriers shall be supplemented with standard delineation, pavement markings,**
43 **or channelizing devices for improved daytime and nighttime visibility if they are used to channelize**
44 **vehicular traffic. The delineation color shall match the applicable pavement marking color.**

45 Temporary traffic barriers, including their end treatments, shall be crashworthy. In order to
46 mitigate the effect of striking the upstream end of a temporary traffic barrier, the end shall be installed
47 in accordance with AASHTO's "Roadside Design Guide" (see Section 1A.11) by flaring until the end is
48 outside the acceptable clear zone or by providing crashworthy end treatments.

49 Option:

50 Warning lights or steady-burn ~~electric~~ lamps may be mounted on temporary traffic barrier installations.

51 Support:

~~A movable barrier is a linear system of connected barrier segments that can rapidly be shifted laterally by using a specially designed transfer vehicle. The transfer is accomplished in a manner that does not interfere with vehicular traffic in adjacent lanes. Applications of movable barriers include the following:~~

- ~~A. Closing an additional lane during work periods while maintaining the advantage of having the traveled way separated from the work space by a barrier;~~
- ~~B. Closing an additional lane during off-peak periods to provide extra space for work activities without adversely impacting vehicular traffic flow; and~~
- ~~C. Creating a temporary reversible lane, thus providing unbalanced capacity favoring the major direction of vehicular traffic flow.~~

Movable barriers are capable of being repositioned laterally using a transfer vehicle that travels along the barrier. Movable barriers enable short-term closures to be installed and removed on long-term projects. Providing a barrier-protected work space for short-term closures and providing unbalanced flow to accommodate changes in the direction of peak-period traffic flows are two of the advantages of using movable barriers.

Figure 6H-45 shows a temporary reversible lane using movable barriers. The notable feature of the movable barrier is that in both Phase A and Phase B, the lanes used by opposing traffic are separated by a barrier.

Figure 6H-34 shows an exterior lane closure using a temporary traffic barrier. Notes 7 through 9 address the option of using a movable barrier. By using a movable barrier, the barrier can be positioned to close the lane during the off-peak periods and can be relocated to open the lane during peak periods to accommodate peak traffic flows. With one pass of the transfer vehicle, the barrier can be moved out of the lane and onto the shoulder. Furthermore, if so desired, with a second pass of the transfer vehicle, the barrier could be moved to the roadside beyond the shoulder.

More specific information on the use of temporary traffic barriers is contained in Chapters 8 and 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11).

Section ~~6F.82~~ 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.

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.

1 Guidance:

2 The shadow truck should be positioned a sufficient distance in advance of the workers or equipment being
3 protected so that there will be sufficient distance, but not so much so that errant vehicles will travel around the
4 shadow truck and strike the protected workers and/or equipment.

5 Support:

6 Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11) contains additional information
7 regarding the use of shadow vehicles.

8 Guidance:

9 If used, the truck-mounted attenuator should be used in accordance with the manufacturer's specifications.

10 ~~Section 6F.83~~ Vehicle Arresting Systems

11 ~~Support:~~

12 ~~Vehicle arresting systems are designed to prevent penetration into activity areas while providing for~~
13 ~~smooth, reasonably safe deceleration for the errant vehicles. They can consist of portable netting, cables, and~~
14 ~~energy-absorbing anchors.~~

15 ~~Guidance:~~

16 ~~When used, a vehicle arresting system should be used in accordance with the manufacturer's~~
17 ~~specifications, and should be located so that vehicles are not likely to penetrate the location that the system is~~
18 ~~designed to protect.~~

19 ~~Section 6F.84~~ 6F.87 Rumble Strips

20 Support:

21 Transverse rumble strips consist of intermittent, narrow, transverse areas of rough-textured or slightly
22 raised or depressed road surface that extend across the travel lanes to alert drivers to unusual vehicular traffic
23 conditions. Through noise and vibration they attract the driver's attention to such features as unexpected
24 changes in alignment and to conditions requiring a stop.

25 Longitudinal rumble strips consist of a series of rough-textured or slightly raised or depressed road
26 surfaces located along the shoulder to alert road users that they are leaving the travel lanes.

27 **Standard:**

28 **If it is desirable to use a color other than the color of the pavement for a longitudinal rumble strip,**
29 **the color of the rumble strip shall be the same color as the longitudinal line the rumble strip**
30 **supplements.**

31 **If the color of a transverse rumble strip used within a travel lane is not the color of the pavement,**
32 **the color of the rumble strip shall be white, black, or orange.**

33 Option:

34 Intervals between transverse rumble strips may be reduced as the distance to the approached conditions is
35 diminished in order to convey an impression that a closure speed is too fast and/or that an action is imminent.
36 A sign warning drivers of the onset of rumble strips may be placed in advance of any transverse rumble strip
37 installation.

38 Guidance:

39 Transverse rumble strips should be placed transverse to vehicular traffic movement. They should not
40 adversely affect overall pavement skid resistance under wet or dry conditions.

41 In urban areas, even though a closer spacing might be warranted, transverse rumble strips should be
42 designed in a manner that does not promote unnecessary braking or erratic steering maneuvers by road users.

43 Transverse rumble strips should not be placed on sharp horizontal or vertical curves.

44 Rumble strips should not be placed through pedestrian crossings or on bicycle routes.

45 Transverse rumble strips should not be placed on roadways used by bicyclists unless a minimum clear
46 path of 4 feet is provided at each edge of the roadway or on each paved shoulder as described in AASHTO's
47 "Guide to the Development of Bicycle Facilities" (see Section 1A.11).

48 Longitudinal rumble strips should not be placed on the shoulder of a roadway that is used by bicyclists
49 unless a minimum clear path of 4 feet is also provided on the shoulder.

1 **Section ~~6F.85~~ 6F.88 Screens**

2 Support:

3 Screens are used to block the road users' view of activities that can be distracting. Screens might improve
4 safety and motor vehicle traffic flow where volumes approach the roadway capacity because they discourage
5 gawking and reduce headlight glare from oncoming motor vehicle traffic.

6 Guidance:

7 Screens should not be mounted where they could adversely restrict road user visibility and sight distance
8 and adversely affect the reasonably safe operation of vehicles.

9 Option:

10 Screens may be mounted on the top of temporary traffic barriers that separate two-way motor vehicle
11 traffic.

12 Guidance:

13 Design of screens should be in accordance with Chapter 9 of AASHTO's "Roadside Design Guide" (see
14 Section 1A.11).

15 **~~Section 6F.86~~ Future and Experimental Devices**

16 ~~Support:~~

17 ~~The States, FHWA, AASHTO, the Transportation Research Board, and other organizations conduct~~
18 ~~research and experimentation on new traffic control and safety devices. Users of this Manual are encouraged~~
19 ~~to stay abreast of these current efforts and to use such devices with care so as to avoid presenting road users~~
20 ~~with unusual or confusing situations that might be abnormal or unexpected.~~

21 ~~Standard:~~

22 ~~New traffic control devices shall conform to the provisions for design, use, and application set forth~~
23 ~~in this Manual. New traffic control devices that do not conform with the provisions in this Manual shall~~
24 ~~be subject to experimentation, documentation, and adoption following the provisions of Section 1A.10.~~

CHAPTER 6G. TYPE OF TEMPORARY TRAFFIC CONTROL ZONE ACTIVITIES

Section 6G.01 Typical Applications

~~Support:~~

~~Whenever the acronym “TTC” is used in this Chapter, it refers to “temporary traffic control.”~~

~~Standard:~~

~~The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.~~

Support:

Each TTC zone is different. Many variables, such as location of work, highway type, geometrics, vertical and horizontal alignment, intersections, interchanges, road user volumes, road vehicle mix (buses, trucks, and cars), and road user speeds affect the needs of each zone. The goal of TTC in work zones is safety with minimum disruption to road users. The key factor in promoting TTC zone safety is proper judgment.

Typical applications (TAs) of TTC zones are organized according to duration, location, type of work, and highway type. Table 6H-1 is an index of these typical applications. These typical applications include the use of various TTC methods, but do not include a layout for every conceivable work situation.

[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.

Option:

Other devices may be added to supplement the devices shown in the typical applications, while others may be deleted. The sign spacings and taper lengths may be increased to provide additional time or space for driver response.

Support:

Decisions regarding the selection of the most appropriate typical application to use as a guide for a specific TTC zone require an understanding of each situation. Although there are many ways of categorizing TTC zone applications, the four factors mentioned earlier (work duration, work location, work type, and highway type) are used to characterize the typical applications illustrated in Chapter 6H.

Section 6G.02 Work Duration

Support:

~~Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.~~

Work duration is a major factor in determining the number and types of devices used in TTC zones. The duration of a TTC zone is defined relative to the length of time a work operation occupies a spot location.

Standard:

The five categories of work duration and their time at a location shall be:

- A. Long-term stationary is work that occupies a location more than 3 days.**
- B. Intermediate-term stationary is work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour.**
- C. Short-term stationary is daytime work that occupies a location for more than 1 hour within a single daylight period.**
- D. Short duration is work that occupies a location up to 1 hour.**
- E. Mobile is work that moves intermittently or continuously.**

Support:

1 At long-term stationary TTC zones, there is ample time to install and realize benefits from the full range
2 of TTC procedures and devices that are available for use. Generally, larger channelizing devices, temporary
3 roadways, and temporary traffic barriers are used.

4 **Standard:**

5 **Since long-term operations extend into nighttime, retroreflective and/or illuminated devices shall be**
6 **used in long-term stationary TTC zones.**

7 Guidance:

8 Inappropriate markings in long-term stationary TTC zones should be removed and replaced with
9 temporary markings.

10 Support:

11 In intermediate-term stationary TTC zones, it might not be feasible or practical to use procedures or
12 devices that would be desirable for long-term stationary TTC zones, such as altered pavement markings,
13 temporary traffic barriers, and temporary roadways. The increased time to place and remove these devices in
14 some cases could significantly lengthen the project, thus increasing exposure time. ~~In other instances, there~~
15 ~~might be insufficient pay-back time to economically justify more elaborate TTC measures.~~

16 **Standard:**

17 **Since intermediate-term operations extend into nighttime, retroreflective and/or illuminated devices**
18 **shall be used in intermediate-term stationary TTC zones.**

19 Support:

20 Most maintenance and utility operations are short-term stationary work.

21 As compared to stationary operations, mobile and short-duration operations are activities that might
22 involve different treatments. Devices having greater mobility might be necessary such as signs mounted on
23 trucks. Devices that are larger, more imposing, or more visible can be used effectively and economically.
24 The mobility of the TTC zone is important.

25 ~~Maintaining reasonably safe work and road user conditions is a paramount goal in carrying out mobile~~
26 ~~operations.~~

27 Guidance:

28 Safety in short-duration or mobile operations should not be compromised by using fewer devices simply
29 because the operation will frequently change its location.

30 Option:

31 Appropriately colored or marked vehicles with high-intensity rotating, flashing, oscillating, or strobe
32 lights may be used in place of signs and channelizing devices for short-duration or mobile operations. These
33 vehicles may be augmented with signs or arrow ~~panels~~ boards.

34 Support:

35 During short-duration work, it often takes longer to set up and remove the TTC zone than to perform the
36 work. Workers face hazards in setting up and taking down the TTC zone. Also, since the work time is short,
37 delays affecting road users are significantly increased when additional devices are installed and removed.

38 Option:

39 Considering these factors, simplified control procedures may be warranted for short-duration work. A
40 reduction in the number of devices may be offset by the use of other more dominant devices such as high-
41 intensity rotating, flashing, oscillating, or strobe lights on work vehicles.

42 Support:

43 Mobile operations often involve frequent short stops for activities such as litter cleanup, pothole patching,
44 or utility operations, and are similar to short-duration operations.

45 Guidance:

46 Warning signs, and high-intensity rotating, flashing, oscillating, or strobe lights should be used on ~~a~~ the
47 vehicle, vehicles that are participating in ~~flags, and/or channelizing devices should be used and moved~~
48 ~~periodically to keep them near~~ the mobile work area.

49 Option:

50 Flags and/or channelizing devices may additionally be used and moved periodically to keep them near the
51 mobile work area.

1 Flaggers may be used for mobile operations that often involve frequent short stops.

2 Support:

3 Mobile operations also include work activities where workers and equipment move along the road without
4 stopping, usually at slow speeds. The advance warning area moves with the work area.

5 Guidance:

6 When mobile operations are being performed, a shadow vehicle equipped with an arrow ~~panel~~ board or a
7 sign should follow the work vehicle, especially when vehicular traffic speeds or volumes are high. Where
8 feasible, warning signs should be placed along the roadway and moved periodically as work progresses.

9 Under high-volume conditions, consideration should be given to scheduling mobile operations work
10 during off-peak hours.

11 If there are mobile operations on a high-speed travel lane of a multi-lane divided highway, arrow ~~panels~~
12 boards should be used.

13 **Standard:**

14 **Mobile operations ~~that move at speeds greater than 20 mph, such as pavement marking operations,~~**
15 **shall have appropriate devices on the equipment (that is, high-intensity rotating, flashing, oscillating, or**
16 **strobe lights, signs, or special lighting), or shall use a separate vehicle with appropriate warning devices.**

17 Option:

18 For mobile operations that move at speeds ~~of~~ less than 3 mph, mobile signs or stationary signing that is
19 periodically retrieved and repositioned in the advance warning area may be used.

20 ~~At higher speeds, vehicles may be used as components of the TTC zones for mobile operations.==~~
21 ~~Appropriately colored and marked vehicles with signs, flags, high intensity rotating, flashing, oscillating, or~~
22 ~~strobe lights, truck-mounted attenuators, and arrow panels or portable changeable message signs may follow a~~
23 ~~train of moving work vehicles.~~

24 ~~For some continuously moving operations, such as street sweeping and snow removal, a single work~~
25 ~~vehicle with appropriate warning devices on the vehicle may be used to provide warning to approaching road~~
26 ~~users.~~

27 **Section 6G.03 Location of Work**

28 Support:

29 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow
30 when pedestrian or bicycle facilities are affected by the worksite.

31 The choice of TTC needed for a TTC zone depends upon where the work is located. As a general rule,
32 the closer the work is to road users (including bicyclists and pedestrians), the greater the number of TTC
33 devices that are needed. Procedures are described later in this Chapter for establishing TTC zones in the
34 following locations:

- 35 A. Outside the shoulder,
- 36 B. On the shoulder with no encroachment,
- 37 C. On the shoulder with minor encroachment,
- 38 D. Within the median, and
- 39 E. Within the traveled way.

40 **Standard:**

41 **When the work space is within the traveled way, except for short-duration and mobile operations,**
42 **advance warning shall provide a general message that work is taking place and shall supply**
43 **information about highway conditions. TTC devices shall indicate how vehicular traffic can move**
44 **through the TTC zone.**

45 **Section 6G.04 Modifications To Fulfill Special Needs**

46 Support:

47 ~~Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow~~
48 ~~when pedestrian or bicycle facilities are affected by the worksite.~~

49 The typical applications in Chapter 6H illustrate commonly encountered situations in which TTC devices
50 are employed.

1 Option:

2 Other devices may be added to supplement the devices ~~indicated~~ [provided](#) in the typical applications, and
3 device spacing may be adjusted to provide additional reaction time. When conditions are less complex than
4 those depicted in the typical applications, fewer devices may be needed.

5 Guidance:

6 When conditions are more complex, typical applications should be modified by giving particular attention
7 to the provisions set forth in Chapter 6B and by incorporating appropriate devices and practices from the
8 following list:

9 A. Additional devices:

- 10 1. Signs
- 11 2. Arrow ~~panels~~ [boards](#)
- 12 3. More channelizing devices at closer spacing (see Section 6F.74 for information regarding
13 detectable edging for pedestrians)
- 14 4. Temporary raised pavement markers
- 15 5. High-level warning devices
- 16 6. Portable changeable message signs
- 17 7. Temporary traffic control signals (including pedestrian signals and accessible pedestrian signals)
- 18 8. Temporary traffic barriers
- 19 9. Crash cushions
- 20 10. Screens
- 21 11. Rumble strips
- 22 12. More delineation

23 B. Upgrading of devices:

- 24 1. A full complement of standard pavement markings
- 25 2. Brighter and/or wider pavement markings
- 26 3. Larger and/or brighter signs
- 27 4. Channelizing devices with greater conspicuity
- 28 5. Temporary traffic barriers in place of channelizing devices

29 C. Improved geometrics at detours or crossovers

30 D. Increased distances:

- 31 1. Longer advance warning area
- 32 2. Longer tapers

33 E. Lighting:

- 34 1. Temporary roadway lighting
- 35 2. Steady-burn lights used with channelizing devices
- 36 3. Flashing lights for isolated hazards
- 37 4. Illuminated signs
- 38 5. Floodlights

39 [F. Pedestrian routes and temporary facilities](#)

40 [G. Bicycle diversions and temporary facilities](#)

41 ~~Where pedestrian or bicycle usage is high, typical applications should also be modified by giving~~
42 ~~particular attention to the provisions set forth in Chapter 6D, Section 6F.68, and other Sections of Part 6~~
43 ~~related to accessibility and detectability provisions in TTC zones.~~

44 **Section 6G.05 Work Affecting Pedestrian and Bicycle Facilities**

45 Support:

46 It is not uncommon, particularly in urban areas, that road work and the associated TTC will affect existing
47 pedestrian or bicycle facilities. It is essential that the needs of all road users, including pedestrians with
48 disabilities, are considered in TTC zones.

49 In addition to specific provisions identified in Sections 6G.06, ~~6G.07, 6G.08, 6G.10, 6G.11, 6G.12, and~~
50 [through](#) 6G.14, there are a number of provisions that might be applicable for all of the types of activities
51 identified in this Chapter.

52 Guidance:

1 Where pedestrian or bicycle usage is high, the typical applications should be modified by giving particular
2 attention to the provisions set forth in Chapters 6D, ~~and 6G~~ [this Chapter](#), Section 6F.74, and in other Sections
3 of Part 6 related to accessibility and detectability provisions in TTC zones.

4 Pedestrians should be separated from the worksite by appropriate devices that maintain the accessibility
5 and detectability for pedestrians with disabilities.

6 Bicyclists and pedestrians should not be exposed to unprotected excavations, open utility access,
7 overhanging equipment, or other such conditions.

8 Except for short duration and mobile operations, when a highway shoulder is occupied, a SHOULDER
9 WORK ([W21-5](#)) sign should be placed in advance of the activity area. When work is performed on a paved
10 shoulder 8 feet or more in width, channelizing devices should be placed on a taper having a length that
11 conforms to the requirements of a shoulder taper. Signs should be placed such that they do not narrow any
12 existing pedestrian passages to less than 48 inches.

13 Pedestrian detours should be avoided since pedestrians rarely observe them and the cost of providing
14 accessibility and detectability might outweigh the cost of maintaining a continuous route. Whenever possible,
15 work should be done in a manner that does not create a need to detour pedestrians from existing routes or
16 crossings.

17 **Standard:**

18 **Where pedestrian routes are closed, alternate pedestrian routes shall be provided.**

19 **When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary**
20 **facilities shall be detectable and shall include accessibility features consistent with the features present**
21 **in the existing pedestrian facility.**

22 **Section 6G.06 Work Outside of [the Shoulder](#)**

23 Support:

24 ~~Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow~~
25 ~~when pedestrian or bicycle facilities are affected by the worksite.~~

26 When work is being performed off the roadway (beyond the shoulders, but within the right-of-way), little
27 or no TTC might be needed. TTC generally is not needed where work is confined to an area 15 feet or more
28 from the edge of the traveled way. However, TTC is appropriate where distracting situations exist, such as
29 vehicles parked on the shoulder, vehicles accessing the worksite via the highway, and equipment traveling on
30 or crossing the roadway to perform the work operations (for example, mowing). For work beyond the
31 shoulder, see Figure 6H-1.

32 Guidance:

33 Where the ~~above~~ situations [described in Paragraph 1](#) exist, a single warning sign, such as ROAD WORK
34 AHEAD ([W20-1](#)), should be used. If the equipment travels on the roadway, the equipment should be
35 equipped with appropriate flags, high-intensity rotating, flashing, oscillating, or strobe lights, and/or a SLOW
36 MOVING VEHICLE ([W21-4](#)) sign.

37 Option:

38 If work vehicles are on the shoulder, a SHOULDER WORK ([W21-5](#)) sign may be used. For mowing
39 operations, the sign MOWING AHEAD ([W21-8](#)) may be used.

40 Where the activity is spread out over a distance of more than 2 miles, the SHOULDER WORK ([W21-5](#))
41 sign may be repeated every 1 mile.

42 A supplementary plaque with the message NEXT XX MILES ([W7-3aP](#)) may be used.

43 Guidance:

44 A general warning sign like ROAD MACHINERY AHEAD ([W21-3](#)) should be used if workers and
45 equipment must occasionally move onto the shoulder.

46 **Section 6G.07 Work on the Shoulder with No Encroachment**

47 Support:

48 ~~Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow~~
49 ~~when pedestrian or bicycle facilities are affected by the worksite.~~

50 The provisions of this Section apply to short-term through long-term stationary operations.

1 **Standard:**

2 **When paved shoulders having a width of 8 feet or more are closed, at least one advance warning**
3 **sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to**
4 **delineate the beginning of the work space and direct motor vehicle traffic to remain within the traveled**
5 **way.**

6 Guidance:

7 When paved shoulders having a width of 8 feet or more are closed on freeways and expressways, road
8 users should be warned about potential disabled vehicles that cannot get off the traveled way. An initial
9 general warning sign, such as ROAD WORK AHEAD (W20-1), should be used, followed by a RIGHT or
10 LEFT SHOULDER CLOSED (W21-5a) sign. Where the downstream end of the shoulder closure extends
11 beyond the distance which that can be perceived by road users, a supplementary plaque bearing the message
12 NEXT XX FEET (W16-4P) or MILES (W7-3aP) should be placed below the SHOULDER CLOSED (W21-
13 5a) sign. On multi-lane, divided highways, signs advising of shoulder work or the condition of the shoulder
14 should be placed only on the side of the affected shoulder.

15 When an improved shoulder is closed on a high-speed roadway, it should be treated as a closure of a
16 portion of the road system because road users expect to be able to use it in emergencies. Road users should be
17 given ample advance warning that shoulders are closed for use as refuge areas throughout a specified length of
18 the approaching TTC zone. The sign(s) should read SHOULDER CLOSED (W21-5a) with distances
19 indicated. The work space on the shoulder should be closed off by a taper or channelizing devices with a
20 length of 1/3 L using the formulas in Tables 6C-3 and 6C-4.

21 When the shoulder is not occupied but work has adversely affected its condition, the LOW SHOULDER
22 (W8-9) or SOFT SHOULDER (W8-4) sign should be used, as appropriate.

23 Where the condition extends over a distance in excess of 1 mile, the sign should be repeated at 1-mile
24 intervals.

25 Option:

26 In addition, a supplementary plaque bearing the message NEXT XX MILES (W7-3aP) may be used.
27 Temporary traffic barriers may be needed to inhibit encroachment of errant vehicles into the work space and
28 to protect workers.

29 **Standard:**

30 **When used for shoulder work, arrow panels boards shall operate only in the caution mode.**

31 Support:

32 A typical application for stationary work operations on shoulders is shown in Figure 6H-3. Short duration
33 or mobile work on shoulders is shown in Figure 6H-4. Work on freeway shoulders is shown in Figure 6H-5.

34 **Section 6G.08 Work on the Shoulder with Minor Encroachment**

35 Support:

36 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow
37 when pedestrian or bicycle facilities are affected by the worksite.

38 Guidance:

39 When work takes up part of a lane, vehicular traffic volumes, vehicle mix (buses, trucks, cars, and
40 bicycles), speed, and capacity should be analyzed to determine whether the affected lane should be closed.
41 Unless the lane encroachment permits a remaining lane width of 10 feet, the lane should be closed.

42 Truck off-tracking should be considered when determining whether the minimum lane width of 10 feet is
43 adequate.

44 Option:

45 A lane width of 9 feet may be used for short-term stationary work on low-volume, low-speed roadways
46 when vehicular traffic does not include longer and wider heavy commercial vehicles.

47 Support:

48 Figure 6H-6 illustrates a method for handling vehicular traffic where the stationary or short duration work
49 space encroaches slightly into the traveled way.

50 **Section 6G.09 Work Within the Median**

1 Support:

2 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow
3 when pedestrian or bicycle facilities are affected by the worksite.

4 Guidance:

5 If work in the median of a divided highway is within 15 feet from the edge of the traveled way for either
6 direction of travel, TTC should be used through the use of advance warning signs and channelizing devices.

7 **Section 6G.10 Work Within the Traveled Way of a Two-Lane Highway**

8 Support:

9 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow
10 when pedestrian or bicycle facilities are affected by the worksite.

11 Detour signs are used to direct road users onto another roadway. At diversions, road users are directed
12 onto a temporary roadway or alignment placed within or adjacent to the right-of-way. Typical applications
13 for detouring or diverting road users on two-lane highways are shown in Figures 6H-7, 6H-8, and 6H-9.
14 Figure 6H-7 illustrates the controls around an area where a section of roadway has been closed and a diversion
15 has been constructed. Channelizing devices and pavement markings are used to indicate the transition to the
16 temporary roadway.

17 Guidance:

18 When a detour is long, Detour (M4-8, M4-9) signs should be installed to remind and reassure road users
19 periodically that they are still successfully following the detour.

20 When an entire roadway is closed, as illustrated in Figure 6H-8, a detour should be provided and road
21 users should be warned in advance of the closure, which in this example is a closure 10 miles from the
22 intersection. If local road users are allowed to use the roadway up to the closure, the ROAD CLOSED
23 AHEAD, LOCAL TRAFFIC ONLY (R11-3a) sign should be used. The portion of the road open to local road
24 users should have adequate signing, marking, and delineation.

25 Detours should be signed so that road users will be able to traverse the entire detour route and back to the
26 original roadway as shown in Figure 6H-9.

27 Support:

28 Techniques for controlling vehicular traffic under one-lane, two-way conditions are described in Section
29 6C.10.

30 Option:

31 Flaggers may be used as shown in Figure 6H-10.

32 STOP/YIELD sign control may be used on roads with low traffic volumes as shown in Figure 6H-11.

33 A temporary traffic control signal may be used as shown in Figure 6H-12.

34 **Section 6G.11 Work Within the Traveled Way of an Urban Street**

35 Support:

36 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow
37 when pedestrian or bicycle facilities are affected by the worksite.

38 In urban TTC zones, decisions are needed on how to control vehicular traffic, such as how many lanes are
39 required, whether any turns need to be prohibited at intersections, and how to maintain access to business,
40 industrial, and residential areas.

41 Pedestrian traffic needs separate attention. Chapter 6D contains information regarding pedestrian
42 movements near TTC zones.

43 **Standard:**

44 ~~If the TTC zone affects the movement of pedestrians, adequate pedestrian access and walkways~~
45 ~~shall be provided. If the TTC zone affects an accessible and detectable pedestrian facility, the~~
46 ~~accessibility and detectability shall be maintained along the alternate pedestrian route.~~ relocated to
47 **Section 6D.01**

48 **If the TTC zone affects the movement of bicyclists, adequate access to the roadway or shared-use**
49 **paths shall be provided (see Part 9).**

1 **Where transit stops are affected or relocated because of work activity, both pedestrian and**
2 **vehicular access to ~~temporary~~ the affected or relocated transit stops shall be provided.**

3 Guidance:

4 If a designated bicycle route is closed because of the work being done, a signed alternate route should be
5 provided. Bicyclists should not be directed onto the path used by pedestrians.

6 Worksites within the intersection should be protected against inadvertent pedestrian incursion by
7 providing detectable channelizing devices.

8 Support:

9 Utility work takes place both within and outside the roadway to construct and maintain services such as
10 power, gas, light, water, or telecommunications. Operations often involve intersections, since that is where
11 many of the network junctions occur. The work force is usually small, only a few vehicles are involved, and
12 the number and types of TTC devices placed in the TTC zone is usually minimal.

13 **Standard:**

14 **All TTC devices shall be retroreflective or illuminated if utility work is performed during nighttime**
15 **hours.**

16 Guidance:

17 As discussed under short-duration projects, however, the reduced number of devices in utility work zones
18 should be offset by the use of high-visibility devices, such as high-intensity rotating, flashing, oscillating, or
19 strobe lights on work vehicles or high-level warning devices.

20 Support:

21 Figures 6H-6, 6H-10, 6H-15, 6H-18, 6H-21, 6H-22, 6H-23, 6H-26, and 6H-33 are examples of typical
22 applications for utility operations. Other typical applications might apply as well.

23 **Section 6G.12 Work Within the Traveled Way of a Multi-Lane, Non-Access Controlled** 24 **Highways**

25 Support:

26 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow
27 when pedestrian or bicycle facilities are affected by the worksite.

28 Work on multi-lane (two or more lanes of moving motor vehicle traffic in one direction) highways is
29 divided into right-lane closures, left-lane closures, interior-lane closures, multiple-lane closures, and closures
30 on five-lane roadways.

31 **Standard:**

32 **When a lane is closed on a multi-lane road for other than a mobile operation, a transition area**
33 **containing a merging taper shall be used.**

34 Guidance:

35 When justified by an engineering study, temporary traffic barriers ([see Section 6F.70](#)) should be used to
36 prevent incursions of errant vehicles into hazardous areas or work space.

37 ~~**Standard:**~~

38 ~~**When temporary traffic barriers are placed immediately adjacent to the traveled way, they shall be**~~
39 ~~**equipped with appropriate channelizing devices, delineation, and/or other TTC devices. For lane**~~
40 ~~**closures, the merging taper shall use channelizing devices and the temporary traffic barrier shall be**~~
41 ~~**placed beyond the transition area.**~~

42 Support:

43 ~~**It must be recognized that although temporary traffic barriers are shown in several of the typical**~~
44 ~~**applications of Chapter 6H, they are not considered to be TTC devices in themselves.**~~

45 Figure 6H-34 illustrates a lane closure in which temporary traffic barriers are used.

46 Option:

47 When the right lane is closed, TTC similar to that shown in Figure 6H-33 may be used for undivided or
48 divided four-lane roads.

49 Guidance:

1 If morning and evening peak hour vehicular traffic volumes in the two directions are uneven and the
2 greater volume is on the side where the work is being done in the right-hand lane, consideration should be
3 given to closing the inside lane for opposing vehicular traffic and making the lane available to the side with
4 heavier vehicular traffic, as shown in Figure 6H-31.

5 If the larger vehicular traffic volume changes to the opposite direction at a different time of the day, the
6 TTC should be changed to allow two lanes for opposing vehicular traffic by moving the devices from the
7 opposing lane back to the ~~centerline~~ center line. When it is necessary to create a temporary ~~centerline~~ center
8 line that is not consistent with the pavement markings, channelizing devices should be used and closely
9 spaced.

10 Option:

11 When closing a left lane on a multi-lane undivided road, as vehicular traffic flow permits, the two interior
12 lanes may be closed, as shown in Figure 6H-30, to provide drivers and workers additional lateral clearance
13 and to provide access to the work space.

14 **Standard:**

15 **When only the left lane is closed on undivided roads, channelizing devices shall be placed along the**
16 **~~centerline~~ center line as well as along the adjacent lane.**

17 Guidance:

18 When an interior lane is closed, an adjacent lane should also be considered for closure to provide
19 additional space for vehicles and materials and to facilitate the movement of equipment within the work space.

20 When multiple lanes in one direction are closed, a capacity analysis should be made to determine the
21 number of lanes needed to accommodate motor vehicle traffic needs. Vehicular traffic should be moved over
22 one lane at a time. As shown in Figure 6H-37, the tapers should be separated by a distance of 2L, with L
23 being determined by the formulas in Tables 6C-3 and 6C-4.

24 Option:

25 If operating speeds are 40 mph or less and the space approaching the work area does not permit moving
26 traffic over one lane at a time, a single continuous taper may be used.

27 **Standard:**

28 **When a directional roadway is closed, inapplicable WRONG WAY signs and markings, and other**
29 **existing traffic control devices at intersections within the temporary two-lane, two-way operations**
30 **section shall be covered, removed, or obliterated.**

31 Option:

32 When half the road is closed on an undivided highway, both directions of vehicular traffic may be
33 accommodated as shown in Figure 6H-32. When both interior lanes are closed, temporary traffic controls
34 may be used as ~~indicated~~ provided in Figure 6H-30. When a roadway must be closed on a divided highway, a
35 median crossover may be used (see Section 6G.16).

36 Support:

37 TTC for lane closures on five-lane roads is similar to other multi-lane undivided roads. Figure 6H-32 can
38 be adapted for use on five-lane roads. Figure 6H-35 can be used on a five-lane road for short duration and
39 mobile operations.

40 **Section 6G.13 Work Within the Traveled Way at an Intersection**

41 Support:

42 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow
43 when pedestrian or bicycle facilities are affected by the worksite.

44 The typical applications for intersections are classified according to the location of the work space with
45 respect to the intersection area (as defined by the extension of the curb or edge lines). The three
46 classifications are near side, far side, and in-the-intersection. Work spaces often extend into more than one
47 portion of the intersection. For example, work in one quadrant often creates a near-side work space on one
48 street and a far-side work space on the cross street. In such instances, an appropriate TTC plan is obtained by
49 combining features shown in two or more of the intersection and pedestrian typical applications.

50 TTC zones in the vicinity of intersections might block movements and interfere with normal road user
51 flows. Such conflicts frequently occur at more complex signalized intersections having such features as traffic

1 signal heads over particular lanes, lanes allocated to specific movements, multiple signal phases, signal
2 detectors for actuated control, and accessible pedestrian signals and detectors.

3 Guidance:

4 The effect of the work upon signal operation should be considered, [and temporary corrective actions](#)
5 [should be taken, if necessary](#), such as [revising](#) signal phasing [and/or timing](#) ~~for ensuring to provide~~ adequate
6 capacity, maintaining or adjusting signal detectors, and ~~ensuring relocating the appropriate visibility of~~ signal
7 heads [to provide adequate visibility as described in Part 4](#).

8 **Standard:**

9 **When work will occur near an intersection where operational, capacity, or pedestrian accessibility**
10 **problems are anticipated, the highway agency having jurisdiction shall be contacted.**

11 Guidance:

12 For work at an intersection, advance warning signs, devices, and markings should be used on all cross
13 streets, as appropriate. The typical applications depict urban intersections on arterial streets. Where the
14 posted speed limit, the off-peak 85th-percentile speed prior to the work starting, or the anticipated speed
15 exceeds 40 mph, additional warning signs should be used in the advance warning area.

16 Pedestrian crossings near TTC sites should be separated from the worksite by appropriate barriers that
17 maintain the accessibility and detectability for pedestrians with disabilities.

18 Support:

19 Near-side work spaces, as depicted in Figure 6H-21, are simply handled as a midblock lane closure. A
20 problem that might occur with near-side lane closure is a reduction in capacity, which during certain hours of
21 operation could result in congestion and backups.

22 Option:

23 When near-side work spaces are used, an exclusive turn lane may be used for through vehicular traffic.

24 Where space is restricted in advance of near-side work spaces, as with short block spacings, two warning
25 signs may be used in the advance warning area, and a third action-type warning or a regulatory sign (such as
26 Keep Left) may be placed within the transition area.

27 Support:

28 Far-side work spaces, as depicted in Figures 6H-22 through 6H-25, involve additional treatment because
29 road users typically enter the activity area by straight-through and left- or right-turning movements.

30 Guidance:

31 When a lane through an intersection must be closed on the far side, it should also be closed on the near-
32 side approach to preclude merging movements within the intersection.

33 Option:

34 If there are a significant number of vehicles turning from a near-side lane that is closed on the far side, the
35 near-side lane may be converted to an exclusive turn lane.

36 Support:

37 Figures 6H-26 and 6H-27 provide guidance on applicable procedures for work performed within the
38 intersection.

39 Option:

40 If the work is within the intersection, any of the following strategies may be used:

- 41 A. A small work space so that road users can move around it, as shown in Figure 6H-26;
- 42 B. Flaggers or uniformed law enforcement officers to direct road users, as shown in Figure 6H-27;
- 43 C. Work in stages so the work space is kept to a minimum; and
- 44 D. Road closures or upstream diversions to reduce road user volumes.

45 Guidance:

46 Depending on road user conditions, a flagger(s) and/or a uniformed law enforcement officer(s) should be
47 used to control road users.

48 **Section 6G.14 Work Within the Traveled Way of ~~a~~ Freeways ~~and~~ or Expressways**

49 Support:

1 Problems of TTC might occur under the special conditions encountered where vehicular traffic must be
2 moved through or around TTC zones on high-speed, high-volume roadways. Although the general principles
3 outlined in the previous Sections of this Manual are applicable to all types of highways, high-speed, access-
4 controlled highways need special attention in order to ~~reasonably safely and efficiently~~ accommodate
5 vehicular traffic while also protecting ~~work forces~~ road users and workers. The road user volumes, road
6 vehicle mix (buses, trucks, cars, and bicycles, if permitted), and speed of vehicles on these facilities require
7 that careful TTC procedures be implemented, for example, to induce critical merging maneuvers well in
8 advance of work spaces and in a manner that creates minimum turbulence and delay in the vehicular traffic
9 stream. These situations often require more conspicuous devices than specified for normal rural highway or
10 urban street use. However, the same important basic considerations of uniformity and standardization of
11 general principles apply for all roadways.

12 Work under high-speed, high-volume vehicular traffic on a controlled access highway is complicated by
13 the roadway design and operational features. The presence of a median that establishes separate roadways for
14 directional vehicular traffic flow might prohibit the closing of one of the roadways or the diverting of
15 vehicular traffic to the other roadway. Lack of access to and from adjacent roadways prohibits rerouting of
16 vehicular traffic away from the work space in many cases. Other conditions exist where work must be limited
17 to night hours, thereby necessitating increased use of warning lights, illumination of work spaces, and advance
18 warning systems.

19 TTC for a typical lane closure on a divided highway is shown in Figure 6H-33. Temporary traffic
20 controls for short duration and mobile operations on freeways are shown in Figure 6H-35. A typical
21 application for shifting vehicular traffic lanes around a work space is shown in Figure 6H-36. TTC for
22 multiple and interior lane closures on a freeway is shown in Figures 6H-37 and 6H-38.

23 Guidance:

24 The method for closing an interior lane when the open lanes have the capacity to carry vehicular traffic
25 should be as shown in Figure 6H-37. When the capacity of the other lanes is needed, the method shown in
26 Figure 6H-38 should be used.

27 **Section 6G.15 Two-Lane, Two-Way Traffic on One Roadway of a Normally Divided Highway**

28 Support:

29 Two-lane, two-way operation on one roadway of a normally divided highway is a typical procedure that
30 requires special consideration in the planning, design, and work phases, because unique operational problems
31 (for example, increasing the risk of head-on crashes) can arise with the two-lane, two-way operation.

32 **Standard:**

33 **When two-lane, two-way traffic control must be maintained on one roadway of a normally divided**
34 **highway, opposing vehicular traffic shall be separated with either temporary traffic barriers (concrete**
35 **safety-shape or approved alternate), ~~or with~~ channelizing devices, or a temporary raised island**
36 **throughout the length of the two-way operation. The use of markings and complementary signing, by**
37 **themselves, shall not be used.**

38 Support:

39 Figure 6H-39 shows the procedure for two-lane, two-way operation. Treatments for entrance and exit
40 ramps within the two-way roadway segment of this type of work are shown in Figures 6H-40 and 6H-41.

41 **Section 6G.16 Crossovers**

42 Guidance:

43 The following are considered good guiding principles for the design of crossovers:

- 44 A. Tapers for lane drops should be separated from the crossovers, as shown in Figure 6H-39.
- 45 B. Crossovers should be designed for speeds no lower than 10 mph below the posted speed, the off-peak
46 85th-percentile speed prior to the work starting, or the anticipated operating speed of the roadway,
47 unless unusual site conditions require that a lower design speed be used.
- 48 C. A good array of channelizing devices, delineators, and full-length, properly placed pavement
49 markings should be used to provide drivers with a clearly defined travel path.
- 50 D. The design of the crossover should accommodate all vehicular traffic, including trucks and buses.

51 Support:

1 Temporary traffic barriers and the excessive use of TTC devices cannot compensate for poor geometric
2 and roadway cross-section design of crossovers.

3 **Section 6G.17 Interchanges**

4 Guidance:

5 Access to interchange ramps on limited-access highways should be maintained even if the work space is
6 in the lane adjacent to the ramps. Access to exit ramps should be clearly marked and delineated with
7 channelizing devices. For long-term projects, conflicting pavement markings should be removed and new
8 ones placed. Early coordination with officials having jurisdiction over the affected cross streets and providing
9 emergency services should occur before ramp closings.

10 Option:

11 If access is not possible, ramps may be closed by using signs and Type ~~III~~ 3 Barricades. As the work
12 space changes, the access area may be changed, as shown in Figure 6H-42. A TTC zone in the exit ramp may
13 be handled as shown in Figure 6H-43.

14 When a work space interferes with an entrance ramp, a lane may need to be closed on the freeway (see
15 Figure 6H-44). A TTC zone in the entrance ramp may require shifting ramp vehicular traffic (see Figure 6H-
16 44).

17 ~~Section 6G.18 Movable Barriers~~

18 ~~Support:~~

19 ~~Figure 6H-45 shows a temporary reversible lane using movable barriers.~~

20 ~~Option:~~

21 ~~If the work activity in Figure 6H-34 permits, a movable barrier may be used and relocated to the shoulder~~
22 ~~during nonwork periods or peak period vehicular traffic conditions.~~

23 ~~Section 6G.19~~ **6G.18 Work in the Vicinity of a Highway-Rail Grade Crossings**

24 **Standard:**

25 When ~~highway-rail~~ grade crossings exist either within or in the vicinity of a TTC zone, lane
26 restrictions, flagging, or other operations shall not create conditions where vehicles can be queued
27 across the ~~railroad~~ tracks. If the queuing of vehicles across the tracks cannot be avoided, a uniformed
28 law enforcement officer or flagger shall be provided at the crossing to prevent vehicles from stopping on
29 the tracks, even if automatic warning devices are in place.

30 Support:

31 Figure 6H-46 shows work in the vicinity of a ~~highway-rail~~ grade crossing.

32 [Section 8A.08 contains additional information regarding temporary traffic control zones in the vicinity of](#)
33 [grade crossings.](#)

34 Guidance:

35 Early coordination with the railroad company [or light rail transit agency](#) should occur before work starts.

36 ~~Section 6G.20~~ **6G.19 Temporary Traffic Control During Nighttime Hours**

37 Support:

38 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow
39 when pedestrian or bicycle facilities are affected by the worksite.

40 Conducting highway construction and maintenance activities during night hours could provide an
41 advantage when traditional daytime traffic control strategies cannot achieve an acceptable balance between
42 worker and public safety, traffic and community impact, and constructability. The two basic advantages of
43 working at night are reduced traffic congestion and less involvement with business activities. However, the
44 two basic conditions that must normally be met for night work to offer any advantage are reduced traffic
45 volumes and easy set up and removal of the traffic control patterns on a nightly basis.

46 Shifting work activities to night hours, when traffic volumes are lower and normal business is less active,
47 might offer an advantage in some cases, as long as the necessary work can be completed and the worksite
48 restored to essentially normal operating conditions to carry the higher traffic volume during non-construction
49 hours.

1 Although working at night might offer advantages, it also includes safety issues. Reduced visibility
2 inherent in night work impacts the performance of both drivers and workers. Because traffic volumes are
3 lower and congestion is minimized, speeds are often higher at night necessitating greater visibility at a time
4 when visibility is reduced. Finally, the incidence of impaired (alcohol or drugs), fatigued, or drowsy drivers
5 might be higher at night.

6 Working at night also involves other factors, including construction productivity and quality, social
7 impacts, economics, and environmental issues. A decision to perform construction or maintenance activities
8 at night normally involves some consideration of the advantages to be gained compared to the safety and other
9 issues that might be impacted.

10 Guidance:

11 Considering the safety issues inherent to night work, consideration should be given to enhancing traffic
12 controls (see Section 6G.04) to provide added visibility and driver guidance, and increased protection for
13 workers.

14 In addition to the enhancements listed in Section 6G.04, consideration should be given to providing
15 additional lights and retroreflective markings to workers, work vehicles, and equipment.

16 Option:

17 Where reduced traffic volumes at night make it feasible, the entire roadway may be closed by detouring
18 traffic to alternate facilities, thus removing the traffic risk from the activity area.

19 Guidance:

20 ~~Because typical street and highway lighting is rarely adequate to provide sufficient levels of illumination~~
21 ~~for work tasks, temporary lighting should be provided where workers are active to supply sufficient~~
22 ~~illumination to reasonably safely perform the work tasks.~~

23 ~~Temporary lighting for night work should be designed such that glare does not interfere with driver~~
24 ~~visibility, or create visibility problems for truck drivers, equipment operators, flaggers, or other workers.~~

25 Consideration should ~~also~~ be given to stationing uniformed law enforcement officers and lighted patrol
26 cars at night work locations where there is a concern that high speeds or impaired drivers might result in
27 undue risks for workers or other drivers.

28 **Standard:**

29 **Except in emergencies, temporary lighting shall be provided at all flagger stations.**

30 Support:

31 Desired illumination levels vary depending upon the nature of the task involved. An average horizontal
32 luminance of 5 foot candles can be adequate for general activities. An average horizontal luminance of 10
33 foot candles can be adequate for activities around equipment. Tasks requiring high levels of precision and
34 extreme care can require an average horizontal luminance of 20 foot candles.

CHAPTER 6H. TYPICAL APPLICATIONS

Section 6H.01 Typical Applications

~~Support:~~

~~Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control."~~

~~Standard:~~

~~The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.~~

Support:

Chapter 6G contains discussions of typical TTC activities. [This](#) Chapter ~~6H~~ presents typical applications for a variety of situations commonly encountered. While not every situation is addressed, the information illustrated can generally be adapted to a broad range of conditions. In many instances, an appropriate TTC plan is achieved by combining features from various typical applications. For example, work at an intersection might present a near-side work zone for one street and a far-side work zone for the other street. These treatments are found in two different typical applications, while a third typical application shows how to handle pedestrian crosswalk closures. For convenience in using the typical application diagrams, Tables 6C-1 and 6C-4 are reproduced in this Chapter as Tables 6H-3 and 6H-4, respectively.

Procedures for establishing TTC zones vary with such conditions as road configuration, location of the work, work activity, duration of work, road user volumes, road vehicle mix (buses, trucks, cars, motorcycles, and bicycles), and road user speeds. ~~Examples are presented in this Chapter showing how to apply principles and standards. Applying these guidelines to actual situations and adjusting to field conditions requires judgment.~~

In general, the procedures illustrated represent minimum solutions for the situations depicted. [Except for the notes \(which are clearly classified using headings as being Standard, Guidance, Option, or Support\), the information presented in the typical applications can generally be regarded as Guidance.](#)

Option:

Other devices may be added to supplement the devices and device spacing may be adjusted to provide additional reaction time or delineation. Fewer devices may be used based on field conditions.

Support:

Figures and tables found throughout Part 6 provide information for the development of TTC plans. Also, Table 6H-3 is used for the determination of sign spacing and other dimensions for various area and roadway types.

Table 6H-1 is an index of the 46 typical applications. Typical applications are shown on the right-hand page with notes on the facing page to the left. The legend for the symbols used in the typical applications is provided in Table 6H-2. In many of the typical applications, sign spacings and other dimensions are indicated by letters using the criteria provided in Table 6H-3. The formulas for determining taper lengths are provided in Table 6H-4.

Most of the typical applications show TTC devices for only one direction.

1 **Notes for Figure 6H-1—Typical Application 1**

2 **Work Beyond ~~the~~ a Shoulder**

3 **Guidance:**

- 4 1. If the work space is in the median of a divided highway, an advance warning sign should also be
5 placed on the left side of the directional roadway.

6 **Option:**

- 7 2. The ROAD WORK AHEAD sign may be replaced with other appropriate signs such as the
8 SHOULDER WORK sign. The SHOULDER WORK sign may be used for work adjacent to the
9 shoulder.
10 3. The ROAD WORK AHEAD sign may be omitted where the work space is behind a barrier, more than
11 24 inches behind the curb, or 15 feet or more from the edge of any roadway.
12 4. For short-term, short duration or mobile operation, all signs and channelizing devices may be
13 eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is
14 used.
15 5. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing,
16 oscillating, or strobe lights.

17 **Standard:**

- 18 **6. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating,**
19 **flashing, oscillating, or strobe lights.**

1 **Notes for Figure 6H-2—Typical Application 2**

2 **Blasting Zone**

3 **Standard:**

- 4 1. Whenever blasting caps are used within 1,000 feet of a roadway, the signing shown shall be
5 used.
- 6 2. The signs shall be covered or removed when there are no explosives in the area or the area is
7 otherwise secure.
- 8 3. Whenever a side road intersects the roadway between the **BLASTING ZONE AHEAD** sign and
9 the **END BLASTING ZONE** sign, or a side road is within 1,000 feet of any blasting cap, similar
10 signing, as on the mainline, shall be installed on the side road.
- 11 4. Prior to blasting, the blaster in charge shall determine whether road users in the blasting zone
12 will be endangered by the blasting operation. If there is danger, road users shall not be
13 permitted to pass through the blasting zone during blasting operations.

14 **Guidance:**

- 15 5. On a divided highway, the signs should be mounted on both sides of the directional roadways.

1 **Notes for Figure 6H-3—Typical Application 3**

2 **Work on Shoulders**

3 **Guidance:**

- 4 1. A SHOULDER WORK sign should be placed on the left side of the roadway for a divided or one-
5 way street only if the left shoulder is affected.

6 **Option:**

- 7 2. The Workers symbol signs may be used instead of SHOULDER WORK signs.
8 3. The SHOULDER WORK AHEAD sign on an intersecting roadway may be omitted where drivers
9 emerging from that roadway will encounter another advance warning sign prior to this activity area.
10 4. For short duration operations of 60 minutes or less, all signs and channelizing devices may be
11 eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is
12 used.
13 5. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing,
14 oscillating, or strobe lights.

15 **Standard:**

- 16 **6. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating,**
17 **flashing, oscillating, or strobe lights.**
18 **7. When paved shoulders having a width of 8 feet or more are closed, at least one advance warning**
19 **sign shall be used. In addition, channelizing devices shall be used to close the shoulder in**
20 **advance to delineate the beginning of the work space and direct vehicular traffic to remain**
21 **within the traveled way.**

1 **Notes for Figure 6H-4—Typical Application 4**
2 **Short Duration or Mobile Operation on a Shoulder**

3 **Guidance:**

- 4 1. In those situations where multiple work locations within a limited distance make it practical to place
5 stationary signs, the distance between the advance warning sign and the work should not exceed 5
6 miles.
7 2. In those situations where the distance between the advance signs and the work is 2 miles to 5 miles, a
8 Supplemental Distance plaque should be used with the ROAD WORK AHEAD sign.

9 **Option:**

- 10 3. The ROAD WORK NEXT XX MILES sign may be used instead of the ROAD WORK AHEAD sign
11 if the work locations occur over a distance of more than 2 miles.
12 4. Stationary warning signs may be omitted for short duration or mobile operations if the work vehicle
13 displays high-intensity rotating, flashing, oscillating, or strobe lights.
14 ~~5. Warning signs may be omitted when the work vehicle displays high-intensity rotating, flashing,~~
15 ~~oscillating, or strobe lights if the distance between work locations is 1 mile or more, and if the work~~
16 ~~vehicle travels at vehicular traffic speeds between locations.~~
17 5. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing,
18 oscillating, or strobe lights.

19 **Standard:**

- 20 6. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating,
21 flashing, oscillating, or strobe lights.
22 7. If an arrow ~~panel~~ board is used for an operation on the shoulder, the caution mode shall be
23 used.
24 8. Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by
25 equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from
26 view when work is not in progress.

1 **Notes for Figure 6H-5—Typical Application 5**

2 **Shoulder Closure on a Freeway**

3 **Guidance:**

- 4 1. SHOULDER CLOSED signs should be used on limited-access highways where there is no
5 opportunity for disabled vehicles to pull off the roadway.
6 2. If drivers cannot see a pull-off area beyond the closed shoulder, information regarding the length of
7 the shoulder closure should be provided in feet or miles, as appropriate.
8 3. The use of a temporary traffic barrier should be based on engineering judgment.

9 **Standard:**

- 10 4. ~~Where~~ Temporary traffic barriers, if used, ~~are installed, the ends of the barrier shall be treated~~
11 ~~in accordance~~ comply with the provisions of Section 6F.85.

12 **Option:**

- 13 5. The barrier shown in this typical application is an example of one method that may be used to close a
14 shoulder of a long-term project.
15 6. The warning lights shown on the barrier may be used.

1 **Notes for Figure 6H-6—Typical Application 6**
2 **Shoulder Work with Minor Encroachment**

3 **Guidance:**

- 4 1. All lanes should be a minimum of 10 feet in width as measured to the near face of the channelizing
5 devices.
6 2. The treatment shown should be used on a minor road having low speeds. For higher-speed traffic
7 conditions, a lane closure should be used.

8 **Option:**

- 9 3. For short-term use on low-volume, low-speed roadways with vehicular traffic that does not include
10 longer and wider heavy commercial vehicles, a minimum lane width of 9 feet may be used.
11 4. Where the opposite shoulder is suitable for carrying vehicular traffic and of adequate width, lanes
12 may be shifted by use of closely-spaced channelizing devices, provided that the minimum lane width
13 of 10 feet is maintained.
14 5. Additional advance warning may be appropriate, such as a ROAD NARROWS sign.
15 6. Temporary traffic barriers may be used along the work space.
16 7. The shadow vehicle may be omitted if a taper and channelizing devices are used.
17 8. A truck-mounted attenuator may be used on the shadow vehicle.
18 9. For short-duration work, the taper and channelizing devices may be omitted if a shadow vehicle with
19 activated high-intensity rotating, flashing, oscillating, or strobe lights is used.
20 10. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing,
21 oscillating, or strobe lights.

22 **Standard:**

- 23 11. Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by
24 equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from
25 view when work is not in progress.
26 12. Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe
27 lights.
28 **13. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating,**
29 **flashing, oscillating, or strobe lights.**

1 **Notes for Figure 6H-7—Typical Application 7**
2 **Road Closure with a Diversion**

3 Support:

- 4 1. Signs and object markers are shown for one direction of travel only.

5 **Standard:**

- 6 2. **Devices similar to those depicted shall be placed for the opposite direction of travel.**
7 3. **Pavement markings no longer applicable to the traffic pattern of the roadway shall be removed**
8 **or obliterated ~~as soon as practicable~~ before any new traffic patterns are open to traffic.**
9 4. **Temporary barriers and end treatments shall be crashworthy.**

10 Guidance:

- 11 5. If the tangent distance along the temporary diversion is more than 600 feet, a Reverse Curve sign, left
12 first, should be used instead of the Double Reverse Curve sign, and a second Reverse Curve sign,
13 right first, should be placed in advance of the second reverse curve back to the original alignment.
14 6. When the tangent section of the diversion is more than 600 feet, and the diversion has sharp curves
15 with recommended speeds of 30 mph or less, Reverse Turn signs should be used.
16 7. Where the temporary pavement and old pavement are different colors, the temporary pavement should
17 start on the tangent of the existing pavement and end on the tangent of the existing pavement.

18 Option:

- 19 8. Flashing warning lights and/or flags may be used to call attention to the warning signs.
20 9. On sharp curves, large arrow signs may be used in addition to other advance warning signs.
21 10. Delineators or channelizing devices may be used along the diversion.


1 **Notes for Figure 6H-8—Typical Application 8**

2 **Road Closure with [an](#) Off-Site Detour**

3 Guidance:

- 4 1. Regulatory traffic control devices should be modified as needed for the duration of the detour.

5 Option:

- 6 2. If the road is opened for some distance beyond the intersection and/or there are significant
7 origin/destination points beyond the intersection, the ROAD CLOSED and DETOUR signs on Type
8  3 Barricades may be located at the edge of the traveled way.
- 9 3. A Route Sign Directional assembly may be placed on the far left corner of the intersection to augment
10 or replace the one shown on the near right corner.
- 11 4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
- 12 5. Cardinal direction plaques may be used with route signs.

Notes for Figure 6H-9—Typical Application 9
Overlapping Routes with a Detour

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Support:

1. TTC devices are shown for one direction of travel only.

Standard:

2. **Devices similar to those depicted shall be placed for the opposite direction of travel.**

Guidance:

3. STOP or YIELD signs displayed to side roads should be installed as needed along the temporary route.

Option:

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. Flashing warning lights may be used on the Type ~~W~~ 3 Barricades.
6. Cardinal direction plaques may be used with route signs.

1 **Notes for Figure 6H-10—Typical Application 10**
2 **Lane Closure on a Two-Lane Road Using Flaggers**

3 Option:

- 4 1. For low-volume situations with short work zones on straight roadways where the flagger is visible to
5 road users approaching from both directions, a single flagger, positioned to be visible to road users
6 approaching from both directions, may be used (see Chapter 6E).
7 2. The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short-duration
8 operations.
9 3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs. A BE
10 PREPARED TO STOP sign may be added to the sign series.

11 Guidance:

- 12 4. The buffer space should be extended so that the two-way traffic taper is placed before a horizontal (or
13 crest vertical) curve to provide adequate sight distance for the flagger and a queue of stopped vehicles.

14 **Standard:**

- 15 **5. At night, flagger stations shall be illuminated, except in emergencies.**

16 Guidance:

- 17 6. When used, the BE PREPARED TO STOP sign should be located between the Flagger sign and the
18 ONE LANE ROAD sign.
19 7. When a ~~highway-rail~~ grade crossing exists within or upstream of the transition area and it is
20 anticipated that queues resulting from the lane closure might extend through the ~~highway-rail~~ grade
21 crossing, the TTC zone should be extended so that the transition area precedes the ~~highway-rail~~ grade
22 crossing.
23 8. When a ~~highway-rail~~ grade crossing equipped with active warning devices exists within the activity
24 area, provisions should be made for keeping flaggers informed as to the activation status of these
25 warning devices.
26 9. When a ~~highway-rail~~ grade crossing exists within the activity area, drivers operating on the left-hand
27 side of the normal ~~centerline~~ center line should be provided with comparable warning devices as for
28 drivers operating on the right-hand side of the normal ~~centerline~~ center line.
29 10. Early coordination with the railroad company or light rail transit agency should occur before work
30 starts.

31 Option:

- 32 11. A flagger or a uniformed law enforcement officer may be used at the ~~highway-rail~~ grade crossing to
33 minimize the probability that vehicles are stopped within 15 feet of the ~~highway-rail~~ grade crossing,
34 measured from both sides of the outside rails.

1 **Notes for Figure 6H-11—Typical Application 11**
2 **Lane Closure on a Two-Lane Road with Low Traffic Volumes**

3 Option:

- 4 1. This TTC zone application may be used as an alternate to the TTC application shown in Figure 6H-10
5 (using flaggers) when the following conditions exist:
6 a. Vehicular traffic volume is such that sufficient gaps exist for vehicular traffic that must yield.
7 b. Road users from both directions are able to see approaching vehicular traffic through and beyond
8 the worksite and have sufficient visibility of approaching vehicles.
9 2. The Type B flashing warning lights may be placed on the ROAD WORK AHEAD and the ONE
10 LANE ROAD AHEAD signs whenever a night lane closure is necessary.

1 **Notes for Figure 6H-12—Typical Application 12**
2 **Lane Closure on a Two-Lane Road Using Traffic Control Signals**

3 **Standard:**

- 4 **1. Temporary traffic control signals shall be installed and operated in accordance with the**
5 **provisions of Part 4. Temporary traffic control signals shall meet the physical display and**
6 **operational requirements of conventional traffic control signals.**
7 **2. Temporary traffic control signal timing shall be established by authorized officials. Durations**
8 **of red clearance intervals shall be adequate to clear the one-lane section of conflicting vehicles.**
9 **3. When the temporary traffic control signal is changed to the flashing mode, either manually or**
10 **automatically, red signal indications shall be flashed to both approaches.**
11 **4. Stop lines shall be installed with temporary traffic control signals for intermediate and long-**
12 **term closures. Existing conflicting pavement markings and raised pavement marker reflectors**
13 **between the activity area and the stop line shall be removed. After the temporary traffic control**
14 **signal is removed, the stop lines and other temporary pavement markings shall be removed and**
15 **the permanent pavement markings restored.**
16 **5. Safeguards shall be incorporated to avoid the possibility of conflicting signal indications at each**
17 **end of the TTC zone.**

18 **Guidance:**

- 19 **6. Where no-passing lines are not already in place, they should be added.**
20 **7. Adjustments in the location of the advance warning signs should be made as needed to accommodate**
21 **the horizontal or vertical alignment of the roadway, recognizing that the distances shown for sign**
22 **spacings are minimums. Adjustments in the height of the signal heads should be made as needed to**
23 **conform to the vertical alignment.**

24 **Option:**

- 25 **8. Flashing warning lights shown on the ROAD WORK AHEAD and the ONE LANE ROAD AHEAD**
26 **signs may be used.**
27 **9. Removable pavement markings may be used.**

28 **Support:**

- 29 **10. Temporary traffic control signals are preferable to flaggers for long-term projects and other activities**
30 **that would require flagging at night.**
31 **11. The maximum length of activity area for one-way operation under temporary traffic control signal**
32 **control is determined by the capacity required to handle the peak demand.**

1 **Notes for Figure 6H-13—Typical Application 13**
2 **Temporary Road Closure**

3 Support:

- 4 1. Conditions represented are a planned closure not exceeding 20 minutes during the daytime.

5 **Standard:**

- 6 **2. A flagger or uniformed law enforcement officer shall be used for this application. The flagger,**
7 **if used for this application, shall follow the procedures ~~noted~~ [provided](#) in Sections 6E.07 and**
8 **6E.08.**

9 Guidance:

- 10 3. The uniformed law enforcement officer, if used for this application, should follow the procedures
11 ~~noted~~ [provided](#) in Sections 6E.07 and 6E.08.

12 Option:

- 13 4. A BE PREPARED TO STOP sign may be added to the sign series.

14 Guidance:

- 15 5. When used, the BE PREPARED TO STOP sign should be located before the Flagger symbol sign.

1 Notes for Figure 6H-14—Typical Application 14

2 Haul Road Crossing

3 Guidance:

- 4 1. Floodlights should be used to illuminate haul road crossings where existing light is inadequate.
5 2. Where no-passing lines are not already in place, they should be added.

6 Standard:

- 7 3. The traffic control method selected shall be used in both directions.

8 Flagging Method

- 9 4. When a road used exclusively as a haul road is not in use, the haul road shall be closed with
10 Type ~~III~~ 3 Barricades and the Flagger symbol signs covered.
11 5. The flagger shall follow the procedures ~~noted~~ provided in Sections 6E.07 and 6E.08.
12 6. At night, flagger stations shall be illuminated, except in emergencies.

13 Signalized Method

- 14 7. When a road used exclusively as a haul road is not in use, the haul road shall be closed with
15 Type ~~III~~ 3 Barricades ~~shall be in place~~. The signals shall either flash yellow on the main road or
16 be covered, and the Signal Ahead and STOP HERE ON RED signs shall be covered or hidden
17 from view.
18 8. The temporary traffic control signals shall control both the highway and the haul road and shall
19 meet the physical display and operational requirements of conventional traffic control signals as
20 described in Part 4. Traffic control signal timing shall be established by authorized officials.
21 9. Stop lines shall be used on existing highway with temporary traffic control signals.
22 10. Existing conflicting pavements markings between the stop lines shall be removed. After the
23 temporary traffic control signal is removed, the stop lines and other temporary pavement
24 markings shall be removed and the permanent pavement markings restored.

1 **Notes for Figure 6H-15—Typical Application 15**
2 **Work in the Center of a Road with Low Traffic Volumes**

3 **Guidance:**

- 4 1. The lanes on either side of the center work space should have a minimum width of 10 feet as
5 measured from the near edge of the channelizing devices to the edge of the pavement or the outside
6 edge of the paved shoulder.

7 ~~2. Workers in the roadway should wear high-visibility safety apparel as described in Section 6D.03.~~

8 **Option:**

- 9 2. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
10 3. If the closure continues overnight, warning lights may be used on the channelizing devices.
11 4. A lane width of 9 feet may be used for short-term stationary work on low-volume, low-speed
12 roadways when motor vehicle traffic does not include longer and wider heavy commercial vehicles.
13 5. A work vehicle displaying high-intensity rotating, flashing, oscillating, or strobe lights may be used
14 instead of the channelizing devices forming the tapers or the high-level warning devices.
15 6. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing,
16 oscillating, or strobe lights.

17 **Standard:**

- 18 7. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating,**
19 **flashing, oscillating, or strobe lights.**

1 Notes for Figure 6H-16—Typical Application 16

2 Surveying Along ~~the Centerline~~ Center Line of a Road with Low Traffic Volumes

3 Guidance:

- 4 1. The lanes on either side of the center work space should have a minimum width of 10 feet as
5 measured from the near edge of the channelizing devices to the edge of the pavement or the outside
6 edge of the paved shoulder.
- 7 2. Cones should be placed 6 to 12 inches on either side of the ~~centerline~~ center line.
- 8 ~~2. Spacing of channelizing devices should not exceed a distance in feet equal to the speed limit (mph)~~
9 ~~when used for the taper channelization and a distance in feet of 2 times the speed limit (mph) when~~
10 ~~used for tangent channelization.~~
- 11 3. A flagger should be used to warn workers who cannot watch road users.
- 12 ~~4. Workers in the roadway should wear high-visibility safety apparel as described in Section 6D.03.~~

13 **Standard:**

- 14 4. **For surveying on the ~~centerline~~ center line of a high-volume road, one lane shall be closed using**
15 **the information illustrated in Figure 6H-10.**

16 Option:

- 17 5. A high-level warning device may be used to protect a surveying device, such as a target on a tripod.
- 18 6. Cones may be omitted for a cross-section survey.
- 19 7. ROAD WORK AHEAD signs may be used in place of the SURVEY CREW AHEAD signs.
- 20 8. Flags may be used to call attention to the advance warning signs.
- 21 9. If the work is along the shoulder, the flagger may be omitted.
- 22 10. For a survey along the edge of the road or along the shoulder, cones may be placed along the edge
23 line.
- 24 11. A BE PREPARED TO STOP sign may be added to the sign series.

25 Guidance:

- 26 12. When used, the BE PREPARED TO STOP sign should be located before the Flagger symbol sign.

1 **Notes for Figure 6H-17—Typical Application 17**

2 **Mobile Operations on a Two-Lane Road**

3 **Standard:**

- 4 **1. Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by**
5 **equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from**
6 **view when work is not in progress.**
- 7 **2. Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe**
8 **lights.**
- 9 **3. If an arrow ~~panel~~ board is used, it shall be used in the caution mode.**

10 **Guidance:**

- 11 4. Where practical and when needed, the work and shadow vehicles should pull over periodically to
12 allow vehicular traffic to pass.
- 13 5. Whenever adequate stopping sight distance exists to the rear, the shadow vehicle should maintain the
14 minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should
15 slow down in advance of vertical or horizontal curves that restrict sight distance.
- 16 6. The shadow vehicles should also be equipped with two high-intensity flashing lights mounted on the
17 rear, adjacent to the sign.

18 **Option:**

- 19 7. The distance between the work and shadow vehicles may vary according to terrain, paint drying time,
20 and other factors.
- 21 8. Additional shadow vehicles to warn and reduce the speed of oncoming or opposing vehicular traffic
22 may be used. Law enforcement vehicles may be used for this purpose.
- 23 9. A truck-mounted attenuator may be used on the shadow vehicle or on the work vehicle.
- 24 10. If the work and shadow vehicles cannot pull over to allow vehicular traffic to pass frequently, a DO
25 NOT PASS sign may be placed on the rear of the vehicle blocking the lane.

26 **Support:**

- 27 11. Shadow vehicles are used to warn motor vehicle traffic of the operation ahead.

28 **Standard:**

- 29 **12. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating,**
30 **flashing, oscillating, or strobe lights.**

1 **Notes for Figure 6H-18—Typical Application 18**

2 **Lane Closure on a Minor Street**

3 **Standard:**

- 4 **1. This TTC shall be used only for low-speed facilities having low traffic volumes.**

5 Option:

- 6 2. Where the work space is short, where road users can see the roadway beyond, and where volume is
7 low, vehicular traffic may be self-regulating.

8 **Standard:**

- 9 **3. Where vehicular traffic cannot effectively self-regulate, one or two flaggers shall be used as**
10 **illustrated in Figure 6H-10.**

11 Option:

- 12 4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
13 5. A truck-mounted attenuator may be used on the work vehicle and the shadow vehicle.

1 **Notes for Figure 6H-19—Typical Application 19**

2 **Detour for One Travel Direction**

3 **Guidance:**

- 4 1. This plan should be used for streets without posted route numbers.
5 2. On multi-lane streets, Detour signs with an Advance Turn Arrow should be used in advance of a turn.

6 **Option:**

- 7 3. The STREET CLOSED legend may be used in place of ROAD CLOSED.
8 4. Additional DO NOT ENTER signs may be used at intersections with intervening streets.
9 5. Warning lights may be used on Type ~~3~~ 3 Barricades.
10 6. Detour signs may be located on the far side of intersections.
11 7. A Street Name sign may be mounted with the Detour sign. The Street Name sign may be either white
12 on green or black on orange.

13 **Standard:**

- 14 **8. When used, the Street Name sign shall be placed above the Detour sign.**

1 **Notes for Figure 6H-20—Typical Application 20**

2 **Detour for a Closed Street**

3 **Guidance:**

- 4 1. This plan should be used for streets without posted route numbers.
5 2. On multi-lane streets, Detour signs with an Advance Turn Arrow should be used in advance of a turn.

6 **Option:**

- 7 3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
8 4. Flashing warning lights may be used on Type ~~III~~ 3 Barricades.
9 5. Detour signs may be located on the far side of intersections. A Detour sign with an advance arrow
10 may be used in advance of a turn.
11 6. A Street Name sign may be mounted with the Detour sign. The Street Name sign may be either white
12 on green or black on orange.

13 **Standard:**

- 14 **7. When used, the Street Name sign shall be placed above the Detour sign.**

15 **Support:**

- 16 8. See Figure 6H-9 for the information for detouring a numbered highway.

1 **Notes for Figure 6H-21—Typical Application 21**
2 **Lane Closure on the Near Side of an Intersection**

3 **Standard:**

- 4 **1. The merging taper shall direct vehicular traffic into either the right-hand or left-hand lane, but**
5 **not both.**

6 **Guidance:**

- 7 2. In this typical application, a left taper should be used so that right-turn movements will not impede
8 through motor vehicle traffic. However, the reverse should be true for left-turn movements.
9 3. If the work space extends across a crosswalk, the crosswalk should be closed using the information
10 and devices shown in Figure 6H-29.

11 **Option:**

- 12 4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
13 5. A shadow vehicle with a truck-mounted attenuator may be used.
14 6. A work vehicle with high-intensity rotating, flashing, oscillating, or strobe lights may be used with the
15 high-level warning device.
16 7. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing,
17 oscillating, or strobe lights.

18 **Standard:**

- 19 **8. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating,**
20 **flashing, oscillating, or strobe lights.**

1 **Notes for Figure 6H-22—Typical Application 22**

2 **Right-Hand Lane Closure on the Far Side of an Intersection**

3 Guidance:

- 4 1. If the work space extends across a crosswalk, the crosswalk should be closed using the information
5 and devices shown in Figure 6H-29.

6 Option:

- 7 2. The normal procedure is to close on the near side of the intersection any lane that is not carried
8 through the intersection. However, when this results in the closure of a right-hand lane having
9 significant right turning movements, then the right-hand lane may be restricted to right turns only, as
10 shown. This procedure increases the through capacity by eliminating right turns from the open
11 through lane.
- 12 3. For intersection approaches reduced to a single lane, left-turning movements may be prohibited to
13 maintain capacity for through vehicular traffic.
- 14 4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
- 15 5. Where the turning radius is large, it may be possible to create a right-turn island using channelizing
16 devices or pavement markings.

1 **Notes for Figure 6H-23—Typical Application 23**
2 **Left Lane Closure on the Far Side of an Intersection**

3 Guidance:

- 4 1. If the work space extends across a crosswalk, the crosswalk should be closed using the information
5 and devices shown in Figure 6H-29.

6 Option:

- 7 2. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
8 3. The normal procedure is to close on the near side of the intersection any lane that is not carried
9 through the intersection. However, when this results in the closure of a left lane having significant
10 left-turning movements, then the left lane may be reopened as a turn bay for left turns only, as shown.

11 Support:

- 12 4. By first closing off the left lane and then reopening it as a turn bay, the left-turn bay allows storage of
13 turning vehicles so that the movement of through traffic is not impeded. A left-turn bay that is long
14 enough to accommodate all turning vehicles during a traffic signal cycle will provide the maximum
15 benefit for through traffic. Also, an island is created with channelizing devices that allows the LEFT
16 LANE MUST TURN LEFT sign to be repeated on the left adjacent to the lane that it controls.

1 **Notes for Figure 6H-24—Typical Application 24**
2 **Half Road Closure on the Far Side of an Intersection**

3 Guidance:

- 4 1. If the work space extends across a crosswalk, the crosswalk should be closed using the information
5 and devices shown in Figure 6H-29.
6 2. When turn prohibitions are implemented, two turn prohibition signs should be used, one on the near
7 side and, space permitting, one on the far side of the intersection.

8 Option:

- 9 3. A buffer space may be used between opposing directions of vehicular traffic as shown in this
10 application.
11 4. The normal procedure is to close on the near side of the intersection any lane that is not carried
12 through the intersection. However, if there is a significant right-turning movement, then the right-
13 hand lane may be restricted to right turns only, as shown.
14 5. Where the turning radius is large, a right-turn island using channelizing devices or pavement markings
15 may be used.
16 6. There may be insufficient space to place the back-to-back Keep Right sign and No Left Turn symbol
17 signs at the end of the row of channelizing devices separating opposing vehicular traffic flows. In this
18 situation, the No Left Turn symbol sign may be placed on the right and the Keep Right sign may be
19 omitted.
20 7. For intersection approaches reduced to a single lane, left-turning movements may be prohibited to
21 maintain capacity for through vehicular traffic.
22 8. Flashing warning lights and/or flags may be used to call attention to advance warning signs.
23 9. Temporary pavement markings may be used to delineate the travel path through the intersection.

24 Support:

- 25 10. Keeping the right-hand lane open increases the through capacity by eliminating right turns from the
26 open through lane.
27 11. A temporary turn island reinforces the nature of the temporary exclusive right-turn lane and enables a
28 second RIGHT LANE MUST TURN RIGHT sign to be placed in the island.

1 **Notes for Figure 6H-25—Typical Application 25**

2 **Multiple Lane Closures at an Intersection**

3 **Guidance:**

- 4 1. If the work space extends across a crosswalk, the crosswalk should be closed using the information
5 and devices shown in Figure 6H-29.
6 2. If the left through lane is closed on the near-side approach, the LEFT LANE MUST TURN LEFT
7 sign should be placed in the median to discourage through vehicular traffic from entering the left-turn
8 bay.

9 ~~Option~~ Support:

- 10 3. The normal procedure is to close on the near side of the intersection any lane that is not carried
11 through the intersection.

12 Option:

- 13 4. If the left-turning movement that normally uses the closed turn bay is small and/or the gaps in
14 opposing vehicular traffic are frequent, left turns may be permitted on that approach.
15 5. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

1 **Notes for Figure 6H-26—Typical Application 26**

2 **Closure in the Center of an Intersection**

3 **Guidance:**

- 4 1. All lanes should be a minimum of 10 feet in width as measured to the near face of the channelizing
5 devices.

6 **Option:**

- 7 2. A high-level warning device may be placed in the work space, if there is sufficient room.
8 3. For short-term use on low-volume, low-speed roadways with vehicular traffic that does not include
9 longer and wider heavy commercial vehicles, a minimum lane width of 9 feet may be used.
10 4. Flashing warning lights and/or flags may be used to call attention to advance warning signs.
11 5. Unless the streets are wide, it may be physically impossible to turn left, especially for large vehicles.
12 Left turns may be prohibited as required by geometric conditions.
13 6. For short-duration work operations, the channelizing devices may be eliminated if a vehicle
14 displaying high-intensity rotating, flashing, oscillating, or strobe lights is positioned in the work
15 space.
16 7. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing,
17 oscillating, or strobe lights.

18 **Standard:**

- 19 **8. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating,**
20 **flashing, oscillating, or strobe lights.**

1 **Notes for Figure 6H-27—Typical Application 27**

2 **Closure at the Side of an Intersection**

3 **Guidance:**

- 4 1. The situation depicted can be simplified by closing one or more of the intersection approaches. If this
5 cannot be done, and/or when capacity is a problem, through vehicular traffic should be directed to
6 other roads or streets.
7 2. Depending on road user conditions, flagger(s) or uniformed law enforcement officer(s) should be used
8 to direct road users within the intersection.

9 **Standard:**

- 10 **3. At night, flagger stations shall be illuminated, except in emergencies.**

11 **Option:**

- 12 4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
13 5. For short-duration work operations, the channelizing devices may be eliminated if a vehicle
14 displaying high-intensity rotating, flashing, oscillating, or strobe lights is positioned in the work
15 space.
16 6. A BE PREPARED TO STOP sign may be added to the sign series.

17 **Guidance:**

- 18 7. When used, the BE PREPARED TO STOP sign should be located before the Flagger symbol sign.
19 8. ONE LANE ROAD AHEAD signs ~~may~~ should also be used to provide adequate advance warning.

20 **Support:**

- 21 9. Turns can be prohibited as required by vehicular traffic conditions. Unless the streets are wide, it
22 might be physically impossible to make certain turns, especially for large vehicles.

23 **Option:**

- 24 10. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing,
25 oscillating, or strobe lights.

26 **Standard:**

- 27 **11. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating,**
28 **flashing, oscillating, or strobe lights.**

1 **Notes for Figure 6H-28—Typical Application 28**

2 **Sidewalk ~~Closures and Bypass Sidewalks~~ Detour or Diversion**

3 **Standard:**

- 4 **1. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall**
5 **be detectable and shall include accessibility features consistent with the features present in the**
6 **existing pedestrian facility.**

7 **Guidance:**

- 8 2. Where high speeds are anticipated, a temporary traffic barrier and, if necessary, a crash cushion
9 should be used to separate the temporary sidewalks from vehicular traffic.
10 3. Audible information devices should be considered where midblock closings and changed crosswalk
11 areas cause inadequate communication to be provided to pedestrians who have visual disabilities.

12 **Option:**

- 13 4. Street lighting may be considered.
14 5. Only the TTC devices related to pedestrians are shown. Other devices, such as lane closure signing or
15 ROAD NARROWS signs, may be used to control vehicular traffic.
16 6. For nighttime closures, Type A Flashing warning lights may be used on barricades that support signs
17 and close sidewalks.
18 7. Type C Steady-Burn or Type D 360-degree Steady-Burn warning lights may be used on channelizing
19 devices separating the temporary sidewalks from vehicular traffic flow.
20 8. Signs, such as KEEP RIGHT (LEFT), may be placed along a temporary sidewalk to guide or direct
21 pedestrians.

1 **Notes for Figure 6H-29—Typical Application 29**

2 **Crosswalk Closures and Pedestrian Detours**

3 **Standard:**

- 4 **1. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall**
5 **be detectable and shall include accessibility features consistent with the features present in the**
6 **existing pedestrian facility.**
7 **2. Curb parking shall be prohibited for at least 50 feet in advance of the midblock crosswalk.**

8 **Guidance:**

- 9 3. Audible information devices should be considered where midblock closings and changed crosswalk
10 areas cause inadequate communication to be provided to pedestrians who have visual disabilities.
11 4. Pedestrian traffic signal displays controlling closed crosswalks should be covered or deactivated.

12 **Option:**

- 13 5. Street lighting may be considered.
14 6. Only the TTC devices related to pedestrians are shown. Other devices, such as lane closure signing or
15 ROAD NARROWS signs, may be used to control vehicular traffic.
16 7. For nighttime closures, Type A Flashing warning lights may be used on barricades supporting signs
17 and closing sidewalks.
18 8. Type C Steady-Burn [or Type D 360-degree Steady-Burn](#) warning lights may be used on channelizing
19 devices separating the work space from vehicular traffic.
20 9. In order to maintain the systematic use of the fluorescent yellow-green background for pedestrian,
21 bicycle, and school warning signs in a jurisdiction, the fluorescent yellow-green background for
22 pedestrian, bicycle, and school warning signs may be used in TTC zones.

1 **Notes for Figure 6H-30—Typical Application 30**

2 **Interior Lane Closure on a Multi-Lane Street**

3 Guidance:

- 4 1. This information applies to low-speed, low-volume urban streets. Where speed or volume is higher,
5 additional signing such as LEFT LANE CLOSED XX FT should be used between the signs shown.

6 Option:

- 7 2. The closure of the adjacent interior lane in the opposing direction may not be necessary, depending
8 upon the activity being performed and the work space needed for the operation.
9 3. Shadow vehicles with a truck-mounted attenuator may be used.

10 ~~Guidance:~~

11 ~~4. When a highway rail grade crossing exists within or upstream of the transition area and it is~~
12 ~~anticipated that backups resulting from the lane closure might extend through the highway rail grade~~
13 ~~crossing, the TTC zone should be extended so that the transition area precedes the highway rail grade~~
14 ~~crossing.~~

15 ~~5. Early coordination with the railroad company should occur before work starts.~~

1 **Notes for Figure 6H-31—Typical Application 31**
2 **Lane Closure on a Street with Uneven Directional Volumes**

3 **Standard:**

- 4 **1. The illustrated information shall be used only when the vehicular traffic volume indicates that**
5 **two lanes of vehicular traffic shall be maintained in the direction of travel for which one lane is**
6 **closed.**

7 **Option:**

- 8 **2. The procedure may be used during a peak period of vehicular traffic and then changed to provide two**
9 **lanes in the other direction for the other peak.**

10 **Guidance:**

- 11 **3. For high speeds, a LEFT LANE CLOSED XX FT sign should be added for vehicular traffic**
12 **approaching the lane closure, as shown in Figure 6H-32.**
13 **4. Conflicting pavement markings should be removed for long-term projects. For short-term and**
14 **intermediate-term projects where this is not practical, the channelizing devices in the area where the**
15 **pavement markings conflict should be placed at a maximum spacing of 1/2 S feet where S is the speed**
16 **in mph. Temporary markings should be installed where needed.**
17 **5. If the lane shift has curves with recommended speeds of 30 mph or less, Reverse Turn signs should be**
18 **used.**
19 **6. Where the shifted section is long, a Reverse Curve sign should be used to show the initial shift and a**
20 **second sign should be used to show the return to the normal alignment.**
21 **7. If the tangent distance along the temporary diversion is less than 600 feet, the Double Reverse Curve**
22 **sign should be used at the location of the first Two Lane Reverse Curve sign. The second Two Lane**
23 **Reverse Curve sign should be omitted.**

24 **Standard:**

- 25 **8. The number of lanes illustrated on the Reverse Curve or Double Reverse Curve signs shall be**
26 **the same as the number of through lanes available to road users, and the direction of the reverse**
27 **curves shall be appropriately illustrated.**

28 **Option:**

- 29 **9. A longitudinal buffer space may be used in the activity area to separate opposing vehicular traffic.**
30 ~~**9. An ALL LANES THRU supplemental plaque may be used to emphasize the point that all lanes shift**~~
31 ~~**and no lanes are closed.**~~
32 **10. Where two or more lanes are being shifted, a W1-4 (or W1-3) sign with an ALL LANES (W24-1cP)**
33 **plaque (see Figure 6F-4) may be used instead of a sign that illustrates the number of lanes.**
34 **11. Where more than three lanes are being shifted, the Reverse Curve (or Turn) sign may be rectangular.**
35 **12. A work vehicle or a shadow vehicle may be equipped with a truck-mounted attenuator.**

1 Notes for Figure 6H-32—Typical Application 32
2 Half Road Closure on a Multi-Lane, High-Speed Highway

3 Standard:

- 4 1. Pavement markings no longer applicable shall be removed or obliterated as soon as practical.
5 Except for intermediate-term and short-term situations, temporary markings shall be provided
6 to clearly delineate the temporary travel path. For short-term and intermediate-term situations
7 where it is not feasible to remove and restore pavement markings, channelization shall be made
8 dominant by using a very close device spacing.

9 Guidance:

- 10 2. When paved shoulders having a width of 8 feet or more are closed, channelizing devices should be
11 used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within
12 the traveled way.
13 3. Where channelizing devices are used instead of pavement markings, the maximum spacing should be
14 1/2 S feet where S is the speed in mph.
15 4. If the tangent distance along the temporary diversion is ~~more~~ less than 600 feet, a Double Reverse
16 Curve sign, left first, should be used instead of the Double first Reverse Curve sign, and a the second
17 Reverse Curve sign, right first, should be ~~placed in advance of the second reverse curve back to the~~
18 ~~original alignment~~ omitted.

19 Option:

- 20 5. Warning lights may be used to supplement channelizing devices at night.

21 ~~Guidance:~~

- 22 ~~6. When a highway rail grade crossing exists within or upstream of the merging taper and it is~~
23 ~~anticipated that backups resulting from the lane closure might extend through the highway rail grade~~
24 ~~crossing, the TTC zone should be extended so that the merging taper precedes the highway rail grade~~
25 ~~crossing.~~
26 ~~7. When a highway rail grade crossing exists within the activity area, provisions should be made to~~
27 ~~provide road users operating on the left side of the normal centerline with comparable warning~~
28 ~~devices as supplied for road users operating on the right side of the normal centerline.~~
29 ~~8. When a highway rail grade crossing exists within the activity area, early coordination with the~~
30 ~~railroad company should occur before work starts.~~

31 ~~Option:~~

- 32 ~~9. When a highway rail grade crossing exists within the activity area, a flagger may be used at the~~
33 ~~highway rail grade crossing to minimize the probability that vehicles are stopped within 15 feet of the~~
34 ~~highway rail grade crossing, measured from both sides of the outside rails.~~
35 6. A truck-mounted attenuator may be used on the work vehicle and/or the shadow vehicle.

1 **Notes for Figure 6H-33—Typical Application 33**

2 **Stationary Lane Closure on a Divided Highway**

3 **Standard:**

- 4 **1. This information also shall be used when work is being performed in the lane adjacent to the**
5 **median on a divided highway. In this case, the LEFT LANE CLOSED signs and the**
6 **corresponding Lane Ends signs shall be substituted.**
7 **2. When a side road intersects the highway within the TTC zone, additional TTC devices shall be**
8 **placed as needed.**

9 **Guidance:**

- 10 **3. When paved shoulders having a width of 8 feet or more are closed, channelizing devices should be**
11 **used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within**
12 **the traveled way.**

13 **Option:**

- 14 **4. A truck-mounted attenuator may be used on the work vehicle and/or shadow vehicle.**

15 **Support:**

- 16 **5. Where conditions permit, restricting all vehicles, equipment, workers, and their activities to one side**
17 **of the roadway might be advantageous.**

18 **Standard:**

- 19 **6. An arrow board shall be used when a freeway lane is closed. When more than one freeway lane**
20 **is closed, a separate arrow board shall be used for each closed lane.**

1 **Notes for Figure 6H-34—Typical Application 34**
2 **Lane Closure with a Temporary Traffic Barrier**

3 **Standard:**

- 4 **1. This information also shall be used when work is being performed in the lane adjacent to the**
5 **median on a divided highway. In this case, the LEFT LANE CLOSED signs and the**
6 **corresponding Lane Ends signs shall be substituted.**

7 **Guidance:**

- 8 **2. For long-term lane closures on facilities with permanent edge lines, a temporary edge line should be**
9 **installed from the ~~start~~ upstream end of the merging taper to the ~~far~~ downstream end of the**
10 **downstream taper, and conflicting pavement markings should be removed.**
11 **3. The use of a barrier should be based on engineering judgment.**

12 **Standard:**

- 13 **4. ~~Where Temporary traffic barriers, if used, are installed, the ends of the barrier shall be treated~~**
14 **~~in accordance~~ comply with the provisions of Section 6F.85.**
15 **5. The barrier shall not be placed along the merging taper. The lane shall first be closed using**
16 **channelizing devices and pavement markings.**

17 **Option:**

- 18 **6. Type C Steady-Burn warning lights may be placed on channelizing devices and the barrier parallel to**
19 **the edge of pavement for nighttime lane closures.**
20 **7. The barrier shown in this typical application is an example of one method that may be used to close a**
21 **lane for a long-term project. If the work activity permits, a movable barrier may be used and**
22 **relocated to the shoulder during non-work periods or peak-period vehicular traffic conditions, as**
23 **appropriate.**

24 **Standard:**

- 25 **8. If a movable barrier is used, the temporary white edge line shown in the typical application**
26 **shall not be used. During the period when the right-hand lane is opened, the sign legends and**
27 **the channelization shall be changed to indicate that only the shoulder is closed, as illustrated in**
28 **Figure 6H-5. The arrow ~~panel~~ board, if used, shall be placed at the downstream end of the**
29 **shoulder taper and shall display the caution mode.**

30 **Guidance:**

- 31 **9. If a movable barrier is used, the shift should be performed in the following manner. When closing the**
32 **lane, the lane should be initially closed with channelizing devices placed along a merging taper using**
33 **the same information employed for a stationary lane closure. The lane closure should then be**
34 **extended with the movable-barrier transfer vehicle moving with vehicular traffic. When opening the**
35 **lane, the movable-barrier transfer vehicle should travel against vehicular traffic from the termination**
36 **area to the transition area. The merging taper should then be removed using the same information**
37 **employed for a stationary lane closure.**

1 **Notes for Figure 6H-35—Typical Application 35**

2 **Mobile Operation on a Multi-Lane Road**

3 **Standard:**

- 4 1. Arrow ~~panels~~ boards shall, as a minimum, be Type B, with a size of 60 x 30 inches.
- 5 2. Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by
- 6 equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from
- 7 view when work is not in progress.
- 8 3. Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe
- 9 lights.
- 10 4. An arrow board shall be used when a freeway lane is closed. When more than one freeway lane
- 11 is closed, a separate arrow board shall be used for each closed lane.

12 **Guidance:**

- 13 5. Vehicles used for these operations should be made highly visible with appropriate equipment, such as ~~high-intensity rotating, flashing, oscillating, or strobe lights,~~ flags, signs, or arrow ~~panels~~ boards.
- 14 6. Shadow Vehicle 1 should be equipped with an arrow ~~panel~~ board and truck-mounted attenuator.
- 15 7. Shadow Vehicle 2 should be equipped with an arrow ~~panel~~ board. An appropriate lane closure sign
- 16 should be placed on Shadow Vehicle 2 so as not to obscure the arrow ~~panel~~ board.
- 17 8. Shadow Vehicle 2 should travel at a varying distance from the work operation so as to provide
- 18 adequate sight distance for vehicular traffic approaching from the rear.
- 19 9. The spacing between the work vehicles and the shadow vehicles, and between each shadow vehicle
- 20 should be minimized to deter road users from driving in between.
- 21 10. Work should normally be accomplished during off-peak hours.
- 22 11. When the work vehicle occupies an interior lane (a lane other than the far right or far left) of a
- 23 directional roadway having a right-hand shoulder 10 feet or more in width, Shadow Vehicle 2 should
- 24 drive the right-hand shoulder with a sign indicating that work is taking place in the interior lane.
- 25

26 **Option:**

- 27 12. A truck-mounted attenuator may be used on Shadow Vehicle 2.
- 28 13. On high-speed roadways, a third shadow vehicle (not shown) may be used with Shadow Vehicle 1 in
- 29 the closed lane, Shadow Vehicle 2 straddling the edge line, and Shadow Vehicle 3 on the shoulder.
- 30 14. Where adequate shoulder width is not available, Shadow Vehicle 3 may ~~drive partially in the lane~~ also
- 31 straddle the edge line.

Notes for Figure 6H-36—Typical Application 36

Lane Shift on a Freeway

Guidance:

1. The lane shift should be used when the work space extends into either the right-hand or left-hand lane of a divided highway and it is not practical, for capacity reasons, to reduce the number of available lanes.

Support:

2. When a lane shift is accomplished by using (1) geometry that meets the design speed at which the permanent highway was designed, (2) full normal cross-section (full lane width and full shoulders), and (3) complete pavement markings, then only the initial general work-zone warning sign is required.

Guidance:

3. When the conditions in Note 2 are not met, the information shown in the typical application should be employed and all the following notes apply.

Standard:

4. ~~Where Temporary traffic barriers, if used, are installed, the ends of the barrier shall be treated in accordance~~ comply with the provisions of Section 6F.85.
5. The barrier shall not be placed along the shifting taper. The lane shall first be shifted using channelizing devices and pavement markings.

Guidance:

6. A warning sign ~~shall~~ should be used to show the changed alignment.

Standard:

7. The number of lanes illustrated on the Reverse Curve signs shall be the same as the number of through lanes available to road users, and the direction of the reverse curves shall be appropriately illustrated.

Option:

8. 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.
9. Where more than three lanes are being shifted, the Reverse Curve (or Turn) sign may be rectangular.

Guidance:

10. Where the shifted section is longer than 600 feet, one set of Reverse Curve signs should be used to show the initial shift and a second set should be used to show the return to the normal alignment. If the tangent distance along the temporary diversion is less than 600 feet, ~~the a~~ Double Reverse Curve sign should be used instead of the first Reverse Curve sign, and the second Reverse Curve sign should be omitted.
11. If a STAY IN LANE sign is used, then solid white lane lines should be used.

Standard:

12. **The minimum width of the shoulder lane shall be 10 feet.**
13. **For long-term stationary work, existing conflicting pavement markings shall be removed and temporary markings shall be installed before traffic patterns are changed.**

Option:

14. For short-term stationary work, lanes may be delineated by channelizing devices or removable pavement markings instead of temporary ~~pavement~~ markings.
11. ~~Three Lane Reverse Curve signs may be used in place of the Reverse Curve signs. ALL LANES THRU supplemental plaques may be used to emphasize the point that all lanes shift and no lanes are closed.~~

Guidance:

15. If the shoulder cannot adequately accommodate trucks, trucks ~~may~~ should be directed to use the travel lanes.
13. ~~The barrier shown in this typical application is one method that may be used to close a lane for a long-term project.~~

Guidance:

1 16. The use of a barrier should be based on engineering judgment.

2 Option:

3 17. Type C Steady-Burn warning lights may be placed on channelizing devices and the barrier parallel to
4 the edge of the pavement for nighttime lane closures.

1 **Notes for Figure 6H-37—Typical Application 37**

2 **Double Lane Closure on a Freeway**

3 **Standard:**

- 4 **1. An arrow board shall be used when a freeway lane is closed. When more than one freeway lane**
5 **is closed, a separate arrow board shall be used for each closed lane.**

6 **Guidance:**

- 7 2. Ordinarily, the preferred position for the second arrow ~~panel~~ board is in the closed exterior lane at the
8 ~~beginning~~ upstream end of the second merging taper. However, the second arrow ~~panel~~ board should
9 be placed in the closed interior lane at the downstream end of the second merging taper in the
10 following situations:
- 11 a. When a shadow vehicle is used in the interior closed lane, and the second arrow ~~panel~~ board is
12 mounted on the shadow vehicle;
 - 13 b. If alignment or other conditions create any confusion as to which lane is closed by the second
14 arrow ~~panel~~ board; and
 - 15 c. When the first arrow ~~panel~~ board is placed in the closed exterior lane at the downstream end of
16 the first merging taper (the alternative position when the shoulder is narrow).

17 **Option:**

- 18 3. Flashing warning lights and/or flags may be used to call attention to the initial warning signs.
19 4. A truck-mounted attenuator may be used on the shadow vehicle.
20 5. If a paved shoulder having a minimum width of 10 feet and sufficient strength is available, the left
21 and adjacent interior lanes may be closed and vehicular traffic carried around the work space on the
22 right-hand lane and a right-hand shoulder.

23 **Guidance:**

- 24 6. When a shoulder lane is used that cannot adequately accommodate trucks, trucks ~~may~~ should be
25 directed to use the normal travel lanes.

1 Notes for Figure 6H-38—Typical Application 38

2 Interior Lane Closure on a Freeway

3 Standard:

- 4 1. An arrow board shall be used when a freeway lane is closed. When more than one freeway lane
5 is closed, a separate arrow board shall be used for each closed lane.
6 2. If temporary traffic barriers are installed, they shall comply with the provisions and
7 requirements in Section 6F.85.
8 3. The barrier shall not be placed along the shifting taper. The lane shall first be shifted using
9 channelizing devices and pavement markings.
10 4. For long-term stationary work, existing conflicting pavement markings shall be removed and
11 temporary markings shall be installed before traffic patterns are changed.

12 Guidance:

- 13 5. For a long-term closure, a barrier should be used to provide additional safety to the operation in the
14 closed interior lane. A buffer space should be used at the upstream end of the closed interior lane.
15 6. The first arrow ~~panel~~ board displaying ~~a right~~ an arrow pointing to the right should be on the left-hand
16 shoulder at the beginning of the taper. The arrow ~~panel~~ board displaying a double arrow should be
17 centered in the closed interior lane and placed at the downstream end of the shifting taper.
18 7. If the two arrow boards create confusion, the 2L distance between the end of the merging taper and
19 beginning of the shift taper should be extended so that road users can focus on one arrow board at a
20 time.
21 8. The placement of signs should not obstruct or obscure arrow ~~panels~~ boards.
22 9. For long-term use, the dashed lane lines should be made solid white in the two-lane section.

23 Option:

- 24 ~~7. As the arrow panel with a double arrow displayed is key, the arrow panel closing the exterior lane~~
25 ~~may be moved or omitted if the alignment is such that the two panels create confusion.~~
26 10. As an alternative to initially closing the left-hand lane, as shown in the typical application, the right-
27 hand lane may be closed in advance of the interior lane closure with appropriate channelization and
28 signs.
29 11. A short, single row of channelizing devices in advance of the vehicular traffic split to restrict
30 vehicular traffic to their respective lanes may be added.
31 12. DO NOT PASS signs may be used.
32 13. If a paved shoulder having a minimum width of 10 feet and sufficient strength is available, the left-
33 hand and center lanes may be closed and motor vehicle traffic carried around the work space on the
34 right-hand lane and a right-hand shoulder.

35 Guidance:

- 36 14. When a shoulder lane is used that cannot adequately accommodate trucks, trucks ~~may~~ should be
37 directed to use the normal travel lanes.

1 **Notes for Figure 6H-39—Typical Application 39**

2 **Median Crossover on a Freeway**

3 **Standard:**

- 4 **1. Channelizing devices or temporary traffic barriers shall be used to separate opposing vehicular**
5 **traffic.**
6 **2. An arrow board shall be used when a freeway lane is closed. When more than one freeway lane**
7 **is closed, a separate arrow board shall be used for each closed lane.**

8 **Guidance:**

- 9 3. For long-term work on high-speed, high-volume highways, consideration should be given to using a
10 temporary traffic barrier to separate opposing vehicular traffic.

11 **Option:**

- 12 4. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic,
13 DO NOT PASS, KEEP RIGHT, and DO NOT ENTER signs may be eliminated.
14 5. The alignment of the crossover may be designed as a reverse curve.

15 **Guidance:**

- 16 6. When the crossover follows a curved alignment, the design criteria contained in the AASHTO “Policy
17 on the Geometric Design of Highways and Streets” (see Section 1A.11) should be used.
18 7. When channelizing devices have the potential of leading vehicular traffic out of the intended traffic
19 space, the channelizing devices should be extended a distance in feet of 2.0 times the speed limit in
20 mph beyond the downstream end of the transition area as depicted.
21 8. Where channelizing devices are used, the Two-Way Traffic signs should be repeated every 1 mile.

22 **Option:**

- 23 9. NEXT XX MILES Supplemental Distance plaques may be used with the Two-Way Traffic signs,
24 where XX is the distance to the downstream end of the two-way section.

25 **Support:**

- 26 10. When the distance is sufficiently short that road users entering the section can see the ~~the~~ downstream
27 end of the section, they are less likely to forget that there is opposing vehicular traffic.
28 11. The sign legends for the four pairs of signs approaching the lane closure for the non-crossover
29 direction of travel are not shown. They are similar to the series shown for the crossover direction,
30 except that the left lane is closed.

1 **Notes for Figure 6H-40—Typical Application 40**

2 **Median Crossover for an Entrance Ramp**

3 Guidance:

- 4 1. The typical application illustrated should be used for carrying an entrance ramp across a closed
5 directional roadway of a divided highway.
- 6 2. A temporary acceleration lane should be used to facilitate merging.
- 7 3. When used, the YIELD or STOP sign should be located far enough forward to provide adequate sight
8 distance of oncoming mainline vehicular traffic to select ~~a reasonably safe~~ an acceptable gap, but
9 should not be located so far forward that motorists will be encouraged to stop in the path of the
10 mainline traffic. If needed, yield or stop lines should be installed across the ramp to indicate the point
11 at which road users should yield or stop. Also, a longer acceleration lane should be provided beyond
12 the sign to reduce the gap size needed.

13 Option:

- 14 4. If vehicular traffic conditions allow, the ramp may be closed.
- 15 5. A broken edge line may be carried across the temporary entrance ramp to assist in defining the
16 through vehicular traffic lane.
- 17 6. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic
18 signs and the DO NOT ENTER signs may be eliminated.

1 **Notes for Figure 6H-41—Typical Application 41**

2 **Median Crossover for an Exit Ramp**

3 **Guidance:**

- 4 1. This typical application should be used for carrying an exit ramp across a closed directional roadway
5 of a divided highway. The design criteria contained in the AASHTO “Policy on the Geometric
6 Design of Highways and Streets” (see Section 1A.11) should be used for determining the curved
7 alignment.
8 2. The guide signs should indicate that the ramp is open, and where the temporary ramp is located.
9 Conversely, if the ramp is closed, guide signs should indicate that the ramp is closed.
10 3. When the exit is closed, a black on orange EXIT CLOSED sign panel should be placed diagonally
11 across the interchange/intersection guide signs and channelizing devices should be placed to
12 physically close the ramp.
13 4. In the situation (not shown) where channelizing devices are placed along the mainline roadway, the
14 devices’ spacing should be reduced in the vicinity of the off ramp to emphasize the opening at the
15 ramp itself. Channelizing devices and/or temporary pavement markings should be placed on both
16 sides of the temporary ramp where it crosses the median and the closed roadway.
17 5. Advance guide signs providing information related to the temporary exit should be relocated or
18 duplicated adjacent to the temporary roadway.

19 **Standard:**

- 20 **6. A temporary EXIT sign shall be located in the temporary gore. For better visibility, it shall be**
21 **mounted a minimum of 7 feet from the pavement surface to the bottom of the sign.**

22 **Option:**

- 23 7. Guide signs referring to the exit may need to be relocated to the median.
24 8. The temporary EXIT sign placed in the temporary gore may be either black on orange or white on
25 green.
26 9. In some instances, a temporary deceleration lane may be useful in facilitating the exiting maneuver.
27 10. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic
28 signs may be omitted.

1 **Notes for Figure 6H-42—Typical Application 42**

2 **Work in the Vicinity of an Exit Ramp**

3 **Guidance:**

- 4 1. The guide signs should indicate that the ramp is open, and where the temporary ramp is located.
5 However, if the ramp is closed, guide signs should indicate that the ramp is closed.
6 2. When the exit ramp is closed, a black on orange EXIT CLOSED sign panel should be placed
7 diagonally across the interchange/intersection guide signs.
8 3. The design criteria contained in the AASHTO “Policy on the Geometric Design of Highways and
9 Streets” (see Section 1A.11) should be used for determining the alignment (~~see Section 1A.11~~).

10 **Standard:**

- 11 **4. A temporary EXIT sign shall be located in the temporary gore. For better visibility, it shall be**
12 **mounted a minimum of 7 feet from the pavement surface to the bottom of the sign.**

13 **Option:**

- 14 5. The temporary EXIT sign placed in the temporary gore may be either black on orange or white on
15 green.
16 6. An alternative procedure that may be used is to channelize exiting vehicular traffic onto the right-hand
17 shoulder and close the lane as necessary.

18 **Standard:**

- 19 **7. An arrow board shall be used when a freeway lane is closed. When more than one freeway lane**
20 **is closed, a separate arrow board shall be used for each closed lane.**

Notes for Figure 6H-43—Typical Application 43

Partial Exit Ramp Closure

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2
3
4
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Guidance:

1. Truck off-tracking should be considered when determining whether the minimum lane width of 10 feet is adequate (see Section 6G.08).

1 **Notes for Figure 6H-44—Typical Application 44**

2 **Work in the Vicinity of an Entrance Ramp**

3 Guidance:

- 4 1. An acceleration lane of sufficient length should be provided whenever possible as shown on the left
5 diagram.

6 **Standard:**

- 7 2. **For the information shown on the diagram on the right-hand side of the typical application,
8 where inadequate acceleration distance exists for the temporary entrance, the YIELD sign shall
9 be replaced with STOP signs (one on each side of the approach).**

10 Guidance:

- 11 3. When used, the YIELD or STOP sign should be located so that ramp vehicular traffic has adequate
12 sight distance of oncoming mainline vehicular traffic to select ~~a reasonably safe~~ an acceptable gap in
13 the mainline vehicular traffic flow, but should not be located so far forward that motorists will be
14 encouraged to stop in the path of the mainline traffic. Also, a longer acceleration lane should be
15 provided beyond the sign to reduce the gap size needed. If insufficient gaps are available,
16 consideration should be given to closing the ramp.
- 17 4. Where STOP signs are used, a temporary stop line should be placed across the ramp at the desired
18 stop location.
- 19 5. The mainline merging taper with the arrow ~~panel~~ board at its starting point should be located
20 sufficiently in advance so that the arrow ~~panel~~ board is not confusing to drivers on the entrance ramp,
21 and so that the mainline merging vehicular traffic from the lane closure has the opportunity to
22 stabilize before encountering the vehicular traffic merging from the ramp.
- 23 6. If the ramp curves sharply to the right, warning signs with advisory ~~speed limits~~ speeds located in
24 advance of the entrance terminal should be placed in pairs (one on each side of the ramp).

25 Option:

- 26 7. A Stop Beacon (see Section 4L.05) or a Type B high-intensity warning flasher with a red lens may be
27 placed above the STOP sign.
- 28 8. Where the acceleration distance is significantly reduced, a supplemental plaque may be placed below
29 the Yield Ahead sign reading NO MERGE AREA.

30 **Standard:**

- 31 **9. An arrow board shall be used when a freeway lane is closed. When more than one freeway lane**
32 **is closed, a separate arrow board shall be used for each closed lane.**

1 **Notes for Figure 6H-45—Typical Application 45**
2 **Temporary Reversible Lane Using Movable Barriers**

3 Support:

4 1. This application addresses one of several uses for movable barriers (see Section 6F.85) in highway
5 work zones. In this example, one side of a 6-lane divided highway is closed to perform the work
6 operation, and vehicular traffic is carried in both directions on the remaining 3-lane roadway by
7 means of a median crossover.

8 To accommodate unbalanced peak-period vehicular traffic volumes, the direction of travel in the
9 center lane is switched to the direction having the greater volume, with the transfer typically being
10 made twice daily. Thus, there are four vehicular traffic phases described as follows:

- 11 a. Phase A—two travel lanes northbound and one lane southbound;
- 12 b. Transition A to B—one travel lane in each direction;
- 13 c. Phase B—one travel lane northbound and two lanes southbound; and
- 14 d. Transition B to A—one travel lane in each direction.

15 The typical application on the left illustrates the placement of devices during Phase A. The typical
16 application on the right shows conditions during the transition (Transition A to B) from Phase A to
17 Phase B.

18 Guidance:

19 2. For the reversible-lane situation depicted, the ends of the movable barrier should terminate in a
20 protected area or a crash cushion should be provided. During Phase A, the transfer vehicle should be
21 parked behind the downstream end of the movable barrier for southbound traffic as shown in the
22 typical application on the left. During Phase B, the transfer vehicle should be parked behind between
23 the downstream ends of the movable barriers at the north end of the TTC zone as shown in the typical
24 application on the right.

25 The transition shift from Phase A to B should be as follows:

- 26 a. Change the signs in the northbound advance warning area and transition area from a LEFT LANE
27 CLOSED AHEAD to a 2 LEFT ~~TWO~~ LANES CLOSED AHEAD. Change the mode of the
28 second northbound arrow ~~panel~~ board from Caution to Right Arrow.
- 29 b. Place channelizing devices to close the northbound center lane.
- 30 c. Move the transfer vehicle from south to north to shift the movable barrier from the west side to
31 the east side of the reversible lane.
- 32 d. Remove the channelizing devices closing the southbound center lane.
- 33 e. Change the signs in the southbound transition area and advance warning area from a 2 LEFT
34 ~~TWO~~ LANES CLOSED AHEAD to a 1 LEFT LANE CLOSED AHEAD. Change the mode of the
35 second southbound arrow ~~panel~~ board from Right Arrow to Caution.

36 3. Where the lane to be opened and closed is an exterior lane (adjacent to the edge of the traveled way or
37 the work space), the lane closure should begin by closing the lane with channelizing devices placed
38 along a merging taper using the same information employed for a stationary lane closure. The lane
39 closure should then be extended with the movable-barrier transfer vehicle moving with vehicular
40 traffic. When opening the lane, the transfer vehicle should travel against vehicular traffic. The
41 merging taper should be removed in a method similar to a stationary lane closure.

42 Option:

- 43 4. The procedure may be used during a peak period of vehicular traffic and then changed to provide two
44 lanes in the other direction for the other peak.
- 45 5. A longitudinal buffer space may be used in the activity area to separate opposing vehicular traffic.
- 46 6. A work vehicle or a shadow vehicle may be equipped with a truck-mounted attenuator.

47 Standard:

48 7. An arrow board shall be used when a freeway lane is closed. When more than one freeway lane
49 is closed, a separate arrow board shall be used for each closed lane.

1 **Notes for Figure 6H-46—Typical Application 46**
2 **Work in the Vicinity of a ~~Highway-Rail~~ Grade Crossing**

3 **Guidance:**

- 4 1. When ~~highway-rail~~ grade crossings exist either within or in the vicinity of roadway work activities,
5 extra care should be taken to minimize the probability of conditions being created, ~~either~~ by lane
6 restrictions, flagging, or other operations, where vehicles might be stopped within the ~~highway-rail~~
7 grade crossing, considered as being 15 feet on either side of the closest and farthest rail.

8 **Standard:**

- 9 2. **If the queuing of vehicles across active rail tracks cannot be avoided, a uniformed law**
10 **enforcement officer or flagger shall be provided at the ~~highway-rail~~ grade crossing to prevent**
11 **vehicles from stopping within the ~~highway-rail~~ grade crossing (as described in Note 1), even if**
12 **automatic warning devices are in place.**

13 **Guidance:**

- 14 3. Early coordination with the railroad company or light rail transit agency should occur before work
15 starts.
16 4. In the example depicted, the buffer space of the activity area should be extended upstream of the
17 ~~highway-rail~~ grade crossing (as shown) so that a queue created by the flagging operation will not
18 extend across the ~~highway-rail~~ grade crossing.
19 5. The DO NOT STOP ON TRACKS sign should be used on all approaches to a ~~highway-rail~~ grade
20 crossing within the limits of a TTC zone.

21 **Option:**

- 22 6. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
23 7. A BE PREPARED TO STOP sign may be added to the sign series.

24 **Guidance:**

- 25 8. When used, the BE PREPARED TO STOP sign should be located before the Flagger symbol sign.

26 **Standard:**

- 27 9. **At night, flagger stations shall be illuminated, except in emergencies.**

CHAPTER 6I. CONTROL OF TRAFFIC THROUGH TRAFFIC INCIDENT MANAGEMENT AREAS

Section 6I.01 General

~~Support:~~

~~Whenever the acronym “TTC” is used in this Chapter, it refers to “temporary traffic control.”~~

~~Standard:~~

~~The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.~~

Support:

[The National Incident Management System \(NIMS\) requires the use of the Incident Command System \(ICS\) at traffic incident management scenes.](#)

A traffic incident is an emergency road user occurrence, a natural disaster, or other unplanned event that affects or impedes the normal flow of traffic.

A traffic incident management area is an area of a highway where temporary traffic controls are ~~imposed~~ [installed, by as authorized by a public authority or the officials having jurisdiction of the roadway](#), in response to a road user incident, natural disaster, hazardous material spill, or other unplanned incident. It is a type of TTC zone and extends from the first warning device (such as a sign, light, or cone) to the last TTC device or to a point where vehicles return to the original lane alignment and are clear of the incident.

Traffic incidents can be divided into three general classes of duration, each of which has unique traffic control characteristics and needs. These classes are:

- A. Major—expected duration of more than 2 hours,
- B. Intermediate—expected duration of 30 minutes to 2 hours, and
- C. Minor—expected duration under 30 minutes.

The primary functions of TTC at a traffic incident management area are to [inform road users of the incident and to provide guidance information on the path to follow through the incident area. Alerting road users and establishing a well defined path to guide road users through the incident area will serve to protect the incident responders and those involved in working at the incident scene and will aid in ~~move~~ moving road users ~~reasonably safely and~~ expeditiously past or around the traffic incident, ~~to will~~ reduce the likelihood of secondary traffic crashes, and ~~to will~~ preclude unnecessary use of the surrounding local road system.](#) Examples include a stalled vehicle blocking a lane, a traffic crash blocking the traveled way, a hazardous material spill along a highway, and natural disasters such as floods and severe storm damage.

Guidance:

In order to reduce response time for traffic incidents, highway agencies, appropriate public safety agencies (law enforcement, fire and rescue, emergency communications, emergency medical, and other emergency management), and private sector responders (towing and recovery and hazardous materials contractors) should mutually plan for occurrences of traffic incidents along the major and heavily traveled highway and street system.

On-scene responders ~~s organizations~~ should ~~be trained~~ [their personnel](#) in ~~safe~~ TTC practices for accomplishing their tasks in and near traffic [and in the requirements for traffic incident management contained in this Manual. On-scene responders should take measures to move the incident off the traveled roadway or to provide for appropriate warning. All on-scene responders and news media personnel should ~~always~~ constantly be aware of their visibility to oncoming traffic and ~~take measures to move the traffic incident as far off the traveled roadway as possible or to provide for appropriate warning~~ \[wear high-visibility apparel.\]\(#\)](#)

[Emergency vehicles should be safe-positioned \(see definition in Section 1A.13\) such that traffic flow through the incident scene is optimized. All emergency vehicles that subsequently arrive should be positioned in a manner that does not interfere with the established temporary traffic flow.](#)

Responders arriving at a traffic incident should, ~~within 15 minutes of arrival on scene~~, estimate the magnitude of the traffic incident, the expected time duration of the traffic incident, and the expected vehicle queue length, and then should set up the appropriate temporary traffic controls for these estimates.

Option:

1 Warning and guide signs used for TTC traffic incident management situations may have a black legend
2 and border on a fluorescent pink background (see Figure 6I-1).

3 Support:

4 While some traffic incidents might be anticipated and planned for, emergencies and disasters might pose
5 more severe and unpredictable problems. The ability to quickly install proper temporary traffic controls might
6 greatly reduce the effects of an incident, such as secondary crashes or excessive traffic delays. An essential
7 part of fire, rescue, spill clean-up, highway agency, and enforcement activities is the proper control of road
8 users through the traffic incident management area in order to protect responders, victims, and other personnel
9 at the site ~~while providing reasonably safe traffic flow~~. These operations might need corroborating legislative
10 authority for the implementation and enforcement of appropriate road user regulations, parking controls, and
11 speed zoning. It is desirable for these statutes to provide sufficient flexibility in the authority for, and
12 implementation of, TTC to respond to the needs of changing conditions found in traffic incident management
13 areas.

14 Option:

15 For traffic incidents, particularly those of an emergency nature, TTC devices on hand may be used for the
16 initial response as long as they do not themselves create unnecessary additional hazards.

17 **Section 6I.02 Major Traffic Incidents**

18 Support:

19 Major traffic incidents are typically traffic incidents involving hazardous materials, fatal traffic crashes
20 involving numerous vehicles, and other natural or man-made disasters. These traffic incidents typically
21 involve closing all or part of a roadway facility for a period exceeding 2 hours.

22 Guidance:

23 If the traffic incident is anticipated to last more than 24 hours, applicable procedures and devices set forth
24 in other Chapters of Part 6 should be used.

25 Support:

26 A road closure can be caused by a traffic incident such as a road user crash that blocks the traveled way.
27 Road users are usually diverted through lane shifts or detoured around the traffic incident and back to the
28 original roadway. A combination of traffic engineering and enforcement preparations is needed to determine
29 the detour route, and to install, maintain or operate, and then to remove the necessary traffic control devices
30 when the detour is terminated. Large trucks are a significant concern in such a detour, especially when
31 detouring them from a controlled-access roadway onto local or arterial streets.

32 During traffic incidents, large trucks might need to follow a route separate from that of automobiles
33 because of bridge, weight, clearance, or geometric restrictions. Also, vehicles carrying hazardous material
34 might need to follow a different route from other vehicles.

35 Some traffic incidents such as hazardous material spills might require closure of an entire highway.
36 Through road users must have adequate guidance around the traffic incident. Maintaining good public
37 relations is desirable. The cooperation of the news media in publicizing the existence of, and reasons for,
38 traffic incident management areas and their TTC can be of great assistance in keeping road users and the
39 general public well informed.

40 The establishment, maintenance, and prompt removal of lane diversions can be effectively managed by
41 interagency planning that includes representatives of highway and public safety agencies.

42 Guidance:

43 All traffic control devices needed to set up the TTC at a traffic incident should be available so that they
44 can be readily deployed for all major traffic incidents. The TTC should include the proper traffic diversions,
45 tapered lane closures, and upstream warning devices to alert ~~traffic of the end of a~~ queue
46 and to encourage early diversion to an appropriate alternative route.

47 Attention should be paid to the upstream end of the traffic queue such that warning is given to road users
48 approaching the ~~end~~ back of the queue.

49 If manual traffic control is needed, it should be provided by qualified flaggers or uniformed law
50 enforcement officers.

51 Option:

1 If flaggers are used to provide traffic control for an incident management situation, the flaggers may use
2 appropriate traffic control devices that are readily available or that can be brought to the traffic incident scene
3 on short notice.

4 Guidance:

5 When [light sticks or flares](#) are used to ~~initiate TTC~~ [establish the initial traffic control](#) at ~~traffic~~ incident
6 ~~scenes, more permanent traffic control~~ [channelizing](#) devices (see Section 6F.63) should ~~replace them~~ [be](#)
7 [installed](#) as soon [thereafter](#) as practical. ~~Both the flare and its supporting device should then be removed from~~
8 ~~the roadway.~~

9 [Option:](#)

10 [The light sticks or flares may remain in place if they are being used to supplement the channelizing](#)
11 [devices.](#)

12 [Guidance:](#)

13 [The light sticks, flares, and channelizing devices should be removed after the incident is terminated.](#)

14 ~~On scene responders should be trained in safe practices for accomplishing their tasks in and near traffic.~~
15 ~~Responders should always be aware of their visibility to oncoming traffic and take measures to move the~~
16 ~~traffic incident as far off the traveled roadway as possible or to provide for appropriate warning.~~

17 **Section 6I.03 Intermediate Traffic Incidents**

18 Support:

19 Intermediate traffic incidents typically affect travel lanes for a time period of 30 minutes to 2 hours, and
20 usually require traffic control on the scene to divert road users past the blockage. Full roadway closures might
21 be needed for short periods during traffic incident clearance to allow traffic incident responders to accomplish
22 their tasks.

23 The establishment, maintenance, and prompt removal of lane diversions can be effectively managed by
24 interagency planning that includes representatives of highway and public safety agencies.

25 Guidance:

26 All traffic control devices needed to set up the TTC at a traffic incident should be available so that they
27 can be readily deployed for intermediate traffic incidents. The TTC should include the proper traffic
28 diversions, tapered lane closures, and upstream warning devices to alert [traffic](#) approaching ~~traffic of the end~~
29 ~~of a~~ [queue](#) [and to encourage early diversion to an appropriate alternative route.](#)

30 Attention should be paid to the [upstream](#) end of the traffic queue such that warning is given to road users
31 approaching the ~~end~~ [back](#) of the queue.

32 If manual traffic control is needed, it should be provided by qualified flaggers or uniformed law
33 enforcement officers.

34 [Option:](#)

35 If flaggers are used to provide traffic control for an incident management situation, the flaggers may use
36 appropriate traffic control devices that are readily available or that can be brought to the traffic incident scene
37 on short notice.

38 Guidance:

39 When [light sticks or flares](#) are used to ~~initiate TTC~~ [establish the initial traffic control](#) at ~~traffic~~ incident
40 ~~scenes, more permanent traffic control~~ [channelizing](#) devices (see Section 6F.63) should ~~replace them~~ [be](#)
41 [installed](#) as soon [thereafter](#) as practical. ~~Both the flare and its supporting device should then be removed from~~
42 ~~the roadway.~~

43 [Option:](#)

44 [The light sticks or flares may remain in place if they are being used to supplement the channelizing](#)
45 [devices.](#)

46 [Guidance:](#)

47 [The light sticks, flares, and channelizing devices should be removed after the incident is terminated.](#)

48 ~~On scene responders should be trained in safe practices for accomplishing their tasks in and near traffic.~~
49 ~~Responders should always be aware of their visibility to oncoming traffic and take measures to move the~~
50 ~~traffic incident as far off the traveled roadway as possible or to provide for appropriate warning.~~

1 **Section 6I.04 Minor Traffic Incidents**

2 Support:

3 Minor traffic incidents are typically disabled vehicles and minor crashes that result in lane closures of less
4 than 30 minutes. On-scene responders are typically law enforcement and towing companies, and occasionally
5 highway agency service patrol vehicles.

6 Diversion of traffic into other lanes is often not needed or is needed only briefly. It is not generally
7 possible or practical to set up a lane closure with traffic control devices for a minor traffic incident. Traffic
8 control is the responsibility of on-scene responders.

9 Guidance:

10 When a minor traffic incident blocks a travel lane, it should be removed from that lane to the shoulder as
11 quickly as possible.

12 **Section 6I.05 Use of Emergency-Vehicle Lighting**

13 Support:

14 The use of emergency-vehicle lighting (such as high-intensity rotating, flashing, oscillating, or strobe
15 lights) is essential, especially in the initial stages of a traffic incident, for the safety of emergency responders
16 and persons involved in the traffic incident, as well as road users approaching the traffic incident.
17 Emergency-vehicle lighting, however, provides warning only and provides no effective traffic control. ~~It is~~
18 ~~often confusing to~~ [The use of too many lights at an incident scene can be distracting and can create confusion](#)
19 [for approaching](#) road users, especially at night. Road users approaching the traffic incident from the opposite
20 direction on a divided facility are often distracted by emergency-vehicle lighting and slow their vehicles to
21 look at the traffic incident posing a hazard to themselves and others traveling in their direction.

22 The use of emergency-vehicle lighting can be reduced if good traffic control has been established at a
23 traffic incident scene. This is especially true for major traffic incidents that might involve a number of
24 emergency vehicles. If good traffic control is established through placement of advanced warning signs and
25 traffic control devices to divert or detour traffic, then public safety agencies can perform their tasks on scene
26 with minimal emergency-vehicle lighting.

27 Guidance:

28 Public safety agencies should examine their policies on the use of emergency-vehicle lighting, especially
29 after a traffic incident scene is secured, with the intent of reducing the use of this lighting as much as possible
30 while not endangering those at the scene. Special consideration should be given to reducing or extinguishing
31 forward facing emergency-vehicle lighting, especially on divided roadways, to reduce distractions to
32 oncoming road users.

33 [Because the glare from floodlights or vehicle headlights can impair the nighttime vision of approaching](#)
34 [road users, any floodlights or](#) vehicle headlights [that are](#) not needed for illumination, or to provide notice to
35 other road users of ~~the~~ [an](#) incident response vehicle being in an unexpected location, should be turned off at
36 night.

CHAPTER 7A. GENERAL

Section 7A.01 Need for Standards

Support:

~~It is important to stress that~~ Regardless of the school location, the best way to achieve ~~reasonably safe and~~ effective traffic control is through the uniform application of realistic policies, practices, and standards developed through engineering judgment or studies.

Pedestrian safety depends upon public understanding of accepted methods for efficient traffic control. This principle is especially important in the control of pedestrians, bicycles, and other vehicles in the vicinity of schools. Neither pedestrians on their way to or from school nor other road users can be expected to move safely in school areas unless they understand both the need for traffic controls and how these controls function for their benefit.

Procedures and devices that are not uniform might cause confusion among pedestrians and other road users, prompt wrong decisions, and contribute to crashes. To achieve uniformity of traffic control in school areas, comparable traffic situations need to be treated in a consistent manner. Each traffic control device and control method described in Part 7 fulfills a specific function related to specific traffic conditions.

A uniform approach to school area traffic controls assures the use of similar controls for similar situations, ~~(which promotes~~ appropriate and uniform behavior on the part of motorists, pedestrians, and bicyclists~~).~~

A school traffic control plan permits the orderly review of school area traffic control needs, and the coordination of school/pedestrian safety education and engineering ~~activities~~ measures. Engineering measures alone do not always result in the intended change in student and road user behavior.

Guidance:

A school route plan for each school serving elementary to high school students should be prepared in order to develop uniformity in the use of school area traffic controls and to serve as the basis for a school traffic control plan for each school.

The school route plan, developed in a systematic manner by the school, law enforcement, and traffic officials responsible for school pedestrian safety, should consist of a map (see Figure 7A-1) showing streets, the school, existing traffic controls, established school walk routes, and established school crossings.

The type(s) of school area traffic control devices used, either warning or regulatory, should be related to the volume and speed of vehicular traffic, street width, and the number and age of the students using the crossing.

School area traffic control devices should be included in a school traffic control plan.

Support:

Reduced speed limit signs for school areas and crossings are included in this Manual solely for the purpose of standardizing signing for these zones and not as an endorsement of mandatory reduced speed zones.

“School” and “school zone” are defined in Section 1A.13.

Section 7A.02 School Routes and Established School Crossings

Support:

To establish a safer route to and from school for schoolchildren, the application of ~~The~~ planning criterion for school walk routes might make it necessary for children to walk an indirect route to an established school crossing located where there is existing traffic control and to avoid the use of a direct crossing where there is no existing traffic control.

Guidance:

School walk routes should be planned to take advantage of existing traffic controls.

The following factors should be considered when determining the feasibility of requiring children to walk a longer distance to a crossing with existing traffic control:

- A. The availability of adequate sidewalks or ~~off-roadway sidewalk areas~~ other pedestrian walkways to and from the location with existing control,
- B. The number of students using the crossing,
- C. The age levels of the students using the crossing, and
- D. The total extra walking distance.

1 **Section 7A.03 School Crossing Control Criteria**

2 Support:

3 ~~Alternate~~ The frequency of gaps ~~and blockades are inherent~~ in the traffic stream that are sufficient for
4 student crossing ~~and are is~~ different at each crossing location. ~~For safety, students need to wait for a gap in~~
5 ~~traffic that is of sufficient duration to permit reasonably safe crossing.~~ When the delay between the
6 occurrences of adequate gaps becomes excessive, students might become impatient and endanger themselves
7 by attempting to cross the street during an inadequate gap. In these instances, the creation of sufficient gaps
8 needs to be considered to accommodate the crossing demand.

9 A recommended method for determining the frequency and adequacy of gaps in the traffic stream is given
10 in the ~~Institute of Transportation Engineers’ publication, “School Trip Safety Program Guidelines”~~ “Traffic
11 Control Devices Handbook” (see Section 1A.11).

12 **Section 7A.04 Scope**

13 Standard:

14 Part 7 sets forth basic principles and prescribes standards that shall be followed in the design,
15 application, installation, and maintenance of all traffic control devices (including signs, signals, and
16 markings) and other controls (including adult crossing guards, ~~student patrols, and grade-separated~~
17 ~~crossings~~) required for the special pedestrian conditions in school areas.

18 ~~Option:~~

19 ~~In roadway signs for school traffic control areas may be used consistent with the requirements of Sections~~
20 ~~2B.12, 7B.08, and 7B.09.~~ **relocated to Section 7B.03**

21 Support:

22 Sections 1A.01 and 1A.08 contain information regarding unauthorized devices and messages. Sections
23 1A.02 and 1A.07 contain information regarding the application of standards. Section 1A.05 contains
24 information regarding the maintenance of traffic control devices. Section 1A.08 contains information
25 regarding placement authority for traffic control devices. Section 1A.09 contains information regarding
26 engineering studies and the assistance that is available to jurisdictions that do not have engineers on their
27 staffs who are trained and/or experienced in traffic control devices. **relocated from Sections 7A.05 through**
28 **7A.09**

29 ~~Requirements~~ Provisions discussed contained in Chapter 2A and Section 2B.06 are applicable in school
30 areas.

31 Part 3 contains provisions regarding pavement markings that are applicable in school areas.

32 Part 4 contains provisions regarding highway traffic signals that are applicable in school areas. The
33 School Crossing signal warrant is described in Section 4C.06.

34 ~~**Section 7A.05 Application of Standards**~~

35 ~~Support:~~

36 ~~Sections 1A.02 and 1A.07 contain information regarding the application of standards.~~

37 ~~**Section 7A.06 Engineering Study Required**~~

38 ~~Support:~~

39 ~~Section 1A.09 contains information regarding engineering studies.~~

40 ~~**Section 7A.07 Maintenance of Traffic Control Devices**~~

41 ~~Support:~~

42 ~~Section 1A.05 contains information regarding the maintenance of traffic control devices.~~

43 ~~**Section 7A.08 Placement Authority**~~

44 ~~Support:~~

45 ~~Section 1A.08 contains information regarding placement authority for traffic control devices.~~

46 ~~**Section 7A.09 Unauthorized Devices and Messages**~~

47 ~~Support:~~

1 ~~Sections 1A.01 and 1A.08 contain information regarding unauthorized devices and messages.~~ Sections
2 7A.05 through 7A.09 relocated to Section 7A.04

3 ~~Section 7A.10 Meaning of Standard, Guidance, Option, and Support~~
4 ~~Support:~~

5 ~~The introduction to this Manual contains information regarding the meaning of the headings Standard,~~
6 ~~Guidance, Option, and Support, and the use of the words shall, should, and may.~~

CHAPTER 7B. SIGNS

Section 7B.01 Size of School Signs

Standard:

Except as provided in Section 2A.11, the sizes of signs and plaques to be used on conventional roadways in school areas shall be as shown in Table 7B-1.

The sizes in the Conventional Road sign-size column 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 sizes in the Minimum sign-size column ~~may~~ shall be used only on local residential streets, in urban areas, and where ~~there are low~~ traffic volumes are low and ~~low vehicle~~ speeds are 30 mph or lower, as determined by engineering judgment.

The sizes in the Oversized sign-size column shall be used on expressways.

Guidance:

The sizes in the Oversized column 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 sign-size column may also be used ~~for applications~~ at other locations that require increased emphasis, improved recognition, or increased legibility.

Signs and plaques larger than those shown in Table 7B-1 may be used (see Section 2A.11).

Section 7B.02 Illumination and Reflectorization

Standard:

The signs used for school area traffic control shall be retroreflectorized or illuminated.

Section 7B.03 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.

~~Guidance:~~

~~Signs should be placed in positions where they will convey their messages most effectively without restricting lateral clearance or sight distances. Placement therefore should consider highway design, alignment, vehicle speed, and roadside development.~~

~~Signs should have a maximum practical clearance from the edge of the traveled way for the safety of vehicles that might leave the roadway and strike the sign supports. Except as noted in the Option, signs should not be closer than 6 feet from the edge of a paved shoulder, or if none, 12 feet from the edge of the traveled way.~~

Option:

~~In urban areas, a lesser clearance of not less than 2 feet from the face of the curb may be used. In urban areas, where sidewalk width is limited or existing poles are close to the curb, a clearance of 1 foot from the curb face may be used.~~

In-roadway signs for school traffic control areas may be used consistent with the requirements of Sections 2B.12, 7B.08, and 7B.12, relocated from Section 7A.04

Section 7B.04 Height of Signs

Support:

Section 2A.18 contains ~~information~~ provisions regarding the mounting height of signs.

Section 7B.05 Installation of Signs

Support:

Section 2A.16 contains ~~information~~ provisions regarding the installation of signs.

1 **Section 7B.06 Lettering**

2 Support:

3 The ~~Federal Highway Administration's~~ "Standard Highway Signs and Markings" book (see Section
4 1A.11) contains information regarding sign lettering.

5 **Section 7B.07 Sign Color for School Warning Signs**

6 Standard:

7 ~~Except as noted in the Option,~~ School warning signs, including the "SCHOOL" portion of the
8 School Speed Limit (S5-1) sign and including any supplemental plaques used in association with these
9 warning signs, shall have a fluorescent yellow-green background with a black legend and border unless
10 otherwise stated provided in this Manual for a specific sign.

11 ~~Option:~~

12 ~~All school warning signs in addition to the following signs may have a fluorescent yellow-green~~
13 ~~background with a black legend and border:~~

- 14 ~~A. School Advance Warning sign (S1-1),~~
- 15 ~~B. SCHOOL BUS STOP AHEAD sign (S3-1),~~
- 16 ~~C. SCHOOL plaque (S4-3),~~
- 17 ~~D. The "SCHOOL" portion of the School Speed Limit sign (S5-1),~~
- 18 ~~E. XXX FEET plaque (W16-2 series),~~
- 19 ~~F. AHEAD plaque (W16-9p),~~
- 20 ~~G. Diagonal Arrow plaque (W16-7p), and~~
- 21 ~~H. Reduced Speed School Zone Ahead sign (S4-5, S4-5a).~~

22 ~~Guidance:~~

23 ~~When the fluorescent yellow-green background color is used, a systematic approach featuring one~~
24 ~~background color within a zone or area should be used. The mixing of standard yellow and fluorescent~~
25 ~~yellow-green backgrounds within a zone or area should be avoided.~~

26 **Section 7B.08 School Advance Warning Assembly Sign (S1-1 with Supplemental Plaque) and**
27 **Plaques**

28 ~~Guidance:~~

29 ~~The School Advance Warning assembly (see Figure 7B-1) should be installed in advance of locations~~
30 ~~where school buildings or grounds are adjacent to the highway, except where a physical barrier such as~~
31 ~~fencing separates schoolchildren from the highway.~~

32 ~~Standard:~~

33 ~~The School Advance Warning assembly shall be used in advance of any installation of the School~~
34 ~~Crosswalk Warning assembly (see Figure 7B-2), or in advance of the first installation of the School~~
35 ~~Speed Limit assembly (see Figure 7B-3).~~

36 ~~If used, the School Advance Warning assembly shall be installed not less than 150 feet or more than~~
37 ~~700 feet in advance of the school grounds or school crossings.~~

38 ~~If used, the School Advance Warning assembly shall consist of a School Advance Warning (S1-1)~~
39 ~~sign supplemented with a plaque with the legend AHEAD (W16-9p) or XXX METERS (XXX FEET)~~
40 ~~(W16-2 or W16-2a) to provide advance notice to road users of crossing activity.~~

41 Support:

42 Many state and local jurisdictions find it beneficial to advise road users that they are approaching a school
43 that is adjacent to a highway, where additional care is needed, even though no school crossing is involved and
44 the speed limit remains unchanged. Additionally, some jurisdictions designate school zones that have a
45 unique legal standing in that fines for speeding or other traffic violations within designated school zones are
46 increased or special enforcement techniques such as photo radar systems are used. It is important and
47 sometimes legally necessary to mark the beginning and end points of these designated school zones so that the
48 road user is given proper notice.

49 The School (S1-1) sign (see Figure 7B-1) has the following four applications:

- 1 A. School Area – the S1-1 sign can be used to warn road users that they are approaching a school area
2 that might include school buildings or grounds, a school crossing, or school related activity adjacent
3 to the highway.
- 4 B. School Zone – the S1-1 sign can be used to identify the location of the beginning of a designated
5 school zone (see Section 7B.09).
- 6 C. School Advance Crossing – if combined with an AHEAD (W16-9P) plaque or an XX FEET (W16-2P
7 or W16-2aP) plaque to comprise the School Advance Crossing assembly, the S1-1 sign can be used to
8 warn road users that they are approaching a crossing where schoolchildren cross the roadway (see
9 Section 7B.11).
- 10 D. School Crossing – if combined with a diagonal downward pointing arrow (W16-7P) plaque to
11 comprise the School Crossing assembly, the S1-1 sign can be used to warn approaching road users of
12 the location of a crossing where schoolchildren cross the roadway (see Section 7B.12).

13 Option:

14 If a school area is located on a cross street in close proximity to the intersection, a School (S1-1) sign with
15 a supplemental arrow (W16-5P or W16-6P) plaque may be installed on each approach of the street or highway
16 to warn road users making a turn onto the cross street that they will encounter a school area soon after making
17 the turn.

18 **Section 7B.09 School Zone Sign (S1-1) and Plaques (S4-3P, S4-7P) and END SCHOOL ZONE**
19 **Sign (S5-2)**

20 **Standard:**

21 **If a school zone has been designated under State or local statute, a School (S1-1) sign (see Figure**
22 **7B-1) shall be installed to identify the beginning point(s) of the designated school zone (see Figure 7B-2).**

23 Option:

24 A School Zone (S1-1) sign may be supplemented with a SCHOOL (S4-3P) plaque (see Figure 7B-1).

25 A School Zone (S1-1) sign may be supplemented with an ALL YEAR (S4-7P) plaque (see Figure 7B-1) if
26 the school operates on a 12-month schedule.

27 The downstream end of a designated school zone may be identified with an END SCHOOL ZONE (S5-2)
28 sign (see Figures 7B-1 and 7B-2).

29 If a school zone is located on a cross street in close proximity to the intersection, a School Zone (S1-1)
30 sign with a supplemental arrow (W16-5P or W16-6P) plaque may be installed on each approach of the street
31 or highway to warn road users making a turn onto the cross street that they will encounter a school zone soon
32 after making the turn.

33 **Section 7B.10 Higher Fines Zone Signs (R2-10, R2-11) and Plaques**

34 **Standard:**

35 **Where increased fines are imposed for traffic violations within a designated school zone, a BEGIN**
36 **HIGHER FINES ZONE (R2-10) sign (see Figure 7B-1) or a FINES HIGHER (R2-6P), FINES DOUBLE**
37 **(R2-6aP), or \$XX FINE (R2-6bP) plaque (see Figure 2B-3) shall be installed as a supplement to the**
38 **School Zone (S1-1) sign to identify the beginning point of the higher fines zone (see Figures 7B-2 and**
39 **7B-3).**

40 Option:

41 Where appropriate, one of the following plaques may be mounted below the sign that identifies the
42 beginning point of the higher fines zone:

43 A. An S4-1P plaque (see Figure 7B-1) specifying the times that the higher fines are in effect,

44 B. A WHEN CHILDREN ARE PRESENT (S4-2P) plaque (see Figure 7B-1), or

45 C. A WHEN FLASHING (S4-4P) plaque (see Figure 7B-1) if used in conjunction with a yellow flashing
46 beacon.

47 **Standard:**

48 **Where a BEGIN HIGHER FINES ZONE (R2-10) sign or a FINES HIGHER (R2-6P) plaque**
49 **supplementing a School Zone (S1-1) sign is posted to notify road users of increased fines for traffic**
50 **violations, an END HIGHER FINES ZONE (R2-11) sign (see Figure 7B-1) or an END SCHOOL ZONE**
51 **(S5-2) sign shall be installed at the downstream end of the zone to notify road users of the termination**
52 **of the increased fines zone (see Figures 7B-2 and 7B-3).**

1 Section 7B.11 School Advance Crossing Assembly

2 Standard:

3 The School Advance Crossing assembly (see Figure 7B-1) shall consist of a School (S1-1) sign
4 supplemented with an AHEAD (W16-9P) plaque or an XX FEET (W16-2P or W16-2aP) plaque.

5 Except as provided in Paragraph 3, a School Advance Crossing assembly shall be used in advance
6 (see Table 2C-4 for advance placement guidelines) of the first School Crossing assembly (see Section
7 7B.12) that is encountered in each direction as traffic approaches a school crosswalk (see Figure 7B-4).

8 Option:

9 The School Advance Crossing assembly may be omitted (see Figure 7B-5) where a School Zone (S1-1)
10 sign (see Section 7B.09) is installed to identify the beginning of a school zone in advance of the School
11 Crossing assembly.

12 If a school crosswalk is located on a cross street in close proximity to an intersection, a School Advance
13 Crossing assembly with a supplemental arrow (W16-5P or W16-6P) plaque may be installed on each approach
14 of the street or highway to warn road users making a turn onto the cross street that they will encounter a
15 school crosswalk soon after making the turn.

16 A 12-inch reduced size in-street School ~~Advance Warning~~ (S1-1) sign (see Figure 7B-6), installed in
17 compliance with the mounting height and ~~breakaway~~ special mounting support requirements for In-Street
18 Pedestrian Crossing (R1-6 or R1-6a) signs (see Section 2B.12), may be used in advance of a school crossing
19 to supplement the ~~ground-~~ post-mounted school warning signs. A 12 x 6-inch reduced size AHEAD (W16-
20 9P) plaque may be mounted below the reduced size in-street School ~~Advance Warning~~ (S1-1) sign. **relocated**
21 **from Section 7B.08**

22 Section ~~7B.09~~ 7B.12 School ~~Crosswalk Warning~~ Crossing Assembly (S1-1 with Diagonal
23 Arrow)

24 Standard:

25 **If used, the School ~~Crosswalk Warning~~ Crossing assembly (see Figure 7B-1) shall be installed at the**
26 **~~marked crosswalk~~ school crossing (see Figures 7B-4 and 7B-5), or as close to it as possible, and shall**
27 **consist of a School ~~Advance Warning~~ (S1-1) sign supplemented with a diagonal downward pointing**
28 **arrow (W16-7P) plaque to show the location of the crossing.**

29 **The School ~~Crosswalk Warning~~ Crossing assembly shall not be used at ~~marked crosswalks~~**
30 **crossings other than those adjacent to schools and those on established school pedestrian routes.**

31 **The School ~~Crosswalk Warning~~ Crossing assembly shall not be installed on approaches controlled**
32 **by a STOP or YIELD sign.**

33 ~~Guidance:~~

34 ~~The School Crosswalk Warning assembly should be installed at marked crosswalk(s), including those at~~
35 ~~signalized locations, used by students going to and from school (see Figure 7B-2) as determined by an~~
36 ~~engineering study.~~

37 Option:

38 The In-Street Pedestrian Crossing (R1-6 or R1-6a) sign (see Section 2B.12 and Figure 7B-6) or the In-
39 Street Schoolchildren Crossing (R1-6b or R1-6c) sign (see Figure 7B-6) may be used at unsignalized school
40 crossings. ~~When~~ **If** used at a school crossing, a 12 x 4-inch SCHOOL (S4-3P) plaque (see Figure 7B-6) may
41 be mounted above the sign. The STATE LAW legend on the R1-6 series signs may be omitted.

42 The Overhead Pedestrian Crossing (R1-9 or R1-9a) sign (see Section 2B.12 and Figure 2B-2) may be
43 modified to replace the standard pedestrian symbol with the standard schoolchildren symbol and may be used
44 at unsignalized school crossings. The STATE LAW legend on the R1-9 series signs may be omitted.

45 A 12-inch reduced size in-street School ~~Advance Warning~~ (S1-1) sign (see Figure 7B-6) may be used at
46 an unsignalized school crossing instead of the In-Street Pedestrian Crossing (R1-6 or R1-6a) or the In-Street
47 Schoolchildren Crossing (R1-6b or R1-6c) sign. A 12 x 6-inch reduced size diagonal downward pointing
48 arrow (W16-7P) plaque may be mounted below the reduced size in-street School ~~Advance Warning~~ (S1-1)
49 sign.

50 Standard:

51 **If an In-Street Pedestrian Crossing sign, an In-Street Schoolchildren Crossing sign, or a reduced**
52 **size in-street School ~~Advance Warning~~ (S1-1) sign is placed in the roadway, the sign support shall**

1 comply with the mounting height and ~~breakaway~~ special mounting support requirements for In-Street
2 Pedestrian Crossing (R1-6 or R1-6a) signs (see Section 2B.12).

3 The In-Street Pedestrian Crossing sign, the In-Street Schoolchildren Crossing sign, the Overhead
4 Pedestrian Crossing sign, and the reduced size in-street School ~~Advance Warning~~ (S1-1) sign shall not
5 be used at signalized locations.

6 Section ~~7B.10~~ 7B.13 ~~SCHOOL BUS STOP AHEAD~~ School Bus Stop Ahead Sign (S3-1)

7 Guidance:

8 The ~~SCHOOL BUS STOP AHEAD~~ School Bus Stop Ahead (S3-1) sign (see Figure 7B-1) should be
9 installed in advance of locations where a school bus, when stopped to pick up or discharge passengers, is not
10 visible to road users for an adequate distance ~~of 500 feet in advance~~ and where there is no opportunity to
11 relocate the school bus stop to provide ~~500 feet of visibility~~ adequate sight distance.

12 Section 7B.14 SCHOOL BUS TURN AHEAD Sign (S3-2)

13 Option:

14 The SCHOOL BUS TURN AHEAD (S3-2) sign (see Figure 7B-1) may be installed in advance of
15 locations where a school bus turns around on a roadway at a location not visible to approaching road users for
16 a distance as determined by the “0” column under Condition B of Table 2C-4, and where there is no
17 opportunity to relocate the school bus turn around to provide the distance provided in Table 2C-4.

18 Section ~~7B.11~~ 7B.15 School Speed Limit Assembly (S4-1P, S4-2P, S4-3P, S4-4P, S4-6P, S5-1) 19 and END SCHOOL SPEED LIMIT Sign (S5-3)

20 **Standard:**

21 A School Speed Limit assembly (see Figure 7B-1) or a School Speed Limit (S5-1) sign (see Figure
22 7B-1) shall be used to indicate the speed limit where a reduced school speed limit zone ~~for a school area~~
23 has been established ~~(in accordance with law based upon an engineering study)~~ or where a reduced
24 school speed limit is specified for such areas by statute. The School Speed Limit assembly or School
25 Speed Limit sign shall be placed at or as near as practical to the point where the reduced school speed
26 limit zone begins (see Figures 7B-3 and 7B-5).

27 If a reduced school speed limit zone has been established, a School (S1-1) sign shall be installed in
28 advance (see Table 2C-4 for advance placement guidelines) of the first School Speed Limit sign
29 assembly or S5-1 sign that is encountered in each direction as traffic approaches the reduced school
30 speed limit zone (see Figures 7B-3 and 7B-5).

31 Where increased fines are imposed for traffic violations within a reduced school speed limit zone, a
32 FINES HIGHER (R2-6P), FINES DOUBLE (R2-6aP), or \$XX FINE (R2-6bP) plaque (see Figure 2B-3)
33 shall be installed as a supplement to the reduced school speed limit sign to notify road users.

34 Except as provided in Paragraph 5, the downstream end of an authorized and posted reduced
35 school speed limit zone shall be marked identified with a standard Speed Limit sign showing the speed
36 limit for the section of highway that follows or with an END SCHOOL ~~ZONE~~ SPEED LIMIT (S5-23)
37 sign (see Figures 7B-1 and 7B-5). ~~relocated from Section 7B.13~~

38 Option:

39 If a reduced school speed limit zone ends at the same point as a higher fines zone, an END SCHOOL
40 ZONE (S5-2) sign may be used instead of a combination of an END HIGHER FINES ZONE (R2-11) sign
41 and an END SCHOOL SPEED LIMIT (S5-3) sign.

42 A standard Speed Limit sign showing the speed limit for the section of highway that is downstream from
43 the authorized and posted reduced school speed limit zone may be mounted on the same post above the END
44 SCHOOL SPEED LIMIT (S5-3) sign or the END SCHOOL ZONE (S5-2) sign.

45 **Guidance:**

46 ~~The reduced speed zone should begin either at a point 200 feet from the crosswalk, or at a point 100 feet~~
47 ~~from the school property line, based on whichever is encountered first as traffic approaches the school. The~~
48 beginning point of a reduced school speed limit zone should be at least 200 feet in advance of the school
49 grounds, a school crossing, or other school related activities; however, this 200-foot distance should be
50 increased if the reduced school speed limit is 30 mph or higher.

51 **Standard:**

1 The School Speed Limit assembly shall be either a fixed-message sign assembly or a changeable
2 message sign.

3 The fixed-message School Speed Limit assembly shall consist of a top plaque (S4-3P) with the
4 legend SCHOOL, a Speed Limit (R2-1) sign, and a bottom plaque (S4-1P, S4-2P, S4-4P, or S4-6P)
5 indicating the specific periods of the day and/or days of the week that the special school speed limit is in
6 effect (see Figure 7B-1).

7 Option:

8 Changeable message signs (see ~~Sections 2A.07~~ Chapter 2L and Section 6F.60) may be used to inform
9 drivers of the ~~special~~ school speed limit. If the sign is internally illuminated, it may have a white legend on a
10 black background. Changeable message signs with flashing beacons may be used for ~~the more critical~~
11 situations, where greater emphasis of the special school speed limit is needed.

12 Guidance:

13 Even though it might not always be practical because of special features to make changeable message
14 signs conform in all respects to the ~~accepted~~ standards in this Manual for fixed-message signs, during the
15 periods that the school speed limit is in effect, their basic shape, message, legend layout, and colors should
16 ~~conform to~~ comply with the standards for fixed-message signs.

17 A confirmation ~~beacon~~ light or device to indicate that the speed limit message is in operation should be
18 considered for inclusion on the back of the changeable message sign.

19 **Option Standard:**

20 Fluorescent yellow-green pixels ~~may~~ shall be used when ~~the school-related~~ “SCHOOL” messages
21 ~~are is shown displayed~~ on a changeable message sign for a school speed limit.

22 Option:

23 Changeable message signs may use blank-out messages or other methods in order to display the school
24 speed limit only during the periods it applies.

25 Changeable message signs that display the speed of approaching drivers (see Section 2B.13) may be used
26 in a school speed limit zone.

27 A Speed Limit Sign Beacon (see Section 4L.04) also may be used, with a WHEN FLASHING legend, to
28 identify the periods that the school speed limit is in effect. ~~The lenses of the Speed Limit Sign Beacon may be~~
29 ~~positioned within the face of the School Speed Limit (S5-1) sign (see Figure 7B-1).~~

30 ~~A FINES HIGHER (R2-6) sign (see Section 2B.17) may be used to advise road users when increased~~
31 ~~finer are imposed for traffic violations in school zones.~~

32 **Section ~~7B.12~~ 7B.16 Reduced ~~Speed~~ School ~~Zone~~ Speed Limit Ahead Sign (S4-5, S4-5a)**

33 **Option Guidance:**

34 ~~The A~~ Reduced ~~Speed~~ School ~~Zone~~ Speed Limit Ahead (S4-5, S4-5a) sign (see Figure 7B-1) ~~may~~ should
35 be used to inform road users of a reduced speed zone ~~when~~ where the speed limit is being reduced by more
36 than 10 mph, or where engineering judgment indicates that advance notice would be appropriate.

37 **Standard:**

38 **If used, the Reduced ~~Speed~~ School ~~Zone~~ Speed Limit Ahead sign shall be followed by a School**
39 **Speed Limit sign or a School Speed Limit assembly.**

40 **The speed limit displayed on the Reduced ~~Speed~~ School ~~Zone~~ Speed Limit Ahead sign shall be**
41 **identical to the speed limit displayed on the subsequent School Speed Limit sign or School Speed Limit**
42 **assembly.**

43 ~~Section 7B.13 END SCHOOL ZONE Sign (S5-2)~~

44 ~~Standard:~~

45 ~~The end of an authorized and posted school speed zone shall be marked with a standard Speed~~
46 ~~Limit sign showing the speed limit for the section of highway that follows or with an END SCHOOL~~
47 ~~ZONE (S5-2) sign (see Figure 7B-1).~~ relocated to Section 7B.15

48 **Section ~~7B.14~~ 7B.17 Parking and Stopping Signs (R7 and R8 Series)**

49 Option:

1 Parking and stopping regulatory signs may be used to prevent parked or waiting vehicles from blocking
2 pedestrians' views, and drivers' views of pedestrians, and to control vehicles as a part of the school traffic
3 plan.

4 Support:

5 Parking signs and other signs governing the stopping and standing of vehicles in school areas cover a
6 wide variety of regulations. Typical examples of regulations are as follows:

- 7 A. No Parking X:XX AM to X:XX PM School Days Only,
- 8 B. No Stopping X:XX AM to X:XX PM School Days Only,
- 9 C. XX Min Loading X:XX AM to X:XX PM School Days Only, and
- 10 D. No Standing X:XX AM to X:XX PM School Days Only.

11 Sections 2B.46, 2B.47, and 2B.48 contain information regarding the signing of parking regulations in
12 school zone areas.

CHAPTER 7C. MARKINGS

Section 7C.01 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 an 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 ~~obliterated~~ [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.

~~Section 7C.02~~ Standardization of Application

~~Standard:~~

~~Each standard marking shall be used only to convey the meaning prescribed for it in this Manual.~~

Section ~~7C.03~~ [7C.02](#) Crosswalk Markings

~~Support:~~

~~Crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, and on approaches to other intersections where traffic stops.~~

~~Crosswalk markings also serve to alert road users of a pedestrian crossing point across roadways not controlled by highway traffic signals or STOP signs.~~

~~At nonintersection locations, crosswalk markings legally establish the crosswalk.~~

~~Standard:~~

~~When transverse crosswalk lines are used, they shall be solid white, marking both edges of the crosswalk, except as noted in the Option. They shall be not 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 on both sides of the crosswalk, should extend across the full width of pavement or to the edge of the intersecting crosswalk to discourage diagonal walking between crosswalks.~~

Crosswalks should be marked at all intersections on established routes to [a](#) school where there is substantial conflict between motorists, bicyclists, and ~~pedestrian~~ [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 ~~they are~~ [a marked crosswalk is](#) installed at [a](#) location~~s~~ away from [a](#) ~~highway~~ traffic [control](#) signal~~s~~ or [an approach controlled by a STOP or YIELD sign](#).

[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.](#)

~~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. When diagonal or longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted.~~

~~Guidance:~~

~~The diagonal or longitudinal lines should be 12 to 24 inches wide and spaced 12 to 60 inches apart. The spacing design should avoid the wheel paths.~~

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.

~~**Section 7C.04 Stop and Yield Lines**~~

~~**Standard:**~~

~~If used, Stop lines shall consist of solid white lines extending across approach lanes to indicate the point at which the stop is intended or required to be made.~~

~~If used, Yield lines (see Figure 3B-14) shall consist of a row of solid white isosceles triangles pointing toward approaching vehicles extending across approach lanes to indicate the point at which the yield is intended or required to be made.~~

~~**Guidance:**~~

~~Stop lines should be 12 to 24 inches wide.~~

~~Stop lines should be used to indicate the point behind which vehicles are required to stop in compliance with a STOP (R1-1) sign (see Figure 2B-1), traffic control signal, or some other traffic control device.~~

~~The individual triangles comprising the yield line should have a base that is 12 to 24 inches wide and a height equal to 1.5 times the base. The space between the triangles should be 3 to 12 inches.~~

~~**Option:**~~

~~Yield lines may be used to indicate the point behind which vehicles are required to yield in compliance with a YIELD (R1-2) sign (see Figure 2B-1) or a Yield Here To Pedestrians (R1-5 or R1-5a) sign (see Figure 2B-2).~~

~~**Guidance:**~~

~~If used, stop and yield lines should be placed a minimum of 4 feet in advance of and parallel to the nearest crosswalk line at controlled intersections, except for yield lines at roundabout intersections as provided for in Section 3B.24 and at midblock crosswalks. In the absence of a marked crosswalk, the stop line or yield line should be placed at the desired stopping or yielding point, but should be placed no more than 30 feet or less than 4 feet from the nearest edge of the intersecting traveled way. Stop lines should be placed to allow sufficient sight distance to all other approaches to an intersection.~~

~~If used at an unsignalized midblock crosswalk, yield lines should be placed adjacent to the Yield Here to Pedestrians sign located 20 to 50 feet in advance of the nearest crosswalk line, and parking should be prohibited in the area between the yield line and the crosswalk (see Figure 3B-15).~~

~~Stop lines at midblock signalized locations should be placed at least 40 feet in advance of the nearest signal indication (see Section 4D.15).~~

~~**Support:**~~

~~Drivers who yield too close to crosswalks on multi-lane approaches place pedestrians at risk by blocking other drivers' views of pedestrians.~~

~~**Section 7C.05 Curb Markings for Parking Regulations**~~

~~**Standard:**~~

~~Signs shall be used with curb markings in those areas where curb markings are frequently obliterated by snow and ice accumulation, unless the no parking zone is controlled by statute or local ordinance.~~

~~**Guidance:**~~

~~When curb markings are used without signs to convey parking regulations, a legible word marking regarding the regulation (such as "No Parking" or "No Standing") should be placed on the curb.~~

~~**Option:**~~

~~Local highway agencies may prescribe special colors for curb markings to supplement standard signs for parking regulation.~~

1 ~~Support:~~

2 ~~Since yellow and white curb markings are frequently used for curb delineation and visibility, it is~~
3 ~~advisable to establish parking regulations through the installation of standard signs (see Sections 2B.39~~
4 ~~through 2B.41).~~

5 **Section ~~7C.06~~ 7C.03 Pavement Word, and Symbol, and Arrow Markings**

6 ~~Support:~~

7 ~~Word and symbol markings on the pavement are used for the purpose of guiding, warning, or regulating~~
8 ~~traffic. Symbol messages are preferable to word messages.~~

9 ~~Standard:~~

10 ~~Word and symbol markings shall be white. Word and symbol markings shall not be used for~~
11 ~~mandatory messages except in support of standard signs.~~

12 ~~Guidance:~~

13 ~~Letters and numerals should be 6 feet or more in height. All letters, numerals, and symbols should be in~~
14 ~~accordance with the Federal Highway Administration's "Standard Highway Signs" book (see Section 1A.11).~~

15 ~~Word and symbol markings should not exceed three lines of information.~~

16 ~~If a pavement marking word message consists of more than one line of information, it should read in the~~
17 ~~direction of travel. The first word of the message should be nearest to the road user.~~

18 ~~The longitudinal space between word or symbol message markings, including arrow markings, should be~~
19 ~~at least four times the height of the characters for low speed roads, but not more than ten times the height of~~
20 ~~the characters under any conditions.~~

21 ~~The number of different word and symbol markings used should be minimized to provide effective~~
22 ~~guidance and avoid misunderstanding.~~

23 ~~Except as noted in the Option below, pavement word and symbol markings should be no more than one~~
24 ~~lane in width.~~

25 Option:

26 If used, the SCHOOL word marking may extend to the width of two approach lanes (see Figure 7C-1).

27 Guidance:

28 If the two-lane SCHOOL word marking is used, the letters should be 10 feet or more in height.

29 Support:

30 Section 3B.20 contains provisions regarding other word, symbol, and arrow pavement markings that can
31 be used to guide, warn, or regulate traffic.

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~~CHAPTER 7D. SIGNALS~~ cross references to Part 4 were added in Section 7A.04

~~Section 7D.01 General~~

~~Support:~~

~~Part 4 contains information regarding highway traffic signals in school areas. The School Crossing signal warrant is described in Section 4C.06.~~

1 CHAPTER ~~7E.~~ 7D. CROSSING SUPERVISION

2 Section ~~7E.01~~ 7D.01 Types of Crossing Supervision

3 Support:

4 There are ~~two~~ three types of school crossing supervision:

- 5 A. Adult control of pedestrians and vehicles by adult crossing guards ~~or uniformed law enforcement~~
- 6 ~~officers, and~~
- 7 B. Adult control of pedestrians and vehicles by uniformed law enforcement officers, and
- 8 C. Student and/or parent control of only pedestrians with student and/or parent patrols.

9 ~~Information for the organization, operation, and administration of an adult crossing guard program are~~
10 ~~given in “Civilian Guards for School Crossings” (available from the Center for Public Safety of Northwestern~~
11 ~~University, 405 Church Street, Evanston, IL 60204) and “Adult School Crossing Guards” (available from the~~
12 ~~American Automobile Association, 1000 AAA Drive, Heathrow, FL 32746).~~

13 Information ~~for regarding~~ the organization, administration, and operation of a student school safety patrol
14 program ~~are given is contained~~ in the “Policies and Practices for AAA School Safety Patrols Operations
15 Manual” (available from the American Automobile Association, 1000 AAA Drive, Heathrow, FL 32746 see
16 Section 1A.11).

17 Section ~~7E.02~~ 7D.02 Adult Crossing Guards

18 Option:

19 Adult crossing guards may be used to provide gaps in traffic at school crossings where an engineering
20 study has shown that adequate gaps need to be created (see Section 7A.03), and where authorized by law.

21 Section ~~7E.03~~ 7D.03 Qualifications of Adult Crossing Guards

22 Support:

23 High standards for selection of adult crossing guards are essential because they are responsible for the
24 safety of and the efficient crossing of the street by schoolchildren within and in the immediate vicinity of
25 school crosswalks.

26 Guidance:

27 Adult crossing guards should possess the following minimum qualifications:

- 28 A. Average intelligence;
- 29 B. Good physical condition, including sight, hearing, and ~~mobility~~ ability to move and maneuver quickly
30 in order to avoid danger from errant vehicles;
- 31 C. Ability to control a STOP paddle effectively to provide approaching road users with a clear, fully
32 direct view of the paddle’s STOP message during the entire crossing movement;
- 33 D. Ability to communicate specific instructions clearly, firmly, and courteously;
- 34 E. Ability to recognize potentially dangerous traffic situations and warn and manage students in
35 sufficient time to avoid injury.
- 36 F. Mental alertness;
- 37 G. Neat appearance;
- 38 H. Good character;
- 39 I. Dependability; and
- 40 J. An overall sense of responsibility for the safety of students.

41 Section ~~7E.04~~ 7D.04 Uniform of Adult Crossing Guards ~~and Student Patrols~~

42 ~~Guidance:~~

43 ~~Adult crossing guards should be uniformed so that road users and pedestrians can recognize them and~~
44 ~~respond to their signals. The uniforms should be distinctively different from those worn by regular law~~
45 ~~enforcement officers.~~

46 Standard:

47 Law enforcement officers performing school crossing supervision and adult crossing guards shall
48 wear high-visibility retroreflective safety apparel labeled as ANSI ~~107-1999~~ 107-2004 standard
49 performance for Class 2 as described in Section 6E.02.

1 ~~Student patrols shall wear high-visibility retroreflective safety apparel labeled as ANSI 107-1999~~
2 ~~standard performance for Class 1 as described in Section 6E.02.~~

3 ~~Guidance:~~

4 ~~Law enforcement officers should wear high-visibility retroreflective material over their uniforms when~~
5 ~~directing nighttime operations.~~

6 ~~Section 7E.05~~ **7D.05 Operating Procedures for Adult Crossing Guards**

7 ~~Guidance~~ **Standard:**

8 Adult crossing guards ~~should~~ **shall** not direct traffic in the usual law enforcement regulatory sense.
9 In the control of traffic, they ~~should~~ **shall** pick opportune times to create a ~~reasonably safe~~ **sufficient**
10 **gap in the traffic flow**. At these times, they ~~should~~ **shall** stand in the roadway to indicate that
11 pedestrians are about to use or are using the crosswalk, and that all vehicular traffic must stop.

12 Adult crossing guards ~~should~~ **shall** use a STOP paddle. The STOP paddle ~~should~~ **shall** be the
13 primary hand-signaling device.

14 ~~Standard:~~

15 The STOP (**R1-1**) paddle shall be an octagonal shape. The background of the STOP face shall be
16 red with at least 6-inch series ~~capital~~ **upper-case** white letters and border. The paddle shall be at least
17 18 inches in size and have the word message STOP on both sides. The paddle shall be retroreflectorized
18 or illuminated when used during hours of darkness.

19 Option:

20 The STOP paddle may be modified to improve conspicuity by incorporating ~~red or~~ white **or red** flashing
21 lights on both sides of the paddle. Among the types of flashing lights that may be used are individual LEDs or
22 groups of LEDs.

23 The ~~red or~~ white **or red** flashing lights **or LEDs** may be arranged in any of the following patterns:

- 24 A. Two ~~red or~~ white **or red** lights centered vertically above and below the STOP legend,
- 25 B. Two ~~red or~~ white **or red** lights centered horizontally on each side of the STOP legend,
- 26 C. One ~~red or~~ white **or red** light centered below the STOP legend,
- 27 D. A series of eight or more small ~~red or~~ white **or red** lights ~~no larger than~~ **having a diameter of** 1/4 inch
28 **or less in diameter** along the outer edge of the paddle, arranged in an octagonal pattern at the eight
29 corners of the STOP paddle (more than eight lights may be used only if the arrangement of the lights
30 is such that it clearly conveys the octagonal shape of the STOP paddle), or
- 31 E. A series of white lights forming the shapes of the letters in the legend.

32 **Standard:**

33 **If flashing lights are used on the STOP paddle, the flash rate shall be at least 50, but not more than**
34 **60, flash periods per minute.**

35 ~~Section 7E.06~~ **Uniformed Law Enforcement Officers**

36 ~~Option:~~

37 ~~Uniformed law enforcement officers may be used for school crossing supervision.~~

38 ~~Section 7E.07~~ **Student Patrols**

39 ~~Option:~~

40 ~~Student patrols may be used to direct and control pedestrians at crossings near schools where adequate~~
41 ~~gaps in traffic occur frequently enough so that gaps do not need to be created.~~

42 ~~Student patrols may be used to direct and control pedestrians at signalized intersections where turning~~
43 ~~movements are not a significant problem, and may be used to assist adult crossing guards in the control of~~
44 ~~pedestrians at crossing locations used by large numbers of pedestrians.~~

45 ~~Guidance:~~

46 ~~Student patrols should not be responsible for directing vehicular traffic. They should not function as~~
47 ~~uniformed law enforcement officers or adult crossing guards.~~

48 ~~Section 7E.08~~ **Choice of Student Patrols**

49 ~~Guidance:~~

1 ~~Student patrols should be carefully selected. They should be students from the fifth grade or higher.~~
2 ~~Leadership and reliability should be determining qualities for patrol membership.~~
3 ~~Parental approval should be obtained in writing before a student is used as a member of a student patrol.~~

4 **Section 7E.09 Operating Procedures for Student Patrols**

5 **Guidance:**

6 ~~Student patrols should use a flagging device to stop pedestrians behind the curb or edge of the roadway,~~
7 ~~and should allow them to cross only when there is an adequate gap in traffic.~~

8 **Standard:**

9 ~~Flagging devices used during periods of twilight or darkness shall be retroreflective or illuminated.~~

10 ~~Because they are not authorized to direct vehicular traffic, student patrols shall not use a STOP~~
11 ~~paddle.~~

1 ~~CHAPTER 7F. GRADE-SEPARATED CROSSINGS~~

2 ~~Section 7F.01 Function~~

3 ~~Option:~~

4 ~~Grade-separated crossings may be used to physically separate the crossing of school pedestrian traffic and~~
5 ~~vehicular flow.~~

6 ~~Section 7F.02 Types of Grade Separated Crossings~~

7 ~~Option:~~

8 ~~Grade-separated crossings may be either overpasses over the highway or underpasses under the highway.~~

9 ~~Guidance:~~

10 ~~The design should follow the guidelines given in the published policies of the American Association of~~
11 ~~State Highway and Transportation Officials, such as "A Policy on Geometric Design of Highways and~~
12 ~~Streets" (see Section 1A.11).~~

13 ~~Support:~~

14 ~~Experience has shown that overpasses are more satisfactory than underpasses for pedestrian crossings, as~~
15 ~~overpasses are easier to maintain and supervise.~~

16 ~~Section 7F.03 Criteria for Use of Grade Separated Crossings~~

17 ~~Guidance:~~

18 ~~If use of the grade separation will be less convenient to pedestrians than an at-grade crossing, barriers or~~
19 ~~supervision should be considered to assure a satisfactory level of use.~~

CHAPTER 8A. GENERAL

Section 8A.01 Introduction

Support:

Whenever the acronym “LRT” is used in Part 8, it refers to “light rail transit.”

Part 8 describes the traffic control devices that are used at highway-rail and highway-LRT grade crossings. Unless otherwise provided in the text or on a figure or table, the provisions of Part 8 are applicable to both highway-rail and highway-LRT grade crossings. When the phrase “grade crossing” is used by itself without the prefix “highway-rail” or “highway-LRT,” it refers to both highway-rail and highway-LRT grade crossings.

Traffic control for ~~highway-rail~~ grade crossings includes all signs, signals, markings, other warning devices, and their supports along highways approaching and at ~~highway-rail~~ grade crossings. The function of this traffic control is to ~~permit reasonably safe~~ promote safety and ~~provide efficient~~ effective operation of ~~both~~ rail and/or LRT and highway traffic at ~~highway-rail~~ grade crossings.

For purposes of design, installation, operation, and maintenance of traffic control devices at ~~highway-rail~~ grade crossings, it is recognized that the crossing of the highway and rail tracks is situated on a right-of-way available for the joint use of both highway traffic and railroad or LRT traffic.

The highway agency or authority with jurisdiction and the regulatory agency with statutory authority, if applicable, jointly determine the need and selection of devices at a ~~highway-rail~~ grade crossing.

In Part 8, the combination of devices selected or installed at a specific ~~highway-rail~~ grade crossing is referred to as a “traffic control system.”

Standard:

The traffic control devices, systems, and practices described herein in this Manual shall be used at all ~~highway-rail~~ grade crossings open to public travel, consistent with Federal, State, and local laws and regulations.

Support:

~~Part 10 provides standards and guidelines for the design, installation, and operation of traffic control devices at grade crossings of highway traffic and light rail transit vehicles to facilitate the reasonably safe, orderly, and integrated movement of all traffic. The principles in Section 8A.01 are the same but, because Part 8 also describes the traffic control devices that are used in locations where light rail LRT vehicles sometimes operate are operating along streets and highways in mixed traffic with automotive vehicles, the traffic controls and associated standards and guidelines for highway light rail transit grade crossings presented in Part 10 can be different than those presented in Part 8.~~ **relocated from Section 10A.01**

~~Light rail transit LRT is a mode of metropolitan transportation that employs ~~light rail transit LRT vehicles~~ (commonly known as light rail vehicles, streetcars, or trolleys) that operate on rails in streets in mixed traffic, and LRT traffic that operates in semi-exclusive rights-of-way, or in exclusive rights-of-way. Grade crossings with ~~light rail transit LRT~~ can occur at intersections or at midblock locations, including public and private driveways.~~ **relocated from Section 10A.01**

An initial educational campaign along with an ongoing program to continue to educate new drivers is beneficial when introducing ~~light rail LRT~~ operations to an area and, hence, new traffic control devices. **relocated from Section 10A.01**

~~Light rail LRT alignments can be grouped into one of the following three types:~~ **relocated from Section 10A.01**

- A. Exclusive: An ~~light rail transit LRT~~ right-of-way that is grade-separated or protected by a fence or traffic barrier. Motor vehicles, pedestrians, and bicycles are prohibited within the right-of-way. Subways and aerial structures are included within this group. This type of alignment does not have grade crossings and is not further addressed in Part 8.
- B. Semi-exclusive: An ~~light rail transit LRT~~ alignment that is in a separate right-of-way or along a street or railroad right-of-way where motor vehicles, pedestrians, and bicycles have limited access and cross at designated locations only.
- C. Mixed-use: An alignment where ~~light rail transit LRT~~ operates in mixed traffic with all types of road users. This includes streets, transit malls, and pedestrian malls where the right-of-way is shared.

Standard:

1 Where ~~light rail transit~~ **LRT** and railroads use the same tracks or adjacent tracks, the traffic
2 control devices, systems, and practices for highway-rail grade crossings ~~described in Part 8~~ shall be
3 used. **relocated from Section 10A.01**

4 ~~Standard~~ Support:

5 To promote an understanding of common terminology between highway and railroad ~~and LRT~~ signaling
6 issues, ~~the following~~ definitions ~~shall be used:~~ ~~and acronyms pertaining to Part 8 are provided in Sections~~
7 ~~1A.13 and 1A.14.~~

8 **All of the definitions previously in this Section were relocated to Section 1A.13, except Definitions 6 and 15,**
9 **which were already present in Section 1A.13**

10 ~~Support:~~

11 ~~Section 8A.01 contains a set of definitions, most of which also apply to Part 10.~~ **relocated from Section**
12 **10A.01**

13 **Section 8A.02 Use of Standard Devices, Systems, and Practices at Highway-Rail Grade**
14 **Crossings**

15 Support:

16 Because of the large number of significant variables to be considered, no single standard system of traffic
17 control devices is universally applicable for all highway-rail grade crossings.

18 Guidance:

19 The appropriate traffic control system to be used at a highway-rail grade crossing should be determined by
20 an engineering study involving both the highway agency and the railroad company.

21 Option:

22 The engineering study may include the Highway-Rail Intersection (HRI) components of the National
23 Intelligent Transportation Systems (ITS) architecture, which is a USDOT accepted method for linking the
24 highway, vehicles, and traffic management systems with rail operations and wayside equipment.

25 Support:

26 More detail on Highway-Rail Intersection components is available from the USDOT's Federal Railroad
27 Administration, ~~1120 Vermont Ave., NW~~ [1200 New Jersey Avenue, SE](#), Washington, DC 20590, or
28 [www.fra.dot.gov](#).

29 **Standard:**

30 **Traffic control devices, systems, and practices shall be consistent with the design and application of**
31 **the Standards contained ~~herein~~ [in this Manual](#).**

32 **Before any new highway-rail grade crossing traffic control system is installed or before**
33 **modifications are made to an existing system, approval shall be obtained from the highway agency with**
34 **the jurisdictional and/or statutory authority, and from the railroad company.**

35 Guidance:

36 To stimulate effective responses from ~~vehicle operators and pedestrians~~ [road users](#), these devices, systems,
37 and practices should use the five basic considerations employed generally for traffic control devices and
38 described fully in Section 1A.02: design, placement, operation, maintenance, and uniformity.

39 Support:

40 Many other details of highway-rail grade crossing traffic control systems that are not set forth in Part 8 are
41 contained in the publications listed in Section 1A.11, [including the "2000 AREMA Communications &](#)
42 [Signals Manual" published by the American Railway Engineering & Maintenance-of-Way Association](#)
43 [\(AREMA\) and the 2006 edition of "Preemption of Traffic Signals Near Railroad Crossings" published by the](#)
44 [Institute of Transportation Engineers \(ITE\).](#)

45 **Section ~~10A.02~~ [8A.03](#) Use of Standard Devices, Systems, and Practices at Highway-LRT**
46 **Grade Crossings**

47 Support:

48 The combination of devices selected or installed at a specific ~~highway-light rail transit~~ [highway-LRT](#)
49 grade crossing is referred to as a Light Rail Transit Traffic Control System. **relocated from Section 10B.01**

1 Because of the large number of significant variables to be considered, no single standard system of traffic
2 control devices is universally applicable for all ~~highway-light rail transit~~ highway-LRT grade crossings.

3 For the safety and integrity of operations by highway and ~~light rail transit~~ LRT users, the highway agency
4 with jurisdiction, the regulatory agency with statutory authority, if applicable, and the ~~light rail transit~~ LRT
5 authority jointly determine the need and selection of traffic control devices and the assignment of priority to
6 ~~light rail transit~~ LRT at a ~~highway-light rail transit~~ highway-LRT grade crossing. **relocated from Section**

7 **10B.01**

8 The normal rules of the road and traffic control priority identified in the “Uniform Vehicle Code” govern
9 the order assigned to the movement of vehicles at an intersection unless the local agency determines that it is
10 appropriate to assign a higher priority to ~~light rail transit~~ LRT. Examples of different types of ~~light rail transit~~
11 LRT priority control include separate traffic control signal phases for ~~light rail transit~~ LRT movements,
12 restriction of movement of roadway vehicles in favor of ~~light rail transit~~ LRT operations, and preemption of
13 highway traffic signal control to accommodate ~~light rail transit~~ LRT movements. **relocated from Section**

14 **10B.01**

15 Guidance:

16 The appropriate traffic control system to be used at a ~~highway-light rail transit~~ highway-LRT grade
17 crossing should be determined by an engineering study conducted by the ~~transit~~ LRT or highway agency in
18 cooperation with other appropriate State and local organizations.

19 **Standard:**

20 **Traffic control devices, systems, and practices shall be consistent with the design and application of**
21 **the Standards contained ~~herein~~ in this Manual.**

22 **The traffic control devices, systems, and practices described ~~herein~~ in this Manual shall be used at**
23 **all ~~highway-light rail transit~~ highway-LRT grade crossings.**

24 **Before any new ~~highway-light rail transit~~ highway-LRT grade crossing traffic control system is**
25 **installed or before modifications are made to an existing system, approval shall be obtained from the**
26 **~~local agencies~~ highway agency having with the jurisdictional and/or statutory authority ~~to grant such~~**
27 **~~approval~~, and from the LRT agency.**

28 Guidance:

29 To stimulate effective responses from ~~vehicle operators and pedestrians~~ road users, these devices, systems,
30 and practices should use the five basic considerations employed generally for traffic control devices and
31 described fully in Section 1A.02: design, placement, operation, maintenance, and uniformity.

32 Support:

33 Many other details of ~~highway-light rail transit~~ highway-LRT grade crossing traffic control systems that
34 are not set forth in Part 8 are contained in the publications listed in Section 1A.11.

35 **Standard:**

36 **~~Highway-light rail transit~~ Highway-LRT grade crossings in semi-exclusive alignments shall be**
37 **equipped with a combination of automatic gates and flashing-light signals, or flashing-light signals only,**
38 **or traffic control signals, unless an engineering study indicates that the use of Crossbuck Assemblies,**
39 **STOP signs, or YIELD, ~~or advance warning~~ signs alone would be adequate. **relocated from Section****

40 **10B.01**

41 Option:

42 **~~Highway-light rail transit~~ Highway-LRT grade crossings in mixed-use alignments may be equipped with**
43 **traffic control signals unless an engineering study indicates that the use of Crossbuck Assemblies, STOP**
44 **signs, or YIELD, ~~or advance warning~~ signs alone would be adequate. **relocated from Section 10B.01****

45 Support:

46 **Sections 8B.03 and 8B.04 contain provisions regarding the use and placement of Crossbuck signs and**
47 **Crossbuck Assemblies. Section 8B.05 describes the appropriate conditions for the use of STOP or YIELD**
48 **signs alone at a ~~highway-light rail transit~~ highway-LRT grade crossing. Sections 8C.10 and 8C.11 contain**
49 **provisions regarding the use of traffic control signals at highway-LRT grade crossings. **relocated from Section****

50 **10B.01**

51 **Section ~~8A.02~~ 8A.04 Uniform Provisions**

52 **Standard:**

1 All signs used in ~~highway-rail~~ grade crossing traffic control systems shall be retroreflectORIZED or
2 illuminated as described in Section 2A.07 to show the same shape and similar color to an approaching
3 road user during both day and night.

4 No sign or signal shall be located in the center of an undivided highway, ~~except in~~ unless it is
5 crashworthy (breakaway, yielding, or shielded with a longitudinal barrier or crash cushion) or unless it
6 is placed on a raised island.

7 Guidance:

8 ~~Such~~ Any signs or signals placed on a raised island in the center of an undivided highway should be
9 installed with a clearance of at least 2 feet from the outer edge of the raised island to the nearest edge of the
10 sign or signal, except as ~~allowed~~ permitted in Section 2A.19.

11 Where the distance between tracks, measured along the highway between the inside rails, exceeds 100
12 feet, additional signs or other appropriate traffic control devices should be used to inform approaching road
13 users of the long distance to cross the tracks.

14 **Section ~~8A.03~~ 8A.05 ~~Highway-Rail~~ Grade Crossing Elimination**

15 Guidance:

16 Because ~~highway-rail~~ grade crossings are a potential source of crashes and congestion, agencies should
17 conduct engineering studies to determine the cost and benefits of eliminating these crossings.

18 **Standard:**

19 When a ~~highway-rail~~ grade crossing is eliminated, the traffic control devices for the crossing shall
20 be removed.

21 If the existing traffic control devices at a multiple-track ~~highway-rail~~ grade crossing become
22 improperly placed or inaccurate because of the removal of some of the tracks, the existing devices shall
23 be relocated and/or modified.

24 Guidance:

25 Any ~~highway-rail~~ grade crossing that cannot be justified should be eliminated.

26 Where a roadway is removed from a ~~highway-rail~~ grade crossing, the roadway approaches in the railroad
27 or LRT right-of-way should also be removed and appropriate signs and object markers should be placed at the
28 roadway end in accordance with Section 2C.66.

29 Where a railroad or LRT is eliminated at a ~~highway-rail~~ grade crossing, the tracks should be removed or
30 ~~paved over~~ covered.

31 Option:

32 Based on engineering judgment, the TRACKS OUT OF SERVICE (R8-9) sign (see Figure 8B-1) may be
33 temporarily installed until the tracks are removed or ~~paved over~~ covered. The length of time before the tracks
34 will be removed or ~~paved over~~ covered may be considered in making the decision as to whether to install the
35 sign.

36 **Section ~~8C.01~~ 8A.06 ~~Illumination at Highway-Rail~~ Grade Crossings relocated from Chapter 8C**

37 ~~Option~~ Support:

38 Illumination ~~may be~~ is sometimes installed at or adjacent to a ~~highway-rail~~ grade crossing=

39 ~~Guidance:~~

40 ~~If an engineering study is conducted and if the engineering study determines that~~ in order to provide better
41 nighttime visibility of ~~the trains~~ or LRT equipment and the ~~highway-rail~~ grade crossing ~~is needed~~ (for
42 example, where a substantial amount of railroad or LRT operations ~~is~~ are conducted at night, where ~~train~~
43 ~~speeds are low and highway-rail~~ grade crossings are blocked for long extended periods of time, or where crash
44 history indicates that ~~drivers~~ road users experience difficulty in seeing trains or LRT equipment or traffic
45 control devices during hours of darkness), ~~then illumination should be installed at and adjacent to the~~
46 ~~highway-rail grade crossing.~~

47 ~~Support:~~

48 Recommended types and locations of luminaires for illuminating ~~highway-rail~~ grade crossings
49 ~~Illumination~~ are contained in the American National Standards Institute's (ANSI) "Practice for Roadway
50 Lighting RP-8," which is available from the Illuminating Engineering Society (see Section 1A.11).

1 **Section 8A.07 Quiet Zone Treatments at Highway-Rail Grade Crossings**

2 Support:

3 49 CFR Part 222 (Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule) prescribes
4 Quiet Zone requirements and treatments.

5 Standard:

6 Any traffic control device and its application where used as part of a Quiet Zone shall comply with
7 all applicable provisions of the MUTCD.

8 **Section ~~8A.05~~ 8A.08 Temporary Traffic Control Zones**

9 Support:

10 Temporary traffic control planning provides for continuity of operations (such as movement of traffic,
11 pedestrians and bicycles, transit operations, and access to property/utilities) when the normal function of a
12 roadway at a ~~highway-rail~~ grade crossing is suspended because of temporary traffic control operations.

13 **Standard:**

14 **Traffic controls for temporary traffic control zones that include ~~highway-rail~~ grade crossings shall**
15 **be as outlined in Part 6.**

16 When a ~~highway-rail~~ grade crossing exists either within or in the vicinity of a temporary traffic
17 control zone, lane restrictions, flagging (see Chapter 6E), or other operations shall not be performed in
18 a manner that would cause highway vehicles to stop on the railroad or LRT tracks, unless a flagger or
19 uniformed law enforcement officer is provided at the ~~highway-rail~~ grade crossing to minimize the
20 possibility of highway vehicles stopping on the tracks, even if automatic warning devices are in place.

21 Guidance:

22 Public and private agencies, including emergency services, businesses, and railroad or LRT companies,
23 should meet to plan appropriate traffic detours and the necessary signing, marking, and flagging requirements
24 for operations during temporary traffic control zone activities. Consideration should be given to the length of
25 time that the ~~highway-rail~~ grade crossing is to be closed, the type of rail or LRT and highway traffic affected,
26 the time of day, and the materials and techniques of repair.

27 The agencies responsible for the operation of the ~~light rail transit~~ LRT and highway should be contacted
28 when the initial planning begins for any temporary traffic control zone that ~~may~~ might directly or indirectly
29 influence the flow of traffic on mixed-use facilities where ~~light rail transit~~ LRT and road users operate.

30 Temporary traffic control operations should minimize the inconvenience, delay, and crash potential to
31 affected traffic. Prior notice should be given to affected public or private agencies, emergency services,
32 businesses, railroad or LRT companies, and road users before the free movement of ~~vehicles~~ road users or
33 ~~trains~~ rail traffic is infringed upon or blocked.

34 Temporary traffic control zone activities should not be permitted to extensively prolong the closing of the
35 ~~highway-rail~~ grade crossing.

36 The width, grade, alignment, and riding quality of the highway surface at a ~~highway-rail~~ grade crossing
37 should, at a minimum, be restored to correspond with the quality of the approaches to the ~~highway-rail~~ grade
38 crossing.

39 Support:

40 Section 6G.18 contains additional information regarding temporary traffic control zones in the vicinity of
41 grade crossings, and Figure 6H-46 shows an example of a typical situation that might be encountered.

1 CHAPTER 8B. SIGNS AND MARKINGS

2 Section 8B.01 Purpose

3 Support:

4 Passive traffic control systems, consisting of signs and pavement markings only, identify and direct
5 attention to the location of a ~~highway-rail~~ grade crossing and advise ~~motorists, bicyclists, and pedestrians to~~
6 ~~take appropriate action~~ road users to slow down or stop at the grade crossing as necessary in order to yield to
7 any rail traffic occupying, or approaching and in proximity to, the grade crossing.

8 Signs and markings regulate, warn, and guide the road users so that they, as well as ~~light-rail-transit~~ LRT
9 vehicle operators on mixed-use alignments, can take appropriate action when approaching a grade crossing.
10 **relocated from Section 10C.01**

11 Standard:

12 The design and location of signs shall ~~conform to~~ comply with the provisions of Part 2. **relocated**
13 **from Section 10C.01** The design and location of pavement markings shall comply with the provisions of
14 Part 3.

15 ~~Support:~~

16 ~~Section 8B.02 contains information regarding the sizes of signs for grade crossings.~~ **relocated from**
17 **Section 10C.01**

18 Section 8B.02 Sizes of Grade Crossing Signs

19 Standard:

20 The sizes of grade crossing signs shall be as shown in Table 8B-1.

21 Option:

22 Signs larger than those shown in Table 8B-1 may be used (see Section 2A.11).

23 Section 8B.03 ~~Highway-Rail~~ Grade Crossing (Crossbuck) Sign (R15-1) and Number of Tracks
24 ~~Sign Plaque (R15-2P) at Active and Passive Grade Crossings~~ Paragraph 7 of this Section was
25 **relocated to Section 8B.04**

26 Standard:

27 The ~~Highway-Rail~~ Grade Crossing (R15-1) sign (see Figure 8B-1), commonly identified as the
28 Crossbuck sign, shall be retroreflectorized white with the words RAILROAD CROSSING in black
29 lettering, mounted as shown in Figure 8B-2.

30 Support:

31 In most States, the Crossbuck sign requires road users to yield the right-of-way to rail traffic at a grade
32 crossing.

33 Standard:

34 As a minimum, one Crossbuck sign shall be used on each highway approach to every highway-rail
35 grade crossing, alone or in combination with other traffic control devices.

36 Option:

37 A Crossbuck sign may be used on a highway approach to a ~~highway-light rail-transit~~ highway-LRT grade
38 crossing on a semi-exclusive or mixed-use alignment, alone or in combination with other traffic control
39 devices. **relocated from Section 10C.02**

40 Standard:

41 If automatic gates are not present and if there are two or more tracks at ~~the a~~ highway-rail grade
42 crossing, the number of tracks shall be indicated on a supplemental Number of Tracks (R15-2P) sign
43 plaque (see Figure 8B-1) of inverted T shape mounted below the Crossbuck sign in the manner ~~and at~~
44 ~~the height indicated~~ shown in Figure 8B-2.

45 ~~Option:~~

46 ~~The supplemental Number of Tracks sign may also be used at highway-rail grade crossings with~~
47 ~~automatic gates.~~

48 ~~Standard:~~

1 On each approach to a highway-rail grade crossing and, if used, on each approach to a highway-
2 LRT grade crossing, the Crossbuck sign shall be installed on the right-hand side of the highway on each
3 approach to the ~~highway-rail~~ grade crossing. Where restricted sight distance or unfavorable highway
4 geometry exists on an approach to a ~~highway-rail~~ grade crossing, an additional Crossbuck sign shall be
5 installed on the left-hand side of the highway, possibly placed back-to-back with the Crossbuck sign for
6 the opposite approach, or otherwise located so that two Crossbuck signs are displayed for that
7 approach.

8 A strip of retroreflective white material not less than 2 inches in width shall be used on the back of
9 each blade of each Crossbuck sign for the length of each blade, at all ~~highway-rail~~ grade crossings
10 where Crossbuck signs have been installed, except those where Crossbuck signs have been installed
11 back-to-back.

12 Guidance:

13 Crossbuck signs should be located with respect to the highway pavement or shoulder in accordance with
14 the criteria in Chapter 2A and Figures 2A-2 and 2A-3, and should be located with respect to the nearest track
15 in accordance with Figure 8C-2.

16 The minimum lateral ~~clearance~~ offset for the nearest edge of the Crossbuck sign should be 6 feet from the
17 edge of the shoulder or 12 feet from the edge of the traveled way in rural areas (whichever is greater), and 2
18 feet from the face of the curb in urban areas.

19 Where unusual conditions make variations in location and lateral ~~clearance~~ offset appropriate, engineering
20 judgment should be used to provide the best practical combination of view and safety clearances.

21 **Section ~~8B.08~~ 8B.04 Crossbuck Assemblies with YIELD or STOP (R1-1) or YIELD (R1-2)**
22 **Signs at Passive ~~Highway-Rail~~ Grade Crossings**

23 ~~Option:~~

24 ~~At the discretion of the responsible State or local highway agency, STOP (R1-1) or YIELD (R1-2) signs~~
25 ~~(see Figure 2B-1) may be used at highway rail grade crossings that have two or more trains per day and are~~
26 ~~without automatic traffic control devices.~~

27 ~~Support:~~

28 ~~Two or more trains per day means an average of two or more trains per day operating over the highway-~~
29 ~~rail grade crossing for a 12-month period prior to the installation of the STOP or YIELD control sign.~~

30 ~~Option:~~

31 ~~For other highway rail grade crossings with passive warning devices, STOP or YIELD signs may be used~~
32 ~~based on an engineering study.~~

33 ~~Guidance:~~

34 ~~The engineering study should take into consideration such factors as highway and train traffic~~
35 ~~characteristics (including volume and speed), collision history, the need for active control devices, and sight~~
36 ~~distance to the approaching train.~~

37 ~~Option:~~

38 ~~If a STOP or YIELD sign is installed at a highway rail grade crossing, it may be installed on the~~
39 ~~Crossbuck post or on a separate post at a point where the vehicle is to stop, or as near to that point as practical.~~

40 ~~Standard:~~

41 ~~For all highway rail grade crossings where STOP or YIELD signs are installed, the placement shall~~
42 ~~conform to the requirements of Sections 2B.06 and 2B.10. Stop Ahead (W3-1) or Yield Ahead (W3-2)~~
43 ~~Advance Warning signs (see Figure 2C-4) shall also be installed if the criteria for their installation given~~
44 ~~in Section 2C.29 is met.~~

45 Standard:

46 A grade crossing Crossbuck Assembly shall consist of a Crossbuck (R15-1) sign, and a Number of
47 Tracks (R15-2P) plaque if two or more tracks are present, that complies with the provisions of Section
48 8B.03, and either a YIELD (R1-2) or STOP (R1-1) sign installed on the same support, except as
49 provided in Paragraph 8. If used at a passive grade crossing, a YIELD or STOP sign shall be installed
50 in compliance with the provisions of Part 2, Section 2B.10, and Figures 8B-2 and 8B-3.

1 At all public highway-rail grade crossings that are not equipped with the active traffic control
2 systems that are described in Chapter 8C, except crossings where road users are directed by an
3 authorized person on the ground to not enter the crossing at all times that an approaching train is
4 about to occupy the crossing, a Crossbuck Assembly shall be installed on the right-hand side of the
5 highway on each approach to the highway-rail grade crossing.

6 If a Crossbuck sign is used on a highway approach to a public highway-LRT grade crossing that is
7 not equipped with the active traffic control systems that are described in Chapter 8C, a Crossbuck
8 Assembly shall be installed on the right-hand side of the highway on each approach to the highway-
9 LRT grade crossing.

10 Where restricted sight distance or unfavorable highway geometry exists on an approach to a grade
11 crossing that has a Crossbuck Assembly, or where there is a one-way multi-lane approach, an
12 additional Crossbuck Assembly shall be installed on the left-hand side of the highway.

13 A YIELD sign shall be the default traffic control device for Crossbuck Assemblies on all highway
14 approaches to passive grade crossings unless an engineering study performed by the regulatory agency
15 or highway authority having jurisdiction over the roadway approach determines that a STOP sign is
16 appropriate.

17 Guidance:

18 The use of STOP signs at passive grade crossings should be limited to unusual conditions where requiring
19 all highway vehicles to make a full stop is deemed essential by an engineering study. Among the factors that
20 should be considered in the engineering study are the line of sight to approaching rail traffic (giving due
21 consideration to seasonal crops or vegetation beyond both the highway and railroad or LRT rights-of-ways),
22 the number of tracks, the speeds of trains or LRT equipment and highway vehicles, and the crash history at the
23 grade crossing.

24 Support:

25 Sections 8A.02 and 8A.03 contain information regarding the responsibilities of the highway agency and
26 the railroad company or LRT agency regarding the selection, design, and operation of traffic control devices
27 placed at grade crossings.

28 Option:

29 If a YIELD or STOP sign is installed for a Crossbuck Assembly at a grade crossing, it may be installed on
30 the same support as the Crossbuck sign or it may be installed on a separate support at a point where the
31 highway vehicle is to stop, or as near to that point as practical, but in either case, the YIELD or STOP sign is
32 considered to be a part of the Crossbuck Assembly.

33 Standard:

34 If a YIELD or STOP sign is installed on an existing Crossbuck sign support, the minimum height,
35 measured vertically from the bottom of the YIELD or STOP sign to the top of the curb, or in the
36 absence of curb, measured vertically from the bottom of the YIELD or STOP sign to the elevation of
37 the near edge of the traveled way, shall be 4 feet (see Figure 8B-2).

38 If a Crossbuck Assembly is installed on a new sign support (see Figure 8B-2) or if the YIELD or
39 STOP sign is installed on a separate support (see Figure 8B-3), the minimum height, measured
40 vertically from the bottom of the YIELD or STOP sign to the top of the curb, or in the absence of curb,
41 measured vertically from the bottom of the YIELD or STOP sign to the elevation of the near edge of the
42 traveled way, shall be 7 feet if the Crossbuck Assembly is installed in an area where parking or
43 pedestrian movements are likely to occur.

44 Guidance:

45 If a YIELD or STOP sign is installed for a Crossbuck Assembly at a grade crossing on a separate support
46 than the Crossbuck sign (see Figure 8B-3), the YIELD or STOP sign should be placed at a point where the
47 highway vehicle is to stop, or as near to that point as practical, but no closer than 15 feet measured
48 perpendicular from the nearest rail.

49 Support:

50 The meaning of a Crossbuck Assembly that includes a YIELD sign is that a road user approaching the
51 grade crossing needs to be prepared to decelerate, and when necessary, yield the right-of-way to any rail
52 traffic that might be occupying the crossing or might be approaching and in such close proximity to the
53 crossing that it would be unsafe for the road user to cross.

1 Certain commercial motor vehicles and school buses are required to stop at all grade crossings in
2 accordance with 49 CFR 392.10 even if a YIELD sign (or just a Crossbuck sign) is posted.

3 The meaning of a Crossbuck Assembly that includes a STOP sign is that a road user approaching the
4 grade crossing must come to a full and complete stop not less than 15 feet short of the nearest rail, and remain
5 stopped while the road user determines if there is rail traffic either occupying the crossing or approaching and
6 in such close proximity to the crossing that the road user must yield the right-of-way to rail traffic. The road
7 user is permitted to proceed when it is safe to cross.

8 **Standard:**

9 A **vertical** strip of retroreflective white material, not less than 2 inches in width, shall be used on
10 each **Crossbuck** support at passive ~~highway-rail~~ grade crossings for the full length of the ~~front and back~~
11 ~~of the support from the Crossbuck sign or Number of Tracks sign plaque~~ to within 2 feet above the ~~edge~~
12 ~~of the roadway ground, except on the side of those supports where a STOP (R1-1) or YIELD (R1-2) sign~~
13 ~~or flashing lights have been installed or on the back side of supports for Crossbuck signs installed on~~
14 ~~one-way streets~~ **as provided in Paragraph 16.** **relocated from Section 8B.03**

15 **Option:**

16 The vertical strip of retroreflective material may be omitted from the back sides of Crossbuck sign
17 supports installed on one-way streets.

18 If a YIELD or STOP sign is installed on the same support as the Crossbuck sign, a vertical strip of red
19 (see Section 2A.21) or white retroreflective material that is at least 2 inches wide may be used on the front of
20 the support from the YIELD or STOP sign to within 2 feet above the ground.

21 **Standard:**

22 **If a Crossbuck sign support at a passive grade crossing does not include a YIELD or STOP sign**
23 **(either because the YIELD or STOP sign is placed on a separate support or because a YIELD or STOP**
24 **sign is not present on the approach), a vertical strip of retroreflective white material, not less than 2**
25 **inches in width, shall be used for the full length of the front of the support from the Crossbuck sign or**
26 **Number of Tracks plaque to within 2 feet above the ground.**

27 At all grade crossings where YIELD or STOP signs are installed, Yield Ahead (W3-2) or Stop
28 Ahead (W3-1) signs shall also be installed if the criteria for their installation in Section 2C.36 is met.

29 **Support:**

30 Section 8B.28 contains provisions regarding the use of stop lines or yield lines at grade crossings.

31 **Section ~~10C.04~~ 8B.05 Use of STOP (R1-1) or YIELD (R1-2) Signs without Crossbuck Signs at**
32 **~~Highway Light Rail Transit~~ Highway-LRT Grade Crossings**

33 **Standard:**

34 For all ~~highway light rail transit~~ **highway-LRT** grade crossings where **only** STOP (R1-1) or YIELD
35 (R1-2) signs are installed, the placement shall ~~conform to~~ **comply with** the requirements of Section
36 2B.10. Stop Ahead (W3-1) or Yield Ahead (W3-2) Advance Warning signs (see Figure 2C-6) shall also
37 be installed if the criteria for their installation given in Section 2C.36 is met.

38 **Guidance:**

39 The use of **only** STOP or YIELD signs for road users at ~~highway light rail transit~~ **highway-LRT** grade
40 crossings should be limited to those crossings where the need and feasibility is established by an engineering
41 study. Such crossings should have all of the following characteristics:

- 42 A. The crossing roadways should be secondary in character (such as a minor street with one lane in each
43 direction, an alley, or a driveway) with low traffic volumes and low speed limits. The specific
44 thresholds of traffic volumes and speed limits should be determined by the local agencies.
- 45 B. ~~Light rail transit~~ **LRT** speeds do not exceed 25 mph.
- 46 C. The line of sight for an approaching ~~light rail transit~~ **LRT** operator is adequate from a sufficient
47 distance such that the operator can sound an audible signal and bring the ~~light rail transit~~ **LRT** ~~vehicle~~
48 **equipment** to a stop before arriving at the crossing.
- 49 D. The road user has sufficient sight distance at the stop line to permit the vehicle to cross the tracks
50 before the arrival of the ~~light rail transit~~ **LRT** ~~vehicle~~ **equipment**.
- 51 E. If at an intersection of two roadways, the intersection does not meet the warrants for a traffic control
52 signal as ~~specified~~ **provided** in Chapter 4C.

1 F. The ~~light rail transit~~ LRT tracks are located such that highway vehicles are not likely to stop on the
2 tracks while waiting to enter a cross street or highway.

3 ~~Option:~~

4 ~~If a STOP or YIELD sign is installed at a highway-light rail transit grade crossing, it may be installed on~~
5 ~~the Crossbuck post or on a separate post at the point where the vehicle is to stop, or as near to that point as~~
6 ~~practical.~~

7 **Section ~~8B-04~~ 8B.06 Highway-Rail Grade Crossing Advance Warning Signs (W10 Series)**

8 **Standard:**

9 A Highway-Rail Grade Crossing Advance Warning (W10-1) sign (see Figure 8B-4) shall be used on
10 each highway in advance of every highway-rail grade crossing, and every highway-LRT grade crossing
11 in semi-exclusive alignments, except in the following circumstances:

- 12 A. On an approach to a ~~highway-rail~~ grade crossing from a T-intersection with a parallel highway
13 if the distance from the edge of the track to the edge of the parallel roadway is less than 100 feet
14 and W10-3 signs are used on both approaches of the parallel highway;
- 15 B. On low-volume, low-speed highways crossing minor spurs or other tracks that are infrequently
16 used and ~~are flagged by train crews~~ road users are directed by an authorized person on the
17 ground to not enter the crossing at all times that approaching rail traffic is about to occupy the
18 crossing;
- 19 C. In business or commercial ~~districts~~ areas where active ~~highway-rail~~ grade crossing traffic
20 control devices are in use; or
- 21 D. Where physical conditions do not permit even a partially effective display of the sign.

22 The placement of the ~~Highway-Rail~~ Grade Crossing Advance Warning sign shall be in accordance
23 with ~~Chapter 2A~~ Section 2C.05 and Table 2C-4.

24 A Yield Ahead (W3-2) or Stop Ahead (W3-1) Advance Warning sign (see Figure 2C-6) shall also be
25 installed if the criteria for their installation given in Section 2C.36 is met. If a Yield Ahead or Stop
26 Ahead sign is installed on the approach to the crossing, the W10-1 sign shall be installed upstream from
27 the Yield Ahead or Stop Ahead sign. The Yield Ahead or Stop Ahead sign shall be located in
28 accordance with Table 2C-4. The minimum distance between the signs shall be in accordance with
29 Section 2C.05 and Table 2C-4.

30 ~~Option:~~

31 On divided highways and one-way streets, an additional W10-1 sign may be installed on the left-hand side
32 of the roadway.

33 **Standard:**

34 If the distance between the ~~railroad~~ tracks and a parallel highway, from the edge of the tracks to
35 the edge of the parallel roadway, is less than 100 feet, W10-2, W10-3, or W10-4 signs (see Figure 8B-4)
36 shall be installed on each approach of the parallel highway to warn road users making a turn that they
37 will encounter a ~~highway-rail~~ grade crossing soon after making a turn, and a W10-1 sign for the
38 approach to the tracks shall not be required to be between the tracks and the parallel highway.

39 If the W10-2, W10-3, or W10-4 signs are used, sign placement in accordance with the guidelines for
40 Intersection Warning signs in Table 2C-4 using the speed of through traffic shall be measured from the
41 highway intersection.

42 ~~Guidance:~~

43 If the distance between the ~~railroad~~ tracks and the parallel highway, from the edge of the tracks to the
44 edge of the parallel roadway, is 100 feet or more, a W10-1 sign should be installed in advance of the ~~highway-~~
45 ~~rail~~ grade crossing, and the W10-2, W10-3, or W10-4 signs should not be used on the parallel highway.

46 **Section ~~8B-05~~ 8B.07 EXEMPT Highway-Rail Grade Crossing ~~Signs~~ Plaques (R15-3P, W10-**
47 **1aP)**

48 ~~Option:~~

49 When authorized by law or regulation, a supplemental EXEMPT (R15-3P) ~~sign~~ plaque (see Figure 8B-1)
50 with a white background ~~bearing the word EXEMPT~~ may be used below the Crossbuck sign or Number of
51 Tracks ~~sign~~ plaque, if present, at the ~~highway-rail~~ grade crossing, and a supplemental EXEMPT (W10-1aP)

1 ~~sign plaque~~ (see Figure 8B-4) with a yellow background ~~bearing the word EXEMPT~~ may be used below the
2 ~~Highway-Rail Grade Crossing~~ Advance Warning (W10- ~~series~~) sign.

3 Where neither the Crossbuck ~~sign~~ nor the advance warning signs exist for a particular ~~highway-LRT~~
4 ~~grade~~ crossing, an EXEMPT (R15-3P) ~~sign plaque~~ with a white background may be placed on its own post on
5 the near right-~~hand~~ side of the approach to the crossing. ~~relocated from Section 10C.10~~

6 Support:

7 These supplemental ~~signs plaques~~ inform drivers of ~~highway~~ vehicles carrying passengers for hire, school
8 buses carrying students, or ~~highway~~ vehicles carrying hazardous materials that a stop is not required at certain
9 designated ~~highway-rail~~ grade crossings, except when ~~a train, locomotive, or other railroad equipment~~ ~~rail~~
10 ~~traffic~~ is approaching or occupying the ~~highway-rail~~ grade crossing, or the driver's view is blocked.

11 ~~Section 8B.06~~ 8B.08 **Turn Restrictions During Preemption**

12 Guidance:

13 At a signalized intersection that is located within 200 feet of a highway-rail grade crossing, measured
14 from the edge of the track to the edge of the roadway, where the intersection traffic control signals are
15 preempted by the approach of a train, all existing turning movements toward the highway-rail grade crossing
16 should be prohibited during the signal preemption sequences.

17 Option:

18 A blank-out or changeable message sign and/or appropriate highway traffic signal indication or other
19 similar type sign may be used to prohibit turning movements toward the highway-rail grade crossing during
20 preemption. The R3-1a and R3-2a signs shown in Figure 8B-1 may be used for this purpose.

21 Support:

22 ~~Light-rail-transit~~ ~~LRT~~ operations can include the use of activated blank-out sign technology for turn
23 prohibition (~~R3-1a, R3-2a~~) signs (~~see Figure 10C-3~~). The signs are typically used on roads paralleling a semi-
24 exclusive or mixed-use ~~light-rail-transit~~ ~~LRT~~ alignment where road users might turn across the ~~light-rail-transit~~
25 ~~LRT~~ tracks. A blank-out sign displays its message only when activated. When not activated, the sign face is
26 blank. ~~relocated from Section 10C.09~~

27 Guidance:

28 An ~~light-rail-transit~~ ~~LRT~~-activated blank-out turn prohibition (~~R3-1a or R3-2a~~) sign should be used where
29 an intersection adjacent to a ~~highway-light-rail-transit~~ ~~highway-LRT~~ crossing is controlled by STOP signs, or
30 is controlled by traffic control signals with permissive turn movements for road users crossing the tracks.
31 ~~relocated from Section 10C.09~~

32 Option:

33 An ~~light-rail-transit~~ ~~LRT~~-activated blank-out turn prohibition (~~R3-1a or R3-2a~~) sign may be used for
34 turning movements that cross the tracks. ~~relocated from Section 10C.09~~

35 As an alternative to ~~light-rail-transit~~ ~~LRT~~-activated blank-out turn prohibition signs at intersections with
36 traffic control signals, exclusive traffic control signal phases such that all movements that cross the tracks
37 have a ~~steady~~ red indication may be used in combination with No Turn on Red (~~R10-11, R10-11a, or R10-~~
38 ~~11b~~) signs (~~see Section 2B.53~~). ~~relocated from Section 10C.09~~

39 **Standard:**

40 Turn prohibition signs that are associated with preemption shall be visible ~~or activated~~ only when
41 the ~~highway-rail~~ grade crossing restriction is in effect.

42 ~~Section 8B.07~~ 8B.09 **DO NOT STOP ON TRACKS Sign (R8-8)**

43 Guidance:

44 ~~Whenever engineering judgment determines that the potential for vehicles stopping on the tracks is high, a~~
45 ~~DO NOT STOP ON TRACKS (R8-8) sign (see Figure 8B-3) should be used.~~

46 ~~The sign, if used, should be located on the right side of the highway on either the near or far side of the~~
47 ~~highway-rail grade crossing, depending upon which side provides better visibility to approaching drivers.~~

48 A DO NOT STOP ON TRACKS (R8-8) sign (see Figure 8B-1) should be installed whenever an
49 engineering study determines that the potential for ~~highway~~ vehicles stopping on the tracks at a ~~highway-light-~~
50 ~~rail-transit~~ grade crossing is significant. Placement of the R8-8 sign should be determined as part of the
51 engineering study. The sign, if used, should be located on the right-~~hand~~ side of the highway on either the

1 near or far side of the grade crossing, depending upon which position provides better visibility to approaching
2 drivers. ~~relocated from Section 10C.05~~

3 If a STOP or YIELD sign is installed ~~beyond~~ at a location, including at a circular intersection, that is
4 downstream from the ~~light rail transit~~ grade crossing such that highway vehicle queues are likely to extend
5 ~~into the path of the light rail transit~~ beyond the tracks, a DO NOT STOP ON TRACKS sign (R8-8) should be
6 ~~posted in accordance with Section 10C.05~~ used. ~~relocated from Section 10C.04~~

7 Option:

8 DO NOT STOP ON TRACKS signs may be placed on both sides of the track.

9 On divided highways and one-way streets, a second DO NOT STOP ON TRACKS sign may be placed on
10 the near or far left-hand side of the highway ~~at~~ at the grade crossing to further improve visibility of the sign.

11 **Section ~~8B.09~~ 8B.10 TRACKS OUT OF SERVICE Sign (R8-9)**

12 Option:

13 The TRACKS OUT OF SERVICE (R8-9) sign (see Figure 8B-1) may be used at a ~~highway-rail~~ grade
14 crossing instead of a Crossbuck (R15-1) sign and a Number of Tracks (R15-2P) ~~sign plaque (see Figure 8B-1)~~
15 or instead of a Crossbuck Assembly when railroad or LRT tracks have been temporarily or permanently
16 abandoned, but only until such time that the tracks are removed or ~~paved over~~ covered.

17 **Standard:**

18 **When tracks are out of service, traffic control devices and gate arms shall be removed and the**
19 **signal heads shall be removed or hooded or turned from view to clearly indicate that they are not in**
20 **operation.**

21 **The R8-9 sign shall be removed when the tracks have been removed or covered or when the**
22 **~~highway-rail~~ grade crossing is returned to service.**

23 **Section ~~8B.10~~ 8B.11 STOP HERE WHEN FLASHING Sign (R8-10, R8-10a)**

24 Option:

25 The STOP HERE WHEN FLASHING (R8-10, R8-10a) sign (see Figure 8B-1) may be used at a ~~highway-~~
26 ~~rail~~ grade crossing to inform drivers of the location of the stop line or the point at which to stop when the
27 flashing-light signals (see Section 8C.02) are activated.

28 **Section ~~8B.11~~ 8B.12 STOP HERE ON RED Sign (R10-6, R10-6a)**

29 Support:

30 The STOP HERE ON RED (R10-6, R10-6a) sign (see Figure 8B-1) defines and facilitates observance of
31 stop lines at traffic control signals.

32 Option:

33 A STOP HERE ON RED sign may be used at locations where highway vehicles frequently violate the
34 stop line or where it is not obvious to road users where to stop.

35 Guidance:

36 If possible, stop lines should be placed at a point where the highway vehicle driver has adequate sight
37 distance along the track.

38 **Section ~~10C.13~~ 8B.13 Light Rail Transit Only Lane Signs (R15-4 Series)**

39 Support:

40 The Light Rail Transit Only Lane (R15-4 series) signs (see Figure 8B-1) are used for multi-lane
41 operations, where road users might need additional guidance on lane use and/or restrictions.

42 Option:

43 Light Rail Transit Only Lane signs may be used on a roadway lane limited to only ~~light rail transit~~ LRT
44 use to indicate the restricted use of a lane in semi-exclusive and mixed alignments.

45 Guidance:

46 If used, the R15-4a, R15-4b, and R15-4c signs should be installed on posts adjacent to the roadway
47 containing the ~~light rail transit~~ LRT tracks or overhead above the ~~light rail transit~~ LRT only lane.

48 Option:

1 If the trackway is paved, preferential lane markings (see ~~Section 3B.22~~ [Chapter 3D](#)) may be installed but
2 only in combination with Light Rail Transit Only Lane signs.

3 Support:

4 The trackway is the continuous way designated for ~~light rail transit~~ [LRT](#), including the entire dynamic
5 envelope. Section 8B.29 contains more information regarding the dynamic envelope.

6 **Section ~~10C.14~~ [8B.14](#) Do Not Pass Light Rail Transit Signs (R15-5, R15-5a)**

7 Support:

8 A Do Not Pass Light Rail Transit (R15-5) sign (see Figure 8B-1) is used to indicate that [motor](#) vehicles
9 are not allowed to pass ~~light rail transit~~ [LRT](#) vehicles that are loading or unloading passengers where there is
10 no raised platform or physical separation from the lanes upon which other motor vehicles are operating.

11 Option:

12 The R15-5 sign may be used in mixed-use alignments and may be mounted overhead where there are
13 multiple lanes.

14 Instead of the R15-5 symbol sign, a regulatory sign with the word message DO NOT PASS STOPPED
15 TRAIN (R15-5a) may be used (see Figure 8B-1).

16 Guidance:

17 If used, the R15-5 sign should be located immediately before the ~~light rail transit~~ [LRT](#) boarding area.

18 **Section ~~10C.12~~ [8B.15](#) No Motor Vehicles On Tracks Signs (R15-6, R15-6a)**

19 Support:

20 The No [Motor](#) Vehicles On Tracks (R15-6) sign (see Figure 8B-1) is used where there are adjacent traffic
21 lanes separated from the ~~light rail transit~~ [LRT](#) lane by a curb or pavement markings.

22 Guidance:

23 The DO NOT ENTER (R5-1) sign should be used where a road user could wrongly enter an ~~light rail~~
24 ~~transit~~ [LRT](#) only street.

25 Option:

26 A No [Motor](#) Vehicles On Tracks sign may be used to deter [motor](#) vehicles from driving on the trackway.
27 It may be installed ~~either~~ on a 3-foot flexible post between double tracks, on a post alongside the tracks, or
28 overhead.

29 Instead of the R15-6 symbol sign, a regulatory sign with the word message DO NOT DRIVE ON
30 TRACKS (R15-6a) may be used (see Figure 8B-1).

31 A reduced size of 12 x 12 inches may be used if the R15-6 sign is installed between double tracks.

32 **Standard:**

33 **The smallest size for the R15-6 sign shall be 12 x 12 inches.**

34 **Section ~~10C.14~~ [8B.16](#) Divided Highway with Light Rail Transit Crossing Signs (R15-7 Series)**

35 Option:

36 The Divided Highway with Light Rail Transit Crossing (R15-7) sign (see Figure 8B-1) may be used as a
37 supplemental sign on the approach legs of a roadway that intersects with a divided highway where ~~light rail~~
38 ~~transit~~ [LRT](#) ~~vehicles~~ [equipment](#) operates in the median. The sign may be placed beneath a STOP sign or
39 mounted separately.

40 Guidance:

41 The number of tracks ~~shown~~ [displayed](#) on the R15-7 sign should be the same as the actual number of
42 tracks.

43 **Standard:**

44 **When the Divided Highway With Light Rail Transit Crossing sign is used at a four-legged**
45 **intersection, the R15-7 sign shall be used. When used at a T-intersection, the R15-7a sign shall be used.**

46 **Section ~~8B.16~~ [8B.17](#) LOOK Sign (R15-8)**

47 Option:

1 At ~~highway-rail~~ grade crossings, the LOOK (R15-8) sign (see Figure 8B-1) may be mounted as a
2 supplemental plaque on the Crossback (~~R15-1~~) ~~sign post~~ support, or ~~as on~~ a separate ~~sign post~~ in the
3 immediate vicinity of the ~~highway-rail~~ grade crossing on the railroad or LRT right-of-way.

4 Guidance:

5 A LOOK sign should not be mounted as a supplemental plaque on a Crossback Assembly that has a
6 YIELD or STOP sign mounted on the same support as the Crossback.

7 **Section ~~8B-12~~ 8B.18 Emergency Notification Sign (I-13 ~~or I-13a~~)**

8 Guidance:

9 ~~An~~ Emergency Notification (I-13 ~~or I-13a~~) signs (see Figure 8B-5) should be installed at all highway-rail
10 grade crossings, and at all highway-LRT grade crossings on semi-exclusive alignments, to provide ~~for~~
11 ~~emergency notification~~ information to road users so that they can notify the railroad company or LRT agency
12 about emergencies or malfunctioning traffic control devices. ~~The sign should have a white message on blue~~
13 ~~background.~~

14 ~~Location and placement should be decided cooperatively by the railroad company and the public or~~
15 ~~private highway agencies based on specific site conditions. However, these signs are typically located on the~~
16 ~~railroad right-of-way.~~

17 ~~This sign, which is for emergency notification, should convey a clear and simple message that is visible to~~
18 ~~anyone stalled or disabled on the railroad tracks, and to anyone with other emergencies.~~

19 ~~Support:~~

20 ~~Examples of sign messages are shown in Figure 8B-4.~~

21 Standard:

22 When Emergency Notification signs are used at a highway-rail grade crossing, they shall, at a
23 minimum, include the USDOT grade crossing inventory number and the emergency contact telephone
24 number.

25 When Emergency Notification signs are used at a highway-LRT grade crossing, they shall, at a
26 minimum, include a unique crossing identifier and the emergency contact telephone number.

27 Emergency Notification Signs shall have a white legend and border on a blue background.

28 The Emergency Notification signs shall be positioned so as to not obstruct any traffic control
29 devices or limit the view of rail traffic approaching the grade crossing.

30 Guidance:

31 Emergency Notification signs should be retroreflective.

32 Emergency Notification signs should be oriented so as to face highway vehicles stopped on or at the grade
33 crossing or on the traveled way near the grade crossing.

34 At station crossings, Emergency Notification signs or information should be posted in a conspicuous
35 location.

36 Emergency Notification signs mounted on Crossback Assemblies or signal masts should only be large
37 enough to provide the necessary contact information. Use of larger signs that might obstruct the view of rail
38 traffic or other highway vehicles should be avoided.

39 **Section ~~10C-17~~ 8B.19 Light Rail Transit Approaching-Activated Blank-Out Warning Sign**
40 **(W10-7)**

41 Support:

42 The Light Rail Transit Approaching-Activated Blank-Out (W10-7) warning sign (see Figure 8B-4)
43 supplements the traffic control signal devices to warn road users ~~turning across~~ crossing the tracks of ~~an~~
44 approaching ~~parallel light rail transit~~ LRT ~~vehicle~~ equipment.

45 Option:

46 A Light Rail Transit Approaching-Activated Blank-Out warning sign may be used at signalized
47 intersections near ~~highway-light rail transit~~ highway-LRT grade crossings or at crossings controlled by STOP
48 signs or automatic gates.

49 **Section ~~8B-13~~ 8B.20 TRAINS MAY EXCEED 80 MPH Sign (W10-8)**

1 Guidance:

2 Where trains are permitted to travel at speeds exceeding 80 mph, a TRAINS MAY EXCEED 80 MPH
3 (W10-8) sign (see Figure 8B-4) should be installed facing road users approaching the highway-rail grade
4 crossing.

5 If used, the TRAINS MAY EXCEED 80 MPH signs should be installed between the ~~Highway-Rail~~ Grade
6 Crossing Advance Warning (W10-~~+~~ series) sign (see Figure 8B-4) and the highway-rail grade crossing on all
7 approaches to the highway-rail grade crossing. The locations should be determined based on specific site
8 conditions.

9 **Section ~~8B-14~~ 8B.21 NO TRAIN HORN Sign and Plaque (W10-9, W10-9P)**

10 Standard:

11 Either a NO TRAIN HORN (W10-9) sign (see Figure 8B-4) or a NO TRAIN HORN (W10-9P)
12 plaque shall be installed in each direction at each highway-rail grade crossing where ~~there is a Federal~~
13 ~~Railroad Administration authorization for trains to not sound a horn~~ a quiet zone has been established
14 in compliance with 49 CFR Part 222. The sign ~~If a W10-9P plaque is used, it shall be mounted as a~~
15 supplemental plaque and be mounted directly below the ~~Highway-Rail~~ Grade Crossing Advance
16 Warning (W10-~~+~~ series) sign (see Figure 8B-4).

17 **Section ~~8B-15~~ 8B.22 NO SIGNAL Sign (W10-10) or NO GATES OR LIGHTS Sign Plaque**
18 **(W10-13P)**

19 Option:

20 ~~A NO SIGNAL (W10-10) sign or a NO GATES OR LIGHTS (W10-13) sign (see Figure 8B-5) may be~~
21 ~~installed at highway-rail grade crossings that are not equipped with automated signals.~~

22 The ~~NO SIGNAL (W10-10) sign or the~~ NO GATES OR LIGHTS (W10-13P) sign plaque (see Figure 8B-
23 4) may be mounted ~~as a supplemental plaque~~ below the Grade Crossing Advance Warning (W10-~~+~~ series)
24 sign at grade crossings that are not equipped with automated signals.

25 **Section ~~8B-17~~ 8B.23 Low Ground Clearance ~~Highway-Rail~~ Grade Crossing Sign (W10-5)**

26 Guidance:

27 If the highway profile conditions are sufficiently abrupt to create a hang-up situation for long wheelbase
28 vehicles or for trailers with low ground clearance, the Low Ground Clearance ~~Highway-Rail~~ Grade Crossing
29 (W10-5) sign (see Figure 8B-4) should be installed in advance of the ~~highway-rail~~ grade crossing.

30 Standard:

31 **Because this symbol might not be readily recognizable by the public, the Low Ground Clearance**
32 **~~Highway-Rail~~ Grade Crossing (W10-5) warning sign shall be accompanied by an educational plaque,**
33 **LOW GROUND CLEARANCE. The LOW GROUND CLEARANCE educational plaque shall remain**
34 **in place for at least 3 years after the initial installation of the W10-5 sign (see Section 2A.12).**

35 Guidance:

36 Auxiliary plaques such as AHEAD, NEXT CROSSING, or USE NEXT CROSSING (with appropriate
37 arrows), or a supplemental distance plaque should be placed below the W10-5 sign at the nearest intersecting
38 highway where a vehicle can detour or at a point on the highway wide enough to permit a U-turn.

39 If engineering judgment of roadway geometric and operating conditions confirms that highway vehicle
40 speeds across the ~~railroad~~ tracks should be below the posted speed limit, a W13-1P advisory speed plaque
41 should be posted.

42 Option:

43 If the ~~highway-rail~~ grade crossing is rough, word message signs such as BUMP, DIP, or ROUGH
44 CROSSING may be installed. A W13-1P advisory speed plaque may be installed below the word message
45 sign in advance of rough crossings.

46 Support:

47 Information on ~~railroad~~ ground clearance requirements at grade crossings is ~~also~~ available in the
48 “American Railway Engineering and Maintenance-of-Way Association’s Engineering Manual,” or the
49 American Association of State Highway and Transportation Officials’ “Policy on Geometric Design of
50 Highways and Streets” (see Section 1A.11).

1 **Section ~~8B.18~~ 8B.24 Storage Space Signs (W10-11, W10-11a, W10-11b)**

2 Guidance:

3 A Storage Space (W10-11) sign supplemented by a word message storage distance (W10-11a) sign (see
4 Figure 8B-4) should be used where there is a highway intersection in close proximity to the ~~highway-rail~~
5 grade crossing and an engineering study determines that adequate space is not available to store a design
6 vehicle(s) between the highway intersection and the train or LRT equipment dynamic envelope.

7 The Storage Space (W10-11 and W10-11a) signs should be mounted in advance of the ~~highway-rail~~ grade
8 crossing at an appropriate location to advise drivers of the space available for highway vehicle storage
9 between the highway intersection and the ~~highway-rail~~ grade crossing.

10 Option:

11 A Storage Space (W10-11b) sign (see Figure 8B-4) may be mounted beyond the ~~highway-rail~~ grade
12 crossing at the highway intersection under the STOP or YIELD sign or just prior to the signalized intersection
13 to remind drivers of the storage space between the tracks and the highway intersection.

14 **Section ~~8B.19~~ 8B.25 Skewed Crossing Sign (W10-12)**

15 Option:

16 The Skewed Crossing (W10-12) sign (see Figure 8B-4) may be used at a skewed ~~highway-rail~~ grade
17 crossing to warn ~~drivers~~ road users that the ~~railroad~~ tracks are not perpendicular to the highway.

18 Guidance:

19 If the Skewed Crossing sign is used, the symbol should show the direction of the crossing (near left to far
20 right as shown in Figure 8B-4, or the mirror image if the track goes from far left to near right). If the Skewed
21 Crossing sign is used where the angle of the crossing is significantly different than 45 degrees, the symbol
22 should show the approximate angle of the crossing.

23 **Standard:**

24 **The Skewed Crossing sign shall not be used as a replacement for the required Advance Warning**
25 **(W10-1) sign. If used, the Skewed Crossing sign shall supplement the W10-1 sign and shall be mounted**
26 **on a separate post.**

27 **Section ~~10C.20~~ 8B.26 Light Rail Transit Station Sign (I-12)**

28 Option:

29 The Light Rail Transit Station (I-12) sign (see Figure 2H-1) may be used to direct road users to an ~~light-~~
30 ~~rail-transit~~ LRT station or boarding location. It may be supplemented by the name of the transit system and by
31 arrows as provided in Section 2D.08.

32 **Section ~~8B.20~~ 8B.27 Pavement Markings**

33 **Standard:**

34 All ~~highway-rail~~ grade crossing pavement markings shall be retroreflectorized white. All other
35 markings shall be in accordance with Part 3.

36 On paved roadways, pavement markings in advance of a ~~highway-rail~~ grade crossing shall consist
37 of an X, the letters RR, a no-passing zone marking (on two-lane, two-way highways ~~where with~~
38 ~~centerline~~ center line markings ~~are used~~ in compliance with Section 3B.01), and certain transverse lines
39 as shown in Figures 8B-6 and 8B-7.

40 Identical markings shall be placed in each approach lane on all paved approaches to ~~highway-rail~~
41 grade crossings where signals or automatic gates are located, and at all other ~~highway-rail~~ grade
42 crossings where the posted or statutory highway speed is 40 mph or greater.

43 Pavement markings shall not be required at ~~highway-rail~~ grade crossings where the posted or
44 statutory highway speed is less than 40 mph; if an engineering study indicates that other installed
45 devices provide suitable warning and control. ~~or~~ Pavement markings shall not be required at grade
46 crossings in urban areas; if an engineering study indicates that other installed devices provide suitable
47 warning and control.

48 Guidance:

1 When pavement markings are used, a portion of the X symbol should be directly opposite the Grade
2 Crossing Advance Warning sign. The X symbol and letters should be elongated to allow for the low angle at
3 which they will be viewed.

4 Option:

5 When justified by engineering judgment, supplemental pavement marking symbol(s) may be placed
6 between the Grade Crossing Advance Warning sign and the ~~highway-rail~~ grade crossing.

7 **Section ~~8B.24~~ 8B.28 Stop and Yield Lines**

8 Standard:

9 On paved roadways at grade crossings that are equipped with active control devices such as
10 flashing-light signals, gates, or traffic control signals, a stop line (see Section 3B.16) shall be installed to
11 indicate the point behind which highway vehicles are or might be required to stop.

12 Guidance:

13 On paved roadway approaches to passive grade crossings where a STOP sign is installed in conjunction
14 with the Crossbuck sign, a stop line should be installed to indicate the point behind which highway vehicles
15 are required to stop or as near to that point as practical.

16 ~~The~~ If a stop line is used, it should be a transverse line at a right angle to the traveled way ~~at a point where~~
17 ~~a vehicle is to stop or as near to that point as possible. The stop line and~~ should be placed approximately 8
18 feet ~~from~~ in advance of the gate (if present), but no closer than 15 feet ~~from~~ in advance of the nearest rail.

19 Option:

20 On paved roadway approaches to passive grade crossings where a YIELD sign is installed in conjunction
21 with the Crossbuck sign, a yield line (see Section 3B.16) or a stop line may be installed to indicate the point
22 behind which highway vehicles are required to yield or stop or as near to that point as practical.

23 Guidance:

24 If a yield line is used, it should be a transverse line (see Figure 3B-16) at a right angle to the traveled way
25 and should be placed no closer than 15 feet in advance of the nearest rail (see Figure 8B-7).

26 **Section ~~8B.22~~ 8B.29 Dynamic Envelope Markings**

27 Support:

28 The dynamic envelope (see Figures 8B-8 and 8B-9) markings indicate the clearance required for the train
29 or light-rail-transit LRT vehicle equipment overhang resulting from any combination of loading, lateral
30 motion, or suspension failure. relocated from Section 10C.25

31 Option:

32 ~~Dynamic envelope markings may be used to mark the edges of the dynamic envelope where there is a~~
33 ~~highway intersection in close proximity to the highway rail grade crossing and an engineering study~~
34 ~~determines that vehicles might stop within the dynamic envelope area.~~

35 Dynamic envelope markings may be installed at all ~~highway-rail~~ grade crossings, unless a Four-Quadrant
36 Gate system (see Section 8C.06) is used.

37 **Standard:**

38 **If used, pavement markings for indicating the dynamic envelope shall ~~conform to~~ comply with the**
39 **provisions of Part 3 and shall be a 4-inch normal solid white line or contrasting pavement color and/or**
40 **contrasting pavement texture.**

41 Guidance:

42 If pavement markings are used to convey the dynamic envelope, they should be placed completely outside
43 of the dynamic envelope. relocated from Section 10C.25 If used, dynamic envelope pavement markings
44 should be placed on the highway 6 feet from and parallel to the nearest rail, ~~installed parallel to the tracks,~~
45 unless the operating railroad company or LRT agency advises otherwise. The pavement markings should
46 extend across the roadway as shown in Figure 8B-8. The dynamic envelope pavement markings should not be
47 placed perpendicular to the roadway at skewed grade crossings.

48 Option:

1 In semi-exclusive [LRT](#) alignments, the dynamic envelope markings may be along the ~~light rail transit~~
2 [LRT](#) trackway between intersections where the trackway is immediately adjacent to travel lanes and no
3 physical barrier is present.

4 In mixed-use [LRT](#) alignments, the dynamic envelope markings may be continuous between intersections
5 (see [Figure 8B-9](#)).

6 [In mixed-use LRT alignments](#), pavement markings for adjacent travel or parking lanes may be used
7 instead of dynamic envelope markings if the lines are outside the dynamic envelope.

2 CHAPTER ~~8D~~ 8C. FLASHING-LIGHT SIGNALS, GATES, AND TRAFFIC CONTROL
3 SIGNALS

4 Section ~~8D.01~~ 8C.01 Introduction

5 Support:

6 ~~Active traffic control systems inform motorists, bicyclists, and pedestrians of the approach or presence of~~
7 ~~trains, locomotives, or other railroad equipment at highway-rail grade crossings.~~

8 Active ~~light rail transit~~ traffic control systems inform ~~motorists, bicyclists, and pedestrians~~ road users of
9 the approach or presence of ~~light rail transit vehicles~~ traffic at ~~highway-light rail transit~~ grade crossings.
10 These systems include four-quadrant gate systems, automatic gates, flashing-light signals, traffic control
11 signals, actuated blank-out and variable message signs, and other active traffic control devices. relocated from
12 Section 10D.01

13 A composite drawing (see Figure 8C-1) shows a post-mounted flashing-light signal (two light units
14 mounted in a horizontal line), a flashing-light signal mounted on an overhead structure, and an automatic gate
15 assembly.

16 Option:

17 Post-mounted and overhead-~~mounted~~ flashing-light signals may be used separately or in combination with
18 each other as determined by an engineering study. Also, flashing-light signals may be used without automatic
19 gate assemblies, as determined by an engineering study.

20 **Standard:**

21 **The meaning of flashing-light signals and gates shall be as stated in the “Uniform Vehicle Code”**
22 **(see Sections 11-701 and 11-703 of the “UVC”), which is available from the National Committee on**
23 **Uniform Traffic Laws and Ordinances (see Page i for the address).**

24 **Location and clearance dimensions for flashing-light signals and gates shall be as shown in Figure**
25 **8C-1.**

26 **When there is a curb, a horizontal clearance offset of at least 2 feet shall be provided from the face**
27 **of the vertical curb to the closest part of the signal or gate arm in its upright position. When a**
28 **cantilevered-arm flashing-light signal is used, the vertical clearance shall be at least 17 feet above the**
29 **crown of the highway to the lowest point of the signal unit.**

30 **Where there is a shoulder, but no curb, a horizontal clearance offset of at least 2 feet from the edge**
31 **of a paved or surfaced shoulder shall be provided, with an clearance offset of at least 6 feet from the**
32 **edge of the traveled way.**

33 **Where there is no curb or shoulder, the minimum horizontal clearance offset shall be 6 feet from**
34 **the edge of the traveled way.**

35 Guidance:

36 Equipment housings (controller cabinets) should have a lateral clearance offset of at least 30 feet from the
37 edge of the highway, and where railroad or LRT property and conditions allow, at least 25 feet from the
38 nearest rail.

39 If a pedestrian route is provided, sufficient clearance from supports, posts, and gate mechanisms should be
40 maintained for pedestrian travel.

41 When determined by an engineering study, a lateral escape route to the right of the highway in advance of
42 the ~~highway-rail~~ grade crossing traffic control devices should be kept free of guardrail or other ground
43 obstructions. Where guardrail is not deemed necessary or appropriate, barriers should not be used for
44 protecting signal supports.

45 The same lateral clearance offset and roadside safety features should apply to flashing-light signal and
46 automatic gate locations on both the right-hand and left-hand sides of the roadway.

47 Option:

48 In industrial or other areas involving only low-speed highway traffic or where signals are vulnerable to
49 damage by turning truck traffic, guardrail may be installed to provide protection for the signal assembly.

50 Guidance:

1 Where both traffic control signals and flashing-light signals (with or without automatic gates) are in
2 operation at the same ~~highway-light rail transit~~ highway-LRT grade crossing, the operation of the devices
3 should be coordinated to avoid any display of conflicting signal indications. **relocated from Section 10D.01**

4 ~~Option:~~

5 ~~Audible devices may be operated in conjunction with the flashing lights or traffic control signals.~~
6 **relocated from Section 10D.01 and replaced by Standard paragraphs in Sections 8C.02 and 8C.10**

7 Support:

8 ~~Light rail transit~~ LRT typically operates through grade crossings in semi-exclusive and mixed-use
9 alignments at speeds between 10 and 65 mph. **relocated from Section 10D.01**

10 When ~~light rail transit~~ LRT speed is cited in this Part, it refers to the maximum speed at which ~~light rail-~~
11 ~~transit LRT vehicles are~~ equipment is permitted to traverse a particular grade crossing. **relocated from Section**
12 **10D.01**

13 ~~Section 8D.02~~ **8C.02** Flashing-Light Signals, ~~Post-Mounted~~

14 Support:

15 Section 8C.03 contains additional information regarding flashing-light signals at highway-LRT grade
16 crossings in semi-exclusive and mixed-use alignments.

17 **Standard:**

18 **If used**, the flashing-light signal assembly (shown in Figure 8C-1) on the side of the highway shall
19 include a standard Crossbuck (R15-1) sign, and where there is more than one track, a supplemental
20 Number of Tracks (R15-2P) ~~sign plaque~~, all of which indicate to motorists, bicyclists, and pedestrians
21 the location of a ~~highway-rail~~ grade crossing.

22 Option:

23 At highway-rail grade crossings, bells or other audible warning devices may be included in the assembly
24 and may be operated in conjunction with the flashing lights to provide additional warning for pedestrians, ~~and~~
25 bicyclists, and/or other non-motorized road users.

26 **Standard:**

27 When indicating the approach or presence of ~~a train~~ rail traffic, the flashing-light signal shall
28 display toward approaching highway traffic two red lights mounted in a horizontal line flashing
29 alternately.

30 **If used**, flashing-light signals shall be placed to the right of approaching highway traffic on all
31 highway approaches to a ~~highway-rail~~ grade crossing. They shall be located laterally with respect to
32 the highway in ~~conformance~~ compliance with Figure 8C-1 except where such location would adversely
33 affect signal visibility.

34 **If used** at a ~~highway-rail~~ grade crossings with highway traffic in both directions, back-to-back pairs
35 of lights shall be placed on each side of the tracks. On multi-lane one-way streets and divided highways,
36 flashing-light signals shall be placed on the approach side of the ~~highway-rail~~ grade crossing on both
37 sides of the roadway or shall be placed above the highway.

38 Each red signal unit in the flashing-light signal shall flash alternately. The number of flashes per
39 minute for each lamp shall be 35 minimum and 65 maximum. Each lamp shall be illuminated
40 approximately the same length of time. Total time of illumination of each pair of lamps shall be the
41 entire operating time. Flashing-light units shall use either 8-inch or 12-inch nominal diameter lenses.

42 Guidance:

43 In choosing between the 8-inch or 12-inch nominal diameter lenses for use in ~~highway-rail~~ grade crossing
44 flashing-light signals, consideration should be given to the principles stated in Section 4D.07.

45 **Standard:**

46 ~~Highway-rail~~ Grade crossing flashing-light signals shall operate at a low voltage using storage
47 batteries either as a primary or stand-by source of electrical energy. Provision shall be made to provide
48 a source of energy for charging batteries.

49 Option:

50 Additional pairs of flashing-light units may be mounted on the same supporting post and directed toward
51 vehicular traffic approaching the ~~highway-rail~~ grade crossing from other than the principal highway route,

1 such as where there are approaching routes on highways closely adjacent to and parallel to the ~~railroad~~
2 track(s).

3 **Standard:**

4 References to lenses in this Section shall not be used to limit flashing-light signal optical units to
5 incandescent lamps within optical assemblies that include lenses.

6 **Support:**

7 Research has resulted in flashing-light signal optical units that are not lenses, such as, but not limited to,
8 light emitting diode (LED) flashing-light signal modules.

9 ~~Section 8D.03 Flashing-Light Signals, Overhead Structures~~

10 **Option:**

11 Flashing-light signals may be installed on overhead structures or cantilevered supports as shown in Figure
12 8C-1 where needed for additional emphasis, or for better visibility to approaching traffic, particularly on
13 multi-lane approaches or highways with profile restrictions.

14 If it is determined by an engineering study that one set of flashing lights on the cantilever arm is not
15 sufficiently visible to road users, one or more additional sets of flashing lights may be mounted on the
16 supporting post and/or on the cantilever arm.

17 **Standard:**

18 **Breakaway or frangible bases shall not be used for overhead structures or cantilevered supports.**

19 Except as otherwise provided in Paragraphs 13 through 15, flashing-light signals mounted overhead
20 shall comply with the applicable provisions of this Section.

21 ~~Section 10D.02~~ **Section 8C.03 Flashing-Light Signals at Highway-LRT Grade Crossings**

22 **Support:**

23 Section 8C.02 ~~and 8D.03~~ contains additional ~~details~~ provisions regarding the design and operation of
24 flashing-light signals, including those installed at highway-LRT grade crossings.

25 **Standard:**

26 ~~Highway-light rail transit~~ Highway-LRT grade crossings in semi-exclusive alignments shall be
27 equipped with flashing-light signals where ~~light rail transit~~ LRT speeds exceed 35 mph. Flashing-light
28 signals shall be clearly visible to motorists, pedestrians, and bicyclists.

29 If flashing-light signals are in operation at a highway-LRT crossing that is used by pedestrians,
30 bicyclists, and/or other non-motorized road users, an audible device such as a bell shall also be provided
31 and shall be operated in conjunction with the flashing-light signals.

32 **Guidance:**

33 Where the crossing is at a location other than an intersection, ~~where~~ and ~~light rail transit~~ LRT speeds
34 exceed 25 mph, flashing-light signals should be installed.

35 **Option:**

36 Traffic control signals may be used instead of flashing-light signals at ~~highway-light rail transit~~ highway-
37 LRT grade crossings within highway-highway intersections where ~~light rail transit~~ LRT speeds do not exceed
38 35 mph. Traffic control signals or flashing-light signals may be used where the crossing is at a location other
39 than an intersection, where ~~light rail transit~~ LRT speeds do not exceed 25 mph, and when the roadway is a
40 low-volume street where prevailing speeds do not exceed 25 mph.

41 ~~Section 8D.04~~ **Section 8C.04 Automatic Gates**

42 **Support:**

43 An automatic gate is a traffic control device used ~~as an adjunct to~~ in conjunction with flashing-light
44 signals.

45 **Standard:**

46 **The automatic gate (see Figure 8C-1) shall consist of a drive mechanism and a fully**
47 **retroreflectorized red- and white-striped gate arm with lights. When in the down position, the gate arm**
48 **shall extend across the approaching lanes of highway traffic.**

1 In the normal sequence of operation, unless constant warning time detection or other advanced
2 system requires otherwise, the flashing-light signals and the lights on the gate arm (in its normal
3 upright position) shall be activated immediately upon detection of ~~the~~ approaching ~~train~~ train rail traffic.
4 The gate arm shall start its downward motion not less than 3 seconds after the flashing-light signals
5 start to operate, shall reach its horizontal position at least 5 seconds before the arrival of the ~~train rail~~
6 traffic, and shall remain in the down position as long as the ~~train rail traffic~~ occupies the ~~highway-rail~~
7 grade crossing.

8 When the ~~train rail traffic~~ clears the ~~highway-rail~~ grade crossing, and if no other ~~train rail traffic~~ is
9 detected, the gate arm shall ascend to its upright position, following which the flashing-light signals and
10 the lights on the gate arm shall cease operation.

11 Gate arms shall be fully retroreflectorized on both sides, and shall have ~~45-degree-diagonal~~ vertical
12 stripes alternately red and white at 16-inch intervals measured horizontally, ~~and~~.

13 Support:

14 It is acceptable to replace a damaged gate with a gate having vertical stripes even if the other existing
15 gates at the same grade crossing have diagonal stripes; however, it is also acceptable to replace a damaged
16 gate with a gate having diagonal stripes if the other existing gates at the same grade crossing have diagonal
17 stripes in order to maintain consistency per the provisions of Paragraph 24 of the Introduction.

18 Standard:

19 Gate arms shall have at least three red lights as ~~indicated~~ provided in Figure 8C-1.

20 When activated, the gate arm light nearest the tip shall be illuminated continuously and the other
21 lights shall flash alternately in unison with the flashing-light signals.

22 The entrance gate arm mechanism shall be designed to fail safe in the down position.

23 Guidance:

24 The gate arm should ascend to its upright position in ~~not more than~~ 12 seconds or less.

25 In its normal upright position, when no ~~train rail traffic~~ is approaching or occupying the ~~highway-rail~~
26 grade crossing, the gate arm should be either vertical or nearly so (see Figure 8C-1).

27 In the design of individual installations, consideration should be given to timing the operation of the gate
28 arm to accommodate large and/or slow-moving highway vehicles.

29 The gates should cover the approaching highway to block all ~~motor~~ highway vehicles from being driven
30 around the gate without crossing the ~~centerline~~ center line.

31 Option:

32 The effectiveness of gates may be enhanced by the use of channelizing devices or raised median islands to
33 discourage driving around lowered automatic gates. relocated from Section 10D.03

34 ~~Automatic gate installations may include median islands between opposing lanes on an approach to a~~
35 ~~highway-rail grade crossing.~~

36 Where gates are located in the median, additional median width may be required to provide the minimum
37 clearance for the counterweight supports.

38 Automatic gates may be supplemented by cantilevered flashing-light signals (see Figure 8C-1) where
39 there is a need for additional emphasis or better visibility. relocated from Section 10D.03

40 Section 8C.05 Use of Automatic Gates at LRT Grade Crossings

41 Guidance:

42 ~~Highway-light rail transit~~ Highway-LRT grade crossings in semi-exclusive alignments should be
43 equipped with automatic gates and flashing-light signals (see Sections 8C.02 and 8C.03) where ~~light-rail~~
44 ~~transit~~ LRT speeds exceed 35 mph. relocated from Section 10D.03

45 Option:

46 Where ~~the a~~ ~~highway-light rail transit~~ highway-LRT grade crossing is at a location other than an
47 intersection, where ~~light-rail-transit~~ LRT speeds exceed 25 mph, automatic gates and flashing-light signals
48 may be installed. relocated from Section 10D.03

49 Traffic control signals may be used instead of automatic gates at ~~highway-light rail transit~~ highway-LRT
50 grade crossings within highway-highway intersections where ~~light-rail-transit~~ LRT speeds do not exceed 35
51 mph. Traffic control signals or flashing-light signals without automatic gates may be used where the crossing

1 is at a location other than an intersection and where ~~light rail transit~~ LRT speeds do not exceed 25 mph and the
2 roadway is a low-volume street where prevailing speeds do not exceed 25 mph. **relocated from Section**
3 **10D.03**

4 **Section ~~8D.05~~ 8C.06 Four-Quadrant Gate Systems**

5 Option:

6 Four-Quadrant Gate systems may be installed to improve safety at ~~highway-rail~~ grade crossings based on
7 an engineering study when less restrictive measures, such as automatic gates and median islands, are not
8 effective.

9 **Standard:**

10 A Four-Quadrant Gate system shall consist of ~~a series of~~ entrance and exit ~~automatic~~ gates ~~used as~~
11 ~~an adjunct to flashing-light signals to~~ that control and block ~~traffic~~ road users on all lanes entering and
12 exiting the ~~highway-rail~~ grade crossing.

13 The Four-Quadrant Gate system shall ~~consist of~~ use a series of drive mechanisms and fully
14 retroreflectorized red- and white-striped gate arms with lights, and when in the down position the gate
15 arms extend individually across the entrance and exit lanes of ~~highway-traffic~~ the roadway as shown in
16 Figure 8C-2. Standards contained in Sections 8C.01 through 8C.03 for flashing-light signals shall be
17 followed for signal specifications, location, and clearance distances.

18 In the normal sequence of operation, unless constant warning time detection or other advanced
19 system requires otherwise, the flashing-light signals and the lights on the gate arms (in their normal
20 upright positions) shall be activated immediately upon the detection of ~~the~~ approaching ~~train rail~~
21 traffic. The gate arms for the entrance lanes of traffic shall start their downward motion not less than 3
22 seconds after the flashing-light signals start to operate and shall reach their horizontal position at least
23 5 seconds before the arrival of the ~~train rail~~ traffic. Exit gate arm activation and downward motion
24 shall be based on detection or timing requirements established by an engineering study of the individual
25 site. The gate arms shall remain in the down position as long as the ~~train rail~~ traffic occupies the
26 ~~highway-rail~~ grade crossing.

27 When the ~~train rail~~ traffic clears the ~~highway-rail~~ grade crossing, and if no other ~~train rail~~ traffic is
28 detected, the gate arms shall ascend to their upright positions, following which the flashing-light signals
29 and the lights on the gate arms shall cease operation.

30 Gate arm design, colors, and lighting requirements shall be in accordance with the Standards
31 contained in Section 8C.04.

32 Except as ~~noted~~ provided in ~~the Option below~~ Paragraph 19, the exit gate arm mechanism shall be
33 designed to fail-safe in the up position.

34 At locations where gate arms are offset a sufficient distance for highway vehicles to drive between
35 the entrance and exit gate arms, median islands (see Figure 8C-2) shall be installed in accordance with
36 the needs established by an engineering study.

37 Guidance:

38 The gate arm should ascend to its upright position in ~~not more than~~ 12 seconds or less.

39 Four-Quadrant Gate systems should only be used in locations with constant warning time ~~train~~ detection.

40 The operating mode of the exit gates should be determined based upon an engineering study, with input
41 from the affected railroad company or LRT agency.

42 If the Timed Exit Gate Operating Mode is used, the engineering study, with input from the affected
43 railroad company or LRT agency, should also determine the Exit Gate Clearance Time (see definition in
44 Section 1A.13).

45 If the Dynamic Exit Gate Operating Mode is used, highway vehicle intrusion detection devices that are
46 part of a system that incorporates processing logic to detect the presence of highway vehicles within the
47 minimum track clearance distance should be installed to control exit gate operation ~~based on vehicle presence~~
48 ~~within the minimum track clearance distance~~.

49 Regardless of which exit gate operating mode is used, the Exit Gate Clearance Time should be considered
50 when determining additional time requirements for the Minimum Warning Time.

1 If a Four-Quadrant Gate system is used at a location that is adjacent to an intersection that could cause
2 highway vehicles to queue within the minimum track clearance distance, the Dynamic Exit Gate Operating
3 Mode should be used unless an engineering study indicates otherwise.

4 If a Four-Quadrant Gate system is interconnected with a highway traffic signal, backup or standby power
5 should be considered for the highway traffic signal. Also, circuitry should be installed to prevent the highway
6 traffic signal from leaving the track clearance green interval until all of the gates are lowered.

7 At locations where sufficient space is available, exit gates should be ~~set back~~ positioned downstream from
8 the track a distance that provides a safety zone long enough to accommodate at least one design vehicle
9 between the exit gate and the nearest rail.

10 Four-Quadrant Gate systems should include remote health (status) monitoring capable of automatically
11 notifying railroad or LRT signal maintenance personnel when anomalies have occurred within the system.

12 Option:

13 Exit gate arms may fail in the down position if the ~~highway-rail~~ grade crossing is equipped with remote
14 health (status) monitoring.

15 Four-Quadrant Gate installations may include median islands between opposing lanes on an approach to a
16 ~~highway-rail~~ grade crossing.

17 Guidance:

18 Where sufficient space is available, median islands should be at least 60 feet in length.

19 Section 8C.07 Wayside Horn Systems

20 Option:

21 A wayside horn system (see definition in Section 1A.13) may be installed in compliance with 49 CFR Part
22 222 to provide audible warning directed toward the road users at a highway-rail or highway-LRT grade
23 crossing or at a pathway grade crossing.

24 Standard:

25 Wayside horn systems used at grade crossings where the locomotive horn is not sounded shall be
26 equipped and shall operate in compliance with the requirements of Appendix E to 49 CFR Part 222.

27 Guidance:

28 The same lateral clearance and roadside safety features should apply to wayside horn systems as described
29 in the Standards contained in Section 8C.01. Wayside horn systems, when mounted on a separate pole
30 assembly, should be installed no closer than 15 feet from the center of the nearest track and should be
31 positioned to not obstruct the motorists' line of sight of the flashing-light signals.

32 ~~Section 8D.06~~ Section 8C.08 Train Rail Traffic Detection

33 Standard:

34 The devices employed in active traffic control systems shall be actuated by some form of ~~train~~ rail
35 traffic detection.

36 ~~Train~~ Rail traffic detection circuits, insofar as practical, shall be designed on the fail-safe principle.

37 Flashing-light signals shall operate for at least 20 seconds before the arrival of any ~~train~~ rail traffic,
38 except as ~~noted~~ provided in the Option below Paragraph 4.

39 Option:

40 On tracks where all ~~trains~~ rail traffic operates at less than 20 mph and where ~~flagging is performed~~ road
41 users are directed by an ~~employee~~ authorized person on the ground to not enter the crossing at all times that
42 approaching rail traffic is about to occupy the crossing, a shorter signal operating time for the flashing-light
43 signals may be used.

44 Additional warning time may be provided when determined by an engineering study.

45 Guidance:

46 Where the speeds of different ~~trains~~ rail traffic on a given track vary considerably under normal operation,
47 special devices or circuits should be installed to provide reasonably uniform notice in advance of all ~~train~~ rail
48 traffic movements over the ~~highway-rail~~ grade crossing. Special control features should be used to eliminate
49 the effects of station stops and switching operations within approach control circuits to prevent excessive

1 activation of the traffic control devices while ~~trains~~ [rail traffic](#) ~~are~~ [is](#) stopped on or switching upon the
2 approach track control circuits.

3 **Section ~~8D.07~~ [8C.09](#) Traffic Control Signals at or Near Highway-Rail Grade Crossings**

4 Option:

5 Traffic control signals may be used instead of flashing-light signals to control road users at industrial
6 highway-rail grade crossings and other places where train movements are very slow, such as in switching
7 operations.

8 **Standard:**

9 **The appropriate provisions of Part 4 relating to traffic control signal design, installation, and**
10 **operation shall be applicable where traffic control signals are used to control road users instead of**
11 **flashing-light signals at highway-rail grade crossings.**

12 **Traffic control signals shall not be used instead of flashing-light signals to control road users at a**
13 **mainline highway-rail grade crossing.**

14 Guidance:

15 If a highway-rail grade crossing is equipped with a flashing-light signal system and is located within 200
16 feet of an intersection or midblock location controlled by a traffic control signal, the traffic control signal
17 should be provided with preemption in accordance with Section 4D.27.

18 Coordination with the flashing-light signal system, queue detection, or other alternatives should be
19 considered for traffic control signals located farther than 200 feet from the highway-rail grade crossing.
20 Factors to be considered should include traffic volumes, [highway](#) vehicle mix, [highway](#) vehicle and train
21 approach speeds, frequency of trains, and queue lengths.

22 The highway agency [or authority](#) with jurisdiction, [and](#) the regulatory agency with statutory authority, if
23 applicable, ~~and the railroad company~~ should jointly determine the preemption operation [and the timing of](#)
24 [traffic control signals interconnected with](#) ~~at~~ highway-rail grade crossings adjacent to signalized highway
25 intersections.

26 Support:

27 [Section 4D.27 includes a recommendation that traffic control signals that are adjacent to highway-rail](#)
28 [grade crossings and that are coordinated with the flashing-light signals or that include railroad preemption](#)
29 [features be provided with a back-up power supply.](#)

30 **Standard:**

31 [Information regarding the type of preemption and any related timing parameters shall be provided](#)
32 [to the railroad company so that they can design the appropriate train detection circuitry.](#)

33 **If preemption is provided, the normal sequence of traffic control signal indications shall be**
34 **preempted upon the approach of trains to avoid entrapment of [highway](#) vehicles on the highway-rail**
35 **grade crossing ~~by conflicting aspects of the traffic control signals and the highway-rail grade crossing~~**
36 **~~flashing-light signals.~~**

37 **This preemption feature shall have an electrical circuit of the closed-circuit principle, or a**
38 **supervised communication circuit between the control circuits of the highway-rail grade crossing**
39 **warning system and the traffic control signal controller. The traffic control signal controller preemptor**
40 **shall be activated via the supervised communication circuit or the electrical circuit that is normally**
41 **energized by the control circuits of the highway-rail grade crossing warning system. The approach of a**
42 **train to a highway-rail grade crossing shall de-energize the electrical circuit or activate the supervised**
43 **communication circuit, which in turn shall activate the traffic control signal controller preemptor. This**
44 **shall establish and maintain the preemption condition during the time the highway-rail grade crossing**
45 **warning system is activated, except that when crossing gates exist, the preemption condition shall be**
46 **maintained until the crossing gates are energized to start their upward movement. When multiple or**
47 **successive preemptions occur, train activation shall receive first priority.**

48 Guidance:

49 If a highway-rail grade crossing is located within 50 feet (or within 75 feet for a highway that is regularly
50 used by multi-unit [highway](#) vehicles) of an intersection controlled by a traffic control signal, the use of pre-
51 signals to control traffic approaching the grade crossing should be considered.

52 **Standard:**

1 If used, the pre-signals shall display a steady red signal indication during the track clearance
2 portion of a signal preemption sequence to prohibit additional highway vehicles from crossing the
3 railroad track.

4 Guidance:

5 Consideration should be given to using visibility-limited signal faces (see definition in Section 1A.13) at
6 the intersection for the downstream signal faces that control the approach that is equipped with pre-signals.

7 Option:

8 The pre-signal phase sequencing may be timed with an offset from the downstream signalized intersection
9 such that the railroad track area and the area between the railroad track and the downstream signalized
10 intersection is generally kept clear of stopped highway vehicles.

11 **Standard:**

12 If a pre-signal is installed at an interconnected highway-rail grade crossing near a signalized
13 intersection, a STOP HERE ON RED (R10-6) sign shall be installed near the pre-signal or at the stop
14 line if used. If there is a nearby signalized intersection with insufficient clear storage distance for a
15 design vehicle, or the highway-rail grade crossing does not have gates, a No Turn on Red (R10-11, R10-
16 11a, or R10-11b) sign (see Section 2B.53) shall be installed for the approach that crosses the railroad
17 track, if applicable.

18 Option:

19 At locations where a highway-rail grade crossing is located more than 50 feet (or more than 75 feet for a
20 highway regularly used by multi-unit highway vehicles) from an intersection controlled by a traffic control
21 signal, a pre-signal may be used if an engineering study determines a need.

22 If highway traffic signals must be located within close proximity to the flashing-light signal system, the
23 highway traffic signals may be mounted on the same overhead structure as the flashing-light signals.

24 Support:

25 Section 4C.10 describes the Intersection Near a Grade Crossing signal warrant that is intended for use at a
26 location where the proximity to the intersection of a grade crossing on an intersection approach controlled by
27 a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.

28 Section 4D.27 describes additional considerations regarding preemption of traffic control signals at or
29 near highway-rail grade crossings.

30 **Section ~~10D.05~~ 8C.10 Traffic Control Signals at or Near Highway-LRT Grade Crossings**

31 Support:

32 There are two types of traffic control signals for controlling vehicular and ~~light-rail-transit~~ LRT
33 movements at interfaces of the two modes. The first is the standard traffic control signal described in Part 4,
34 which is the focus of this Section. The other type of signal is referred to as an ~~light-rail-transit~~ LRT signal and
35 is discussed in Section 8C.11.

36 **Standard:**

37 The provisions of ~~Parts 4 and~~ Section 8C.09 relating to traffic control signal design, installation, and
38 operation, including interconnection with nearby automatic gates or flashing-light signals, shall be
39 applicable as appropriate where traffic control signals are used at ~~highway-light-rail-transit~~ highway-
40 LRT grade crossings.

41 If traffic control signals are in operation at a crossing that is used by pedestrians, bicyclists, and/or
42 other non-motorized road users, an audible device such as a bell shall also be provided and shall be
43 operated in conjunction with the traffic control signals.

44 Guidance:

45 When a ~~highway-light-rail-transit~~ highway-LRT grade crossing equipped with a flashing-light signal
46 system is located within 200 feet of an intersection or midblock location controlled by a traffic control signal,
47 the traffic control signal should be provided with preemption in accordance with Section 4D.27.

48 Coordination with the flashing-light signal system should be considered for traffic control signals located
49 more than 200 feet from the crossing. Factors to be considered should include traffic volumes, highway
50 vehicle mix, highway vehicle and ~~light-rail-transit~~ LRT approach speeds, frequency of ~~light-rail-transit~~ LRT
51 ~~vehicles~~ traffic, and queue lengths.

1 If the highway traffic signal has emergency-vehicle preemption capability, it should be coordinated with
2 ~~light rail transit~~ LRT operation.

3 Where ~~light rail transit~~ LRT operates in a wide median, highway vehicles crossing the tracks and being
4 controlled by both near and far side traffic signal faces should receive a protected left-turn green phase from
5 the far side signal face to clear highway vehicles from the crossing when ~~light rail transit~~ LRT ~~vehicles are~~
6 equipment is approaching the crossing.

7 Option:

8 Green indications may be provided during ~~light rail transit~~ LRT phases for highway vehicle, pedestrian,
9 and bicycle movements that do not conflict with ~~light rail transit~~ LRT movements.

10 Traffic control signals may be installed in addition to four-quadrant gate systems and automatic gates at a
11 ~~highway-light rail transit~~ highway-LRT crossing if the crossing occurs within a highway-highway intersection
12 and if the traffic control signals meet the warrants described in Chapter 4C.

13 At a location other than an intersection, when ~~light rail transit~~ LRT speeds are less than 25 mph, traffic
14 control signals alone may be used to control road users at ~~highway-light rail transit~~ highway-LRT grade
15 crossings only when justified by an engineering study.

16 Typical circumstances may include:

- 17 A. Geometric conditions preclude the installation of ~~highway-light rail transit~~ highway-LRT grade
18 crossing warning devices.
- 19 B. ~~Light rail transit~~ LRT vehicles share the same roadway with road users.
- 20 C. Traffic control signals already exist.

21 Support:

22 ~~See~~ Section 4D.27 ~~for considerations~~ contains information regarding traffic control signals at or near
23 ~~highway-light rail transit~~ highway-LRT grade crossings that are not equipped with ~~highway-light rail transit~~
24 highway-LRT grade crossing warning devices.

25 Section 4C.10 describes the Intersection Near a Grade Crossing signal warrant that is intended for use at a
26 location where the proximity to the intersection of a grade crossing on an intersection approach controlled by
27 a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.

28 ~~Section 10D.06 Highway Traffic Signal Preemption Turning Restrictions~~

29 Guidance:

30 When a ~~light rail transit~~ highway-LRT grade crossing exists within a signalized intersection, consideration
31 should be given to providing separately ~~controlled Protected Only Mode~~ turn phases signal faces (see
32 definition in Section 1A.13) for the movements crossing the tracks (~~see Section 4A.02~~).

33 **Standard:**

34 Separate turn signal faces that are provided for ~~separately controlled Protected Only Mode~~ turn
35 movements toward the crossing shall display a steady red indication during the approach and/or
36 passage of ~~light rail transit~~ LRT ~~vehicles~~ traffic.

37 Guidance:

38 When a signalized intersection that is located within 200 feet of a ~~highway-light rail transit~~ highway-LRT
39 grade crossing is preempted, all existing turning movements toward the ~~highway-light rail transit~~ highway-
40 LRT grade crossing should be prohibited.

41 Support:

42 Section 8B.08 contains information regarding the prohibition of turning movements toward the crossing
43 during preemption.

44 Part 4 contains information regarding signal phasing and timing requirements.

45 ~~Option:~~

46 ~~An activated blank-out or changeable message sign and/or an appropriate highway traffic signal display~~
47 ~~may be used to prohibit turning movements toward the crossing during preemption (see Section 8B.08).~~

48 ~~Standard:~~

49 ~~Messages on the activated blank-out or changeable message signs shall be visible only when the~~
50 ~~highway-light rail transit intersection restriction is in effect.~~

1 **Section ~~10D.07~~ 8C.11 Use of Traffic Control Signals for Control of ~~Light Rail Transit~~ LRT**
2 **Vehicles at Grade Crossings**

3 Guidance:

4 ~~Light rail transit~~ LRT movements in semi-exclusive alignments at non-gated grade crossings that are
5 equipped with traffic control signals should be controlled by special ~~light rail transit~~ LRT signal indications.

6 ~~Support:~~

7 ~~Examples of light rail transit~~ LRT traffic control signals, ~~that are~~ used to control ~~light rail transit~~ LRT
8 movements only, ~~are shown~~ should display the signal indications illustrated in Figure 8C-3.

9 Support:

10 Section 4D.27 contains information about the use of the signal indications shown in Figure 8C-3 for the
11 control of exclusive bus movements at “queue jumper lanes” and for the control of exclusive bus rapid transit
12 movements on semi-exclusive or mixed-use alignments.

13 Option:

14 Standard traffic control signals may be used instead of ~~light rail transit~~ LRT traffic control signals to
15 control the movement of ~~light rail transit~~ LRT vehicles (see Section 8C.10).

16 **Standard:**

17 **If a separate set of standard traffic control signal indications (red, yellow, and green circular and**
18 **arrow indications) is used to control ~~light rail transit~~ LRT movements, the indications shall be**
19 **positioned so they are not visible to motorists, pedestrians, and bicyclists (see Section 4D.12).**

20 **If the ~~light rail transit~~ LRT crossing control is separate from the intersection control, the two shall**
21 **be interconnected. The ~~light rail~~ LRT signal phase shall not be terminated until after the ~~light rail~~**
22 **~~transit~~ LRT vehicle has cleared the crossing.**

23 Option:

24 ~~Light rail transit~~ LRT signals may be used at grade crossings and at intersections in mixed-use alignments
25 in conjunction with standard traffic control signals where special ~~light rail transit~~ LRT signal phases are used
26 to accommodate turning ~~light rail transit~~ LRT vehicles or where additional ~~light rail transit~~ LRT clearance
27 time is desirable.

28 Guidance:

29 ~~Light rail transit~~ LRT signal faces should be separated vertically or horizontally from the nearest highway
30 traffic signal face for the same approach by at least 3 feet.

31 **Section 8C.12 Grade Crossings Within or In Close Proximity to Circular Intersections**

32 Support:

33 At circular intersections, such as roundabouts and traffic circles, that include or are within close proximity
34 to a grade crossing, a queue of vehicular traffic could cause highway vehicles to stop on the grade crossing.

35 **Standard:**

36 **Where circular intersections include or are within 200 feet of a grade crossing, an engineering study**
37 **shall be made to determine if queuing could impact the grade crossing. If traffic queues impact the**
38 **grade crossing, provisions shall be made to clear highway traffic from the grade crossing prior to the**
39 **arrival of rail traffic.**

40 Support:

41 Among the actions that can be taken to keep the grade crossing clear of traffic or to clear traffic from the
42 grade crossing prior to the arrival of rail traffic are the following:

- 43 A. Elimination of the circular intersection,
- 44 B. Geometric design revisions,
- 45 C. Grade crossing regulatory and warning devices,
- 46 D. Highway traffic signals,
- 47 E. Traffic metering devices,
- 48 F. Activated signs, or
- 49 G. A combination of these or other actions.

50 **Section ~~10D.08~~ 8C.13 Pedestrian and Bicycle Signals and Crossings at LRT Grade Crossings**

1 Guidance:

2 Where ~~light-rail-transit~~ LRT tracks are immediately adjacent to other tracks or a road, pedestrian
3 signalization should be designed to avoid having pedestrians wait between sets of tracks or between the tracks
4 and the road. If adequate space exists for a pedestrian refuge and is justified based on engineering judgment,
5 additional pedestrian signal ~~indicators~~ heads, signing, and detectors should be installed (see Section 4E.08).

6 **Standard:**

7 When used at LRT crossings, pedestrian signal heads shall ~~be in accordance~~ comply with the
8 provisions of Section 4E.04.

9 Guidance:

10 Flashing-light signals (see Figure 8C-4) with a Crossbuck (R15-1) sign and an audible device should be
11 installed at pedestrian and bicycle crossings where an engineering study has determined that the sight distance
12 is not sufficient for pedestrians and bicyclists to complete their crossing prior to the arrival of the ~~light-rail-~~
13 ~~transit LRT vehicle traffic~~ at the crossing, or where ~~light-rail-transit~~ LRT speeds exceed 35 mph.

14 If an engineering study shows that flashing-light signals ~~alone~~ with a Crossbuck sign and an audible
15 device would not provide sufficient notice of an approaching ~~light-rail-transit LRT vehicle traffic~~, the LOOK
16 (R15-8) sign (see Figure 8C-4) and/or pedestrian gates should be considered (see Figures 8C-5 through 8C-7).

17 Support:

18 A pedestrian gate is similar to an automatic gate except the gate arm is shorter.

19 The swing gate alerts pedestrians to the ~~light-rail-transit~~ LRT tracks that are to be crossed. Swing gates
20 are designed to open away from the tracks, requiring users to pull the gate open to cross, but permitting a
21 quick exit from the trackway, and to automatically close.

22 Option:

23 Swing gates may be installed across pedestrian and bicycle walkways (see Figure 8C-8).

24 Pedestrian barriers at offset crossings may be used at pedestrian and bicycle crossings as passive devices
25 that force users to face approaching ~~light-rail-transit~~ LRT before entering the trackway (see Figures 8C-9 and
26 8C-10).

CHAPTER 8D. PATHWAY GRADE CROSSINGS

Section 8D.01 Purpose

Support:

Traffic control for pathway grade crossings includes all signs, signals, markings, other warning devices, and their supports at pathway grade crossings and along pathway approaches to grade crossings. The function of this traffic control is to promote safety and provide effective operation of both rail and pathway traffic at pathway grade crossings.

Except as specifically provided in this Chapter, sidewalks are considered to be part of a highway-rail or highway-LRT grade crossing rather than a pathway grade crossing, and are covered by the provisions of Chapters 8B and 8C rather than by the provisions of this Chapter. However, many of the treatments outlined in this Chapter are applicable to sidewalks adjacent to highway-rail or highway-LRT grade crossings, including detectable warnings, swing gates, and automatic gates.

Crosswalks at intersections where pedestrians cross LRT tracks in mixed-use alignments are covered by the provisions of Section 3B.18 rather than by the provisions of this Chapter.

Section 8D.02 Use of Standard Devices, Systems, and Practices

Guidance:

The public agency with jurisdiction over the pathway and the regulatory agency with statutory authority, if applicable, should jointly determine the need and selection of devices at a pathway grade crossing, including the appropriate traffic control system to be used.

Section 8D.03 Pathway Grade Crossing Signs and Markings

Standard:

Pathway grade crossing signs shall be standard in shape, legend, and color.

Traffic control devices mounted adjacent to pathways at a height of less than 8 feet measured vertically from the bottom edge of the device to the elevation of the near edge of the pathway surface shall have a minimum lateral offset of 2 feet from the near edge of the device to the near edge of the pathway (see Figure 9B-1).

The minimum mounting height for post-mounted signs on pathways shall be 4 feet, measured vertically from the bottom edge of the sign to the elevation of the near edge of the pathway surface (see Figure 9B-1).

Pathway grade crossing traffic control devices shall be located a minimum of 12 feet from the center of the nearest track.

The minimum sizes of pathway grade crossing signs shall be as shown in the shared-use path column in Table 9B-1.

When overhead traffic control devices are used on pathways, the clearance from the bottom edge of the device to the pathway surface directly under the sign or device shall be at least 8 feet.

Guidance:

If pathway users include those who travel faster than pedestrians, such as bicyclists or skaters, the use of warning signs and pavement markings in advance of the pathway grade crossing (see Figure 8D-1) should be considered.

Section 8D.04 Stop Lines, Edge Lines, and Detectable Warnings

Guidance:

If used at pathway grade crossings, the pathway stop line should be a transverse line at the point where a pathway user is to stop. The pathway stop line should be placed at least 2 feet further from the nearest rail than the gate, counterweight, or flashing-light signals (if any of these are present) is placed, and at least 12 feet from the nearest rail.

Option:

Edge lines (see Section 3B.06) may be used on approach to and across the tracks at a pathway grade crossing, a sidewalk at a highway-rail or highway-LRT grade crossing, or a station crossing to delineate the designated pathway user route.

1 Support:

2 Edge line delineation can be beneficial where the distance across the tracks is long, commonly because of
3 a skewed grade crossing or because of multiple tracks, or where the pathway surface is immediately adjacent
4 to a traveled way.

5 Detectable warning surfaces (see Section 3B.18) that contrast visually with adjacent walking surfaces,
6 either light-on-dark or dark-on-light, can be used to warn pedestrians about the locations of the tracks at a
7 grade crossing. The “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities
8 (ADAAG)” (see Section 1A.11) contains specifications for design and placement of detectable warning
9 surfaces.

10 **Section 8D.05 Passive Devices for Pathway Grade Crossings**

11 **Standard:**

12 **Except as provided in Paragraph 2, where active traffic control devices are not used, a Crossbuck**
13 **Assembly shall be installed on each approach to a pathway grade crossing.**

14 **Option:**

15 The Crossbuck Assembly may be omitted at station crossings and on the approaches to a pathway grade
16 crossing that is located within 25 feet of the traveled way at a highway-rail or highway-LRT grade crossing.

17 **Guidance:**

18 The pathway user’s ability to detect the presence of approaching rail traffic should be considered in
19 determining the type and placement of traffic control devices or design features (such as fencing or swing
20 gates).

21 Nighttime visibility should be considered if design features (such as fencing or swing gates) are used to
22 channelize pathway users.

23 If automatic gates and swing gates are used, the pathway should be channelized to direct users to the
24 entrance to and exit from the pathway grade crossing.

25 **Standard:**

26 **If used, swing gates shall be designed to open away from the track(s) so that pathway users can**
27 **quickly push the gate open when moving away from the track(s). If used, swing gates shall be designed**
28 **to automatically return to the closed position after each use.**

29 **Option:**

30 When used in conjunction with automatic gates at pathway grade crossings, swing gates may be equipped
31 with a latching device that permits the gate to be opened only from the track side of the gate.

32 **Support:**

33 The “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)”
34 (see Section 1A.11) contains information regarding spring hinges and door and gate opening forces for swing
35 gates.

36 **Section 8D.06 Active Traffic Control Systems for Pathway Grade Crossings**

37 **Standard:**

38 **If used at a pathway grade crossing, an active traffic control system shall include flashing-light**
39 **signals for each direction of the pathway. A bell or other audible warning device shall also be provided.**

40 **Option:**

41 Separate active traffic control devices may be omitted at a pathway grade crossing that is located within
42 25 feet of the traveled way of a highway-rail or highway-LRT grade crossing that is equipped with an active
43 traffic control system.

44 **Standard:**

45 **If used at pathway grade crossings, alternately flashing red lights shall be aligned horizontally and**
46 **the light units shall have a diameter of at least 4 inches. The minimum mounting height of the flashing**
47 **red lights shall be 4 feet, measured vertically from the bottom edge of the lights to the elevation of the**
48 **near edge of the pathway surface.**

49 **Option:**

50 Traffic control devices may be installed between the tracks at multiple track crossings at stations.

1 **Standard:**

2 **The mounting height for flashing lights that are installed between the tracks at multiple track**
3 **crossings at stations shall be a minimum of 1 foot, measured vertically from the bottom edge of the**
4 **lights to the elevation of the near edge of the pathway surface.**

5 **Option:**

6 Automatic gates may be used at pathway grade crossings.

7 **Guidance:**

8 If used at a pathway grade crossing, the height of the automatic gate arm when in the down position
9 should be a minimum of 2.5 feet and a maximum of 4 feet above the sidewalk.

10 If used, the gate configuration, which might include a combination of automatic gates and swing gates,
11 should provide for full width coverage of the pathway on both approaches to the track.

12 **Standard:**

13 **Where a sidewalk is located between the edge of a roadway and the support for a gate arm that**
14 **extends across the sidewalk and into the roadway, the location, placement, and height prescribed for**
15 **vehicular gates shall be used (see Section 8C.04).**

16 **Guidance:**

17 If a separate automatic gate is used for a sidewalk, the height of the gate arm when in the down position
18 should be a minimum of 2.5 feet and a maximum of 4 feet above the sidewalk.

19 If a separate automatic gate is used for a sidewalk at a highway-rail or highway-LRT grade crossing,
20 instead of a supplemental or auxiliary gate arm installed as a part of the same mechanism as the vehicular
21 gate, a separate mechanism should be provided for the sidewalk gate to prevent a pedestrian from raising the
22 vehicular gate.

CHAPTER 9A. GENERAL

Section 9A.01 Requirements for Bicyclist Traffic Control Devices

Support:

General information and definitions concerning traffic control devices are found in Part 1.

Section 9A.02 Scope

Support:

Part 9 covers signs, pavement markings, and highway traffic signals specifically related to bicycle operation on both roadways and shared-use paths.

Guidance:

Parts 1, 2, 3, and 4 should be reviewed for general provisions, signs, pavement markings, and signals.

Standard:

~~None of the bikeway designations in this Manual shall be construed to preclude permitted bicycle travel on roadways or portions of roadways that do not have bikeway designations.~~ The absence of a marked bicycle lane or any of the other traffic control devices discussed in this Chapter on a particular roadway shall not be construed to mean that bicyclists are not permitted to travel on that roadway.

Section 9A.03 Definitions Relating to Bicycles

Support:

Definitions and acronyms pertaining to Part 9 are provided in Sections 1A.13 and 1A.14.

~~Standard:~~

~~The following terms shall be defined as follows when used in Part 9:~~

All of the definitions previously in this Section were relocated to Section 1A.13, except Definitions 2 and 5, which were already present in Section 1A.13

Section 9A.04 Maintenance

Guidance:

All signs, signals, and markings, including those on bicycle facilities, should be properly maintained to command respect from both the motorist and the bicyclist. When installing signs and markings on bicycle facilities, an agency should be designated to maintain these devices.

Section 9A.05 Relation to Other Documents

Support:

“The Uniform Vehicle Code and Model Traffic Ordinance” published by the National Committee on Uniform Traffic Laws and Ordinances (see Section 1A.11) has provisions for bicycles and is the basis for the traffic control devices included ~~herein~~ in this Manual.

Informational documents used during the development of the signing and marking recommendations in Part 9 include the following:

- A. “Guide for Development of Bicycle Facilities,” which is available from the American Association of State Highway and Transportation Officials (see Page i for the address); and
- B. State and local government design guides.

~~C. “Selecting Roadway Design Treatments to Accommodate Bicycles,” FHWA Publication No. FHWA-RD-92-073, which is available from the FHWA Research and Technology Report Center, 9701 Philadelphia Court, Unit Q, Lanham, MD 20106.~~

Other publications that relate to the application of traffic control devices in general are listed in Section 1A.11.

Section 9A.06 Placement Authority

Support:

Section 1A.08 contains information regarding placement authority for traffic control devices.

Section 9A.07 Meaning of Standard, Guidance, Option, and Support

1 Support:

2 The introduction to this Manual contains information regarding the meaning of the headings Standard,
3 Guidance, Option, and Support, and the use of the words “shall,” “should,” and “may.”

4 **Section 9A.08 Colors**

5 Support:

6 Section 1A.12 contains information regarding the color codes.

1 CHAPTER 9B. SIGNS

2 Section 9B.01 Application and Placement of Signs

3 Standard:

4 Bicycle signs shall be standard in shape, legend, and color.

5 All signs shall be retroreflectorized for use on bikeways, including shared-use paths and bicycle lane
6 facilities.

7 Where signs serve both bicyclists and other road users, vertical mounting height and lateral
8 placement shall be as ~~specified~~ provided in Part 2.

9 Where used on a shared-use paths, lateral no portion of a sign clearance or its support shall be a-
10 minimum of 3 feet and a maximum of 6 feet placed less than 2 feet laterally from the near edge of the
11 sign to the near edge of the path, or less than 8 feet vertically over the entire width of the shared-use
12 path (see Figure 9B-1).

13 Mounting height for ~~ground-~~ post-mounted signs on shared-use paths shall be a minimum of 4 feet
14 ~~and a maximum of 5 feet~~, measured vertically from the bottom ~~edge~~ of the sign to the elevation of the
15 near edge of the path surface (see Figure 9B-1).

16 ~~When overhead signs are used on shared-use paths, the clearance from the bottom edge of the sign~~
17 ~~to the path surface directly under the sign shall be a minimum of 8 feet.~~

18 Guidance:

19 Signs for the exclusive use of bicyclists should be located so that other road users are not confused by
20 them.

21 The clearance for overhead signs on shared-use paths should be adjusted when appropriate to
22 accommodate path users requiring more clearance, such as equestrians, or typical maintenance or emergency
23 vehicles.

24 Section 9B.02 Design of Bicycle Signs

25 Standard:

26 If the sign or plaque applies to motorists and bicyclists, then the size shall be as shown for
27 conventional roads in Tables 2B-1, 2C-2, or 2D-1.

28 The minimum sign and plaque sizes for shared-use paths shall be those shown in Table 9B-1, and
29 shall be used only for signs and plaques installed specifically for bicycle traffic applications. The
30 minimum sign and plaque sizes for bicycle facilities shall not be used for signs or plaques that are
31 placed in a location that would have any application to other vehicles.

32 Option:

33 Larger size signs and plaques may be used on bicycle facilities when appropriate (see Section 2A.11).

34 Guidance:

35 Except for size, the design of signs and plaques for bicycle facilities should be identical to that ~~specified~~
36 provided in this Manual for ~~vehicular travel~~ signs and plaques for streets and highways.

37 Support:

38 Uniformity in design of bicycle signs and plaques includes shape, color, symbols, arrows, wording,
39 lettering, and illumination or retroreflectorization.

40 Section 9B.03 STOP and YIELD Signs (R1-1, R1-2)

41 Standard:

42 STOP (R1-1) signs (see Figure 9B-2) shall be installed on shared-use paths at points where bicyclists
43 are required to stop.

44 YIELD (R1-2) signs (see Figure 9B-2) shall be installed on shared-use paths at points where
45 bicyclists have an adequate view of conflicting traffic as they approach the sign, and where bicyclists
46 are required to yield the right-of-way to that conflicting traffic.

47 Option:

1 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
2 emphasis.

3 Guidance:

4 Where conditions require path users, but not roadway users, to stop or yield, the STOP ~~sign~~ or YIELD
5 sign should be placed or shielded so that it is not readily visible to road users.

6 When placement of STOP or YIELD signs is considered, priority at a shared-use path/roadway
7 intersection should be assigned with consideration of the following:

- 8 A. Relative speeds of shared-use path and roadway users,
- 9 B. Relative volumes of shared-use path and roadway traffic, and
- 10 C. Relative importance of shared-use path and roadway.

11 Speed should not be the sole factor used to determine priority, as it is sometimes appropriate to give
12 priority to a high-volume shared-use path crossing a low-volume street, or to a regional shared-use path
13 crossing a minor collector street.

14 When priority is assigned, the least restrictive control that is appropriate should be placed on the lower
15 priority approaches. STOP signs should not be used where YIELD signs would be acceptable.

16 **Section 9B.04 ~~Bicycle~~ Bike Lane Signs and Plaques (R3-17, R3-17aP, R3-17bP)**

17 **Standard:**

18 **The BIKE LANE (R3-17) sign and the R3-17aP and R3-17bP plaques (see Figure 9B-2) shall be**
19 **used only in conjunction with marked bicycle lanes as described in Section 9C.04, ~~and shall be placed at~~**
20 **~~periodic intervals along the bicycle lanes.~~**

21 **Guidance:**

22 ~~The BIKE LANE (R3-17) sign spacing should be~~ If used, Bike Lane signs and plaques should be used in
23 advance of the upstream end of the bicycle lane, at the downstream end of the bicycle lane, and at periodic
24 intervals along the bicycle lane as determined by engineering judgment based on prevailing speed of bicycle
25 and other traffic, block length, distances from adjacent intersections, and other considerations.

26 ~~The AHEAD (R3-17a) sign (see Figure 9B-2) should be mounted directly below a R3-17 sign in advance~~
27 ~~of the beginning of a marked bicycle lane.~~

28 ~~The ENDS (R3-17b) sign (see Figure 9B-2) should be mounted directly below a R3-17 sign at the end of~~
29 ~~a marked bicycle lane.~~

30 **Section 9B.05 BEGIN RIGHT TURN LANE YIELD TO BIKES Sign (R4-4)**

31 **Option:**

32 Where motor vehicles entering an exclusive right-turn lane must weave across bicycle traffic in bicycle
33 lanes, the BEGIN RIGHT TURN LANE YIELD TO BIKES (R4-4) sign (see Figure 9B-2) may be used to
34 inform both the motorist and the bicyclist of this weaving maneuver (see Figures 9C-1, 9C-4, and 9C-5).

35 **Guidance:**

36 The R4-4 sign should not be used when bicyclists need to move left because of a right-turn lane drop
37 situation.

38 **Section 9B.06 Bicycles May Use Full Lane Sign (R4-11)**

39 **Option:**

40 The Bicycles May Use Full Lane (R4-11) sign (see Figure 9B-2) may be used on roadways where no
41 bicycle lanes or adjacent shoulders usable by bicyclists are present and where travel lanes are too narrow for
42 bicyclists and motor vehicles to operate side by side.

43 The Bicycles May Use Full Lane sign may be used in locations where it is important to inform road users
44 that bicyclists might occupy the travel lane.

45 Section 9C.07 describes a Shared Lane Marking that may be used in addition to or instead of the Bicycles
46 May Use Full Lane sign to inform road users that bicyclists might occupy the travel lane.

47 **Support:**

48 The Uniform Vehicle Code (UVC) defines a “substandard width lane” as a “lane that is too narrow for a
49 bicycle and a vehicle to travel safely side by side within the same lane.”

1 **Section ~~9B.06~~ 9B.07 Bicycle WRONG WAY Sign and RIDE WITH TRAFFIC Plaque (R5-1b,
2 R9-3cP)**

3 Option:

4 The Bicycle WRONG WAY (R5-1b) sign and RIDE WITH TRAFFIC (R9-3cP) plaque (see Figure 9B-2)
5 may be placed facing wrong-way bicycle traffic, such as on the left side of a roadway.

6 This sign and plaque may be mounted back-to-back with other signs to minimize visibility to other traffic.

7 Guidance:

8 The RIDE WITH TRAFFIC plaque should be used only in conjunction with the Bicycle WRONG WAY
9 sign, and should be mounted directly below the Bicycle WRONG WAY sign.

10 **Section ~~9B.07~~ 9B.08 NO MOTOR VEHICLES Sign (R5-3)**

11 Option:

12 The NO MOTOR VEHICLES (R5-3) sign (see Figure 9B-2) may be installed at the entrance to a shared-
13 use path.

14 **Section ~~9B.08~~ 9B.09 No Bicycles Selective Exclusion Signs (R5-6)**

15 Option:

16 Selective Exclusion signs (see Figure 9B-2) may be installed at the entrance to a roadway or facility to
17 notify road or facility users that designated types of traffic are excluded from using the roadway or facility.

18 Standard:

19 If used, Selective Exclusion signs shall clearly indicate the type of traffic that is excluded.

20 Support:

21 Typical exclusion messages include:

22 A. No Bicycles (R5-6).

23 B. No Pedestrians (R9-3).

24 C. No Skaters (R9-13), and

25 D. No Equestrians (R9-14).

26 ~~Guidance:~~

27 ~~Where bicyclists are prohibited, the No Bicycles (R5-6) sign (see Figure 9B-2) should be installed at the~~
28 ~~entrance to the facility.~~

29 Option:

30 Where bicyclists, pedestrians, and motor-driven cycles are ~~also~~ all prohibited, it may be more desirable to
31 use the R5-10a word message sign that is described in Section 2B.39.

32 **Section ~~9B.09~~ 9B.10 No Parking Bike Lane Signs (R7-9, R7-9a)**

33 **Standard:**

34 **If the installation of signs is necessary to restrict parking, standing, or stopping in a bicycle lane,**
35 **appropriate signs as described in Sections 2B.46 through 2B.48, or the No Parking Bike Lane (R7-9 or**
36 **R7-9a) signs (see Figure 9B-2) shall be installed.**

37 **Section ~~9B.10~~ 9B.11 Bicycle Regulatory Signs (R9-5, R9-6, ~~R10-3~~ R10-4, R10-24, R10-25, and**
38 **R10-26)**

39 Option:

40 The R9-5 sign (see Figure 9B-2) may be used where the crossing of a street by bicyclists is controlled by
41 pedestrian signal indications.

42 Where it is not intended for bicyclists to be controlled by pedestrian signal indications, the ~~R10-3~~ R10-4,
43 R10-24, or R10-26 sign (see Figure 9B-2 and Section 2B.52) may be used.

44 Guidance:

45 If used, the R9-5, ~~or R10-3~~ R10-4, R10-24, or R10-26 signs should be installed near the edge of the
46 sidewalk in the vicinity of where bicyclists will be crossing the street.

47 Option:

1 [If bicyclists are crossing a roadway where In-Roadway Warning Lights \(see Section 4N.02\) or other](#)
2 [warning lights or beacons have been provided, the R10-25 sign \(see Figure 9B-2\) may be used.](#)

3 The R9-6 sign (see Figure 9B-2) may be used where a bicyclist is required to cross or share a facility used
4 by pedestrians and is required to yield to the pedestrians.

5 **Section ~~9B.11~~ [9B.12](#) Shared-Use Path Restriction Sign (R9-7)**

6 Option:

7 The Shared-Use Path Restriction (R9-7) sign (see Figure 9B-2) may be installed [to supplement a solid](#)
8 [white pavement marking line \(see Section 9C.03\)](#) on facilities that are to be shared by pedestrians and
9 bicyclists [in order to provide a separate designated pavement area for each mode of travel](#). The symbols may
10 be switched as appropriate.

11 ~~A designated pavement area may be provided for each mode of travel (see Section 9C.03).~~

12 [Guidance:](#)

13 [If two-way operation is permitted on the facility for pedestrians and/or bicyclists, the designated pavement](#)
14 [area that is provided for each two-way mode of travel should be wide enough to accommodate both directions](#)
15 [of travel for that mode.](#)

16 **Section ~~9B.12~~ [9B.13](#) Bicycle Signal Actuation Sign (R10-22)**

17 Option:

18 The Bicycle Signal Actuation (R10-22) sign (see Figure 9B-2) may be installed at signalized intersections
19 where markings are used to indicate the location where a bicyclist is to be positioned to actuate the signal (see
20 Section 9C.05).

21 [Guidance:](#)

22 If the Bicycle Signal Actuation sign is installed, it should be placed at the roadside adjacent to the
23 marking to emphasize the connection between the marking and the sign.

24 **Section ~~9B.13~~ [9B.14](#) Other Regulatory Signs**

25 Option:

26 Other regulatory signs described in Chapter 2B may be installed on bicycle facilities as appropriate.

27 **Section ~~9B.14~~ [9B.15](#) Turn or Curve Warning Signs (W1 Series)**

28 [Guidance:](#)

29 To warn bicyclists of unexpected changes in shared-use path direction, appropriate turn or curve (W1-1
30 through W1-7) signs (see Figure 9B-3) should be used.

31 The W1-1 through W1-5 signs should be installed ~~no less than~~ [at least](#) 50 feet in advance of the beginning
32 of the change of alignment.

33 **Section ~~9B.15~~ [9B.16](#) Intersection Warning Signs (W2 Series)**

34 Option:

35 Intersection Warning (W2-1 through W2-5) signs (see Figure 9B-3) may be used on a roadway, street, or
36 shared-use path in advance of an intersection to indicate the presence of an intersection and the possibility of
37 turning or entering traffic.

38 [Guidance:](#)

39 When engineering judgment determines that the visibility of the intersection is limited on the shared-use
40 path approach, Intersection Warning signs should be used.

41 Intersection Warning signs should not be used where the shared-use path approach to the intersection is
42 controlled by a STOP sign, a YIELD sign, or a traffic control signal.

43 **Section ~~9B.16~~ [9B.17](#) Bicycle Surface Condition Warning Sign (W8-10)**

44 Option:

45 The Bicycle Surface Condition Warning (W8-10) sign (see Figure 9B-3) may be installed where roadway
46 or shared-use path conditions could cause a bicyclist to lose control of the bicycle.

1 Signs warning of other conditions that might be of concern to bicyclists, including BUMP (W8-1), DIP
2 (W8-2), PAVEMENT ENDS (W8-3), and any other word message that describes conditions that are of
3 concern to bicyclists, may also be used.

4 A supplemental plaque may be used to clarify the specific type of surface condition.

5 **Section ~~9B.17~~ 9B.18 Bicycle Warning and Combined Bicycle/Pedestrian Signs (W11-1 and**
6 **W11-15)**

7 Support:

8 The Bicycle Warning (W11-1) sign (see Figure 9B-3) alerts the road user to unexpected entries into the
9 roadway by bicyclists, and other crossing activities that might cause conflicts. These conflicts might be
10 relatively confined, or might occur randomly over a segment of roadway.

11 Option:

12 [The combined Bicycle/Pedestrian \(W11-15\) sign \(see Figure 9B-3\) may be used where both bicyclists and](#)
13 [pedestrians might be crossing the roadway, such as at an intersection with a shared-use path. A TRAIL X-ING](#)
14 [\(W11-15P\) supplemental plaque \(see Figure 9B-3\) may be mounted below the W11-15 sign.](#)

15 A supplemental plaque with the legend AHEAD or ~~XXX~~ FEET may be used with the Bicycle Warning [or](#)
16 [combined Bicycle/Pedestrian](#) sign.

17 Guidance:

18 If used in advance of a specific crossing point, the Bicycle Warning [or combined Bicycle/Pedestrian](#) sign
19 should be placed at a distance in advance of the crossing location that conforms with the guidance given in
20 Table 2C-4.

21 **Standard:**

22 **Bicycle Warning [and combined Bicycle/Pedestrian](#) signs, when used at the location of the crossing,**
23 **shall be supplemented with a diagonal downward pointing arrow (W16-7P) plaque (see Figure 9B-3) to**
24 **show the location of the crossing.**

25 Option:

26 A fluorescent yellow-green background color with a black legend and border may be used for Bicycle
27 Warning [and combined Bicycle/Pedestrian](#) signs and supplemental plaques.

28 Guidance:

29 When the fluorescent yellow-green background color is used, a systematic approach featuring one
30 background color within a zone or area should be used. The mixing of standard yellow and fluorescent
31 yellow-green backgrounds within a zone or area should be avoided.

32 **Section ~~9B.18~~ 9B.19 Other Bicycle Warning Signs**

33 Option:

34 Other bicycle warning signs (see Figure 9B-3) such as ~~BIKEWAY~~ [PATH](#) NARROWS (W5-4a) and Hill
35 (W7-5) may be installed on ~~bicycle facilities~~ [shared-use paths](#) to warn bicyclists of conditions not readily
36 apparent.

37 In situations where there is a need to warn motorists to watch for bicyclists traveling along the highway,
38 the SHARE THE ROAD (W16-1P) plaque (see Figure 9B-3) may be used in conjunction with the W11-1
39 sign.

40 Guidance:

41 If used, other advance bicycle warning signs should be installed ~~no less than~~ [at least](#) 50 feet in advance of
42 the beginning of the condition.

43 Where temporary traffic control zones are present on bikeways, appropriate signs from Part 6 should be
44 used.

45 Option:

46 Other warning signs described in Chapter 2C may be installed on bicycle facilities as appropriate.

47 **Section ~~9B.19~~ 9B.20 Bicycle ~~Route~~ Guide Signs (D1-1b, D1-1c, D1-2b, D1-2c, D1-3b, D1-3c,**
48 **D11-1, D11-1c)**

49 ~~Guidance~~ [Option](#):

1 ~~If used, Bicycle~~ **Bike** Route Guide (D11-1) signs (see Figure 9B-4) ~~should~~ **may** be provided ~~at decision~~
2 ~~points~~ along designated bicycle routes, ~~including signs~~ to inform bicyclists of bicycle route direction changes
3 and ~~confirmation signs for~~ **to confirm** route direction, distance, and destination.

4 If used, ~~Bicycle~~ **Bike** Route Guide signs ~~should~~ **may** be repeated at regular intervals so that bicyclists
5 entering from side streets will have an opportunity to know that they are on a bicycle route. Similar guide
6 signing ~~should~~ **may** be used for shared roadways with intermediate signs placed for bicyclist guidance.

7 Alternative Bike Route Guide (D11-1c) signs may be used to provide information on route direction,
8 destination, and/or route name in place of the “BIKE ROUTE” wording on the D11-1 sign (see Figures 9B-4
9 and 9B-6).

10 Destination (D1-1, D1-1a) signs, Street Name (D3-1) signs, or Bicycle Destination (D1-1b, D1-1c, D1-2b,
11 D1-2c, D1-3b, D1-3c) signs (see Figure 9B-4) may be installed to provide direction, destination, and distance
12 information as needed for bicycle travel. If several destinations are to be shown at a single location, they may
13 be placed on a single sign with an arrow (and the distance, if desired) for each name. If more than one
14 destination lies in the same direction, a single arrow may be used for the destinations.

15 Guidance:

16 Adequate separation should be made between any destination or group of destinations in one direction and
17 those in other directions by suitable design of the arrow, spacing of lines of legend, heavy lines entirely across
18 the sign, or separate signs.

19 Standard:

20 An arrow pointing to the right, if used, shall be at the extreme right-hand side of the sign. An
21 arrow pointing left or up, if used, shall be at the extreme left-hand side of the sign. The distance
22 numerals, if used, shall be placed to the right of the destination names.

23 On Bicycle Destination signs, a bicycle symbol shall be placed next to each destination or group of
24 destinations. If an arrow is at the extreme left, the bicycle symbol shall be placed to the right of the
25 respective arrow.

26 Guidance:

27 Unless a sloping arrow will convey a clearer indication of the direction to be followed, the directional
28 arrows should be horizontal or vertical.

29 The bicycle symbol should be to the left of the destination legend.

30 If several individual name signs are assembled into a group, all signs in the assembly should have the
31 same horizontal width.

32 Because of their smaller size, Bicycle Destination signs should not be used as a substitute for vehicular
33 destination signs when the message is also intended to be seen by motorists.

34 Support:

35 Figure 9B-5 shows an example of the signing for the beginning and end of a designated bicycle route on a
36 shared-use path. Figure 9B-6 shows an example of signing for an on-roadway bicycle route. Figure 9B-7
37 shows examples of signing and markings for a shared-use path ~~crossing~~.

38 **Section ~~9B.20~~ 9B.21 Bicycle Route Signs (M1-8, M1-8a, M1-9)**

39 Option:

40 To establish a unique identification (route designation) for a State or local bicycle route, the Bicycle
41 Route (M1-8, M1-8a) sign (see Figure 9B-4) may be used.

42 **Standard:**

43 **The Bicycle Route (M1-8) sign shall contain a route designation and shall have a green background**
44 **with a retroreflectorized white legend and border. The Bicycle Route (M1-8a) sign shall contain the**
45 **same information as the M1-8 sign and in addition shall include a pictograph or words that are**
46 **associated with the route or with the agency that has jurisdiction over the route.**

47 ~~Option~~ Guidance:

48 Bicycle routes, which might be a combination of various types of bikeways, should establish a continuous
49 routing. **relocated from Definition 4 in Section 9A.03**

50 Where a designated bicycle route extends ~~for long distances~~ through two or more States, a coordinated
51 submittal by the affected States for an assignment of ~~an Interstate~~ **a U.S.** Bicycle Route number designation

1 ~~may~~ should be sent to the American Association of State Highway and Transportation Officials (see Page i for
2 the address).

3 **Standard:**

4 The ~~Interstate U.S.~~ Bicycle Route (M1-9) sign (see Figure 9B-4) shall contain the ~~assigned~~ route
5 ~~number~~ designation as assigned by AASHTO and shall have a black legend and border with a
6 ~~retroreflectorized white background.~~

7 Guidance:

8 If used, the Bicycle Route or ~~Interstate U.S.~~ Bicycle Route signs should be placed at intervals frequent
9 enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of
10 bicyclists.

11 Option:

12 Bicycle Route or ~~Interstate U.S.~~ Bicycle Route signs may be installed on shared roadways or on shared-
13 use paths to provide guidance for bicyclists.

14 The Bicycle Route Guide (D11-1) sign (see Figure 9B-4) may be installed where no unique designation of
15 routes is desired.

16 **Section ~~9B.21~~ 9B.22 ~~Destination Arrow and Supplemental Plaque Signs for~~ Bicycle Route**
17 **Signs Auxiliary Plaques**

18 Option:

19 Auxiliary plaques may be used in conjunction with Bike Route Guide signs, Bicycle Route signs, or U.S.
20 Bicycle Route signs as needed.

21 Guidance:

22 If used, ~~the M4-11 through M4-13 supplemental~~ Junction (M2-1), Cardinal Direction (M3 series), and
23 Alternative Route (M4 series) auxiliary plaques (see Figure 9B-4) ~~may~~ should be mounted above the
24 appropriate ~~Bicycle~~ Bike Route Guide signs, Bicycle Route signs, or ~~Interstate U.S.~~ Bicycle Route signs.

25 If used, ~~the appropriate arrow (M7-1 through M7-7) sign~~ Advance Turn Arrow (M5 series) and
26 Directional Arrow (M6 series) auxiliary plaques (see Figure 9B-4) should be ~~placed~~ mounted below the
27 appropriate ~~Bicycle~~ Bike Route Guide sign, Bicycle Route sign, or ~~Interstate U.S.~~ Bicycle Route sign.

28 Except for the M4-8 plaque, all route sign auxiliary plaques should match the color combination of the
29 route sign that they supplement.

30 ~~**Standard:**~~

31 ~~**The arrow signs and supplemental plaques used with the D11-1 or M1-8 signs shall have a white**~~
32 ~~**legend and border on a green background.**~~

33 ~~**The arrow signs and supplemental plaques used with the M1-9 sign shall have a white legend and**~~
34 ~~**border on a black background.**~~

35 Route sign auxiliary plaques carrying word legends that are used on bicycle routes should have a
36 minimum size of 12 x 6 inches. Route sign auxiliary plaques carrying arrow symbols that are used on bicycle
37 routes should have a minimum size of 12 x 9 inches.

38 Option:

39 With route signs of larger sizes, auxiliary plaques may be suitably enlarged, but not such that they exceed
40 the width of the route sign.

41 A route sign and any auxiliary plaques used with it may be combined on a single sign.

42 Destination (D1-1b and D1-1c) signs (see Figure 9B-4) may be mounted below ~~Bicycle~~ Bike Route Guide
43 signs, Bicycle Route signs, or ~~Interstate U.S.~~ Bicycle Route signs to furnish additional information, such as
44 directional changes in the route, or intermittent distance and destination information.

45 **Section ~~9B.22~~ 9B.23 Bicycle Parking Area Sign (D4-3)**

46 Option:

47 The Bicycle Parking Area (D4-3) sign (see Figure 9B-4) may be installed where it is desirable to show the
48 direction to a designated bicycle parking area. The arrow may be reversed as appropriate.

49 **Standard:**

1 **The legend and border of the Bicycle Parking Area sign shall be green on a retroreflectorized white**
2 **background.**

3 **Section 9B.24 Reference Location Signs (D10-1 through D10-3) and Intermediate Reference**
4 **Location Signs (D10-1a through D10-3a)**

5 Support:

6 There are two types of reference location signs:

7 A. Reference Location (D10-1, 2, and 3) signs show an integer distance point along a shared-use path;
8 and

9 B. Intermediate Reference Location (D10-1a, 2a, and 3a) signs also show a decimal between integer
10 distance points along a shared-use path.

11 Option:

12 Reference Location (D10-1 to D10-3) signs (see Figure 9B-4) may be installed along any section of a
13 shared-use path to assist users in estimating their progress, to provide a means for identifying the location of
14 emergency incidents and crashes, and to aid in maintenance and servicing.

15 To augment the reference location sign system, Intermediate Reference Location (D10-1a to D10-3a)
16 signs (see Figure 9B-4), which show the tenth of a mile with a decimal point, may be installed at one tenth of
17 a mile intervals, or at some other regular spacing.

18 Standard:

19 If Intermediate Reference Location (D10-1a to D10-3a) signs are used to augment the reference
20 location sign system, the reference location sign at the integer mile point shall display a decimal point
21 and a zero numeral.

22 If placed on shared-use paths, reference location signs shall contain 4.5-inch white numerals on a
23 green background that is at least 6 inches wide with a white border. The signs shall contain the word
24 MILE in 2.25-inch white letters.

25 Reference location signs shall have a minimum mounting height of 2 feet, measured vertically from
26 the bottom of the sign to the elevation of the near edge of the shared-use path, and shall not be governed
27 by the mounting height requirements prescribed in Section 9B.01.

28 Option:

29 Reference location signs may be installed on one side of the shared-use path only and may be installed
30 back-to-back.

31 If a reference location sign cannot be installed in the correct location, it may be moved in either direction
32 as much as 50 feet.

33 Guidance:

34 If a reference location sign cannot be placed within 50 feet of the correct location, it should be omitted.

35 Zero distance should begin at the south and west terminus points of shared-use paths.

36 Support:

37 Section 2H.05 contains additional information regarding reference location signs.

38 **Section 9B.25 Mode-Specific Guide Signs for Shared-Use Paths (D11-1a, D11-2, D11-3, D11-4)**

39 Option:

40 Where separate pathways are provided for different types of users, Mode-Specific Guide (D11-1a, D11-2,
41 D11-3, D11-4) signs (see Figure 9B-4) may be used to guide different types of users to the traveled way that
42 is intended for their respective modes.

43 Mode-Specific Guide signs may be installed at the entrance to shared-use paths where the signed mode(s)
44 are permitted or encouraged, and periodically along these facilities as needed.

45 The Bicycles Permitted (D11-1a) sign, when combined with the BIKE ROUTE supplemental plaque
46 (D11-1bP), may be substituted for the D11-1 Bicycle Route Guide sign on paths and shared roadways.

47 When some, but not all, non-motorized user types are encouraged or permitted on a shared-use path,
48 Mode-Specific Guide signs may be placed in combination with each other, and in combination with signs (see
49 Section 9B.09) that prohibit travel by particular modes.

1 Support:

2 Figure 9B-8 shows an example of signing where separate pathways are provided for different non-
3 motorized user types.

4 Section 9B.26 Object Markers text for this new Section was relocated from Section 9C.03

5 Option:

6 Fixed objects adjacent to shared-use paths may be marked with Type 1, Type 2, or Type 3 object markers
7 ~~(Type 1, 2, or 3)~~ (see Figure 9B-3) such as those described in Section 2C.63. If the object marker is not
8 intended to also be seen by motorists, a smaller version of the Type 3 object marker may be used (see Table
9 9B-1).

10 **Standard:**

11 ~~Markers such as those described in Section 3C.01 shall also be used on shared-use paths, if needed.~~

12 **Obstructions in the traveled way of a shared-use path shall be marked with retroreflectorized**
13 **material or appropriate object markers.**

14 **All object markers shall be retroreflective.**

15 **On Type 3 object markers, the alternating black and retroreflective yellow stripes shall be sloped**
16 **down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction.**

CHAPTER 9C. MARKINGS

Section 9C.01 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 control signal actuation, and provide advance information for turning and crossing maneuvers.

Section 9C.02 General Principles

Guidance:

Bikeway design guides ([see Section 9A.05](#)) should be used when designing markings for bicycle facilities (~~see Section 9A.05~~).

Standard:

Markings used on bikeways shall be retroreflectorized.

Guidance:

Pavement marking ~~symbols and/or~~ 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, ~~and~~ symbols, [and arrows](#) used for marking bicycle facilities shall be as defined in Sections 3A.05, 3A.06, and 3B.20.

Support:

Figures 9B-7 and 9C-1 through 9C-9 show examples of the application of lines, word messages, ~~and~~ 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.06 and 3B.08.

Section 9C.03 Marking Patterns and Colors on Shared-Use Paths last five paragraphs were relocated to Section 9B.26

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-2 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 ~~Figure 9B-2~~ [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).

Section 9C.04 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.

1 ~~Guidance:~~

2 ~~Longitudinal pavement markings should be used to define bicycle lanes.~~

3 **Standard:**

4 Longitudinal pavement markings shall be used to define bicycle lanes.

5 Guidance:

6 ~~If used, the~~ bicycle lane word, symbol, and/or arrow markings (see Figure 9C-3) ~~shall~~ should be placed
7 ~~immediately after an intersection~~ at the beginning of a bicycle lane and at ~~other locations as needed~~ periodic
8 intervals along the bicycle lane based on engineering judgment.

9 Standard:

10 ~~The bicycle lane symbol marking shall be white.~~ **If the bicycle lane symbol marking is used in**
11 **conjunction with ~~other~~ word or ~~symbol~~ arrow messages, it shall precede them.**

12 Option:

13 If the word, ~~or~~ symbol, and/or arrow pavement markings shown in Figure 9C-3 are used, ~~Bicycle Bike~~
14 Lane signs (see Section 9B.04) ~~shall may~~ also be used, but ~~the signs need not be to avoid overuse of the signs~~
15 not necessarily adjacent to every ~~symbol set of pavement markings to avoid overuse of the signs.~~

16 Standard:

17 **A through bicycle lane shall not be positioned to the right of a right turn only lane or to the left of a**
18 **left turn only lane.**

19 Support:

20 A bicyclist continuing straight through an intersection from the right of a right-turn lane or from the left of
21 a left-turn lane would be inconsistent with normal traffic behavior and would violate the expectations of right-
22 or left-turning motorists.

23 Guidance:

24 When the right through lane is dropped to become a right turn only lane, the bicycle lane markings should
25 stop at least 100 feet before the beginning of the right-turn lane. Through bicycle lane markings should
26 resume to the left of the right turn only lane.

27 An optional through-right turn lane next to a right turn only lane should not be used where there is a
28 through bicycle lane. If a capacity analysis indicates the need for an optional through-right turn lane, the
29 bicycle lane should be discontinued at the intersection approach.

30 Posts or raised pavement markers should not be used to separate bicycle lanes from adjacent travel lanes.

31 Support:

32 Using raised devices creates a collision potential for bicyclists by placing fixed objects immediately
33 adjacent to the travel path of the bicyclist. In addition, raised devices can prevent vehicles turning right from
34 merging with the bicycle lane, which is the preferred method for making the right turn. Raised devices used
35 to define a bicycle lane can also cause problems in cleaning and maintaining the bicycle lane.

36 **Standard:**

37 **Bicycle lanes shall not be provided on the circular roadway of a roundabout ~~intersection.~~**

38 Guidance:

39 Bicycle lane markings should stop at least 100 feet before the crosswalk, or if no crosswalk is provided, at
40 least 100 feet before the yield line, or if no yield line is provided, then at least 100 feet before the edge of the
41 circulatory roadway.

42 Support:

43 Examples of bicycle lane markings at right-turn lanes are shown in Figures 9C-1, 9C-4, and 9C-5.
44 Examples of pavement markings for bicycle lanes on a two-way street are shown in Figure 9C-6. Pavement
45 word message, symbols, and arrow markings for bicycle lanes are shown in Figure 9C-3.

46 **Section 9C.05 Bicycle Detector Symbol**

47 Option:

48 A symbol (see Figure 9C-7) may be placed on the pavement indicating the optimum position for a
49 bicyclist to actuate the signal.

1 An R10-22 sign (see Section 9B.13 and Figure 9B-2) may be installed to supplement the pavement
2 marking.

3 **Section 9C.06 Pavement Markings for Obstructions**

4 Guidance:

5 In roadway situations where it is not practical to eliminate a drain grate or other roadway obstruction that
6 is inappropriate for bicycle travel, white markings applied as shown in Figure 9C-8 should be used [to guide](#)
7 [bicyclists around the condition](#).

8 **Section 9C.07 Shared Lane Marking**

9 Option:

10 [The Shared Lane Marking shown in Figure 9C-9 may be used to:](#)

11 [A. Assist bicyclists with lateral positioning in a shared lane with on-street parallel parking in order to](#)
12 [reduce the chance of a bicyclist's impacting the open door of a parked vehicle,](#)

13 [B. Assist bicyclists with lateral positioning in lanes that are too narrow for a motor vehicle and a bicycle](#)
14 [to travel side by side within the same traffic lane,](#)

15 [C. Alert road users of the lateral location bicyclists are likely to occupy within the traveled way,](#)

16 [D. Encourage safe passing of bicyclists by motorists, and](#)

17 [E. Reduce the incidence of wrong-way bicycling.](#)

18 Guidance:

19 [The Shared Lane Marking should not be placed on roadways that have a speed limit above 35 mph.](#)

20 Standard:

21 [Shared Lane Markings shall not be used on shoulders or in designated bicycle lanes.](#)

22 Guidance:

23 [If used in a shared lane with on-street parallel parking, Shared Lane Markings should be placed so that the](#)
24 [centers of the markings are at least 11 feet from the face of the curb, or from the edge of the pavement where](#)
25 [there is no curb.](#)

26 [If used on a street without on-street parking that has an outside travel lane that is less than 14 feet wide,](#)
27 [the centers of the Shared Lane Markings should be at least 4 feet from the face of the curb, or from the edge of](#)
28 [the pavement where there is no curb.](#)

29 [If used, the Shared Lane Marking should be placed immediately after an intersection and spaced at](#)
30 [intervals not greater than 250 feet thereafter.](#)

31 Option:

32 [Section 9B.06 describes a Bicycles May Use Full Lane sign that may be used in addition to or instead of](#)
33 [the Shared Lane Marking to inform road users that bicyclists might occupy the travel lane.](#)

CHAPTER 9D. SIGNALS

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2 **Section 9D.01 Application**

3 Support:

4 Part 4 contains information regarding signal warrants and other requirements relating to signal
5 installations.

6 Option:

7 For purposes of signal warrant evaluation, bicyclists may be counted as either vehicles or pedestrians.

8 **Section 9D.02 Signal Operations for Bicycles**

9 **Standard:**

10 At installations where visibility-limited signal faces are used, signal faces shall be adjusted so
11 bicyclists for whom the indications are intended can see the signal indications. If the visibility-limited
12 signal faces cannot be aimed to serve the bicyclist, then separate signal faces shall be provided for the
13 bicyclist.

14 On bikeways, signal timing and actuation shall be reviewed and adjusted to consider the needs of
15 bicyclists.

- 1 ~~CHAPTER 10A. GENERAL~~ this Chapter has been combined into Chapter 8A
- 2 ~~Section 10A.01 Introduction~~ this Section has been combined into Section 8A.01
- 3 ~~Section 10A.02 Use of Standard Devices, Systems, and Practices~~ this Section has been relocated to
4 ~~Section 8A.03~~
- 5 ~~Section 10A.03 Uniform Provisions~~ this Section has been combined into Section 8A.04
- 6 ~~Section 10A.04 Highway Light Rail Transit Grade Crossing Elimination~~ this Section has been
7 ~~combined into Section 8A.05~~
- 8 ~~Section 10A.05 Temporary Traffic Control Zones~~ this Section has been combined into Section 8A.08

- 1 ~~CHAPTER 10B. HIGHWAY LIGHT RAIL TRANSIT GRADE CROSSING CONTROL~~
- 2 ~~SYSTEMS~~ this Chapter has been combined into Section 8A.03
- 3 ~~Section 10B.01 Introduction~~ this Section has been combined into Section 8A.03

1 ~~CHAPTER 10C. SIGNS, ILLUMINATION, AND MARKINGS~~ this Chapter has been combined
2 into Chapter 8B

3 ~~Section 10C.01 Purpose~~ this Section has been combined into Section 8B.01

4 ~~Section 10C.02 Highway Rail Grade Crossing (Crossbuck) Sign (R15-1) and Number of~~
5 ~~Tracks Sign (R15-2)~~ this Section has been combined into Sections 8B.03 and 8B.04

6 ~~Section 10C.03 LOOK Sign (R15-8)~~ this Section has been combined into Section 8B.17

7 ~~Section 10C.04 STOP (R1-1) or YIELD (R1-2) Signs at Highway Light Rail Transit Grade~~
8 ~~Crossings~~ this Section has been relocated to Section 8B.05

9 ~~Section 10C.05 DO NOT STOP ON TRACKS Sign (R8-8)~~ this Section has been combined into
10 Section 8B.09

11 ~~Section 10C.06 TRACKS OUT OF SERVICE Sign (R8-9)~~ this Section has been combined into
12 Section 8B.10

13 ~~Section 10C.07 STOP HERE ON RED Sign (R10-6)~~ this Section has been combined into Section
14 8B.12

15 ~~Section 10C.08 STOP HERE WHEN FLASHING Sign (R8-10)~~ this Section has been combined into
16 Section 8B.11

17 ~~Section 10C.09 Light Rail Transit Activated Blank Out Turn Prohibition Signs (R3-1a, R3-2a)~~
18 this Section has been combined into Section 8B.08

19 ~~Section 10C.10 EXEMPT Highway Rail Grade Crossing Sign (R15-3, W10-1a)~~ this Section has
20 been combined into Section 8B.07

21 ~~Section 10C.11 Divided Highway with Light Rail Transit Crossing Signs (R15-7 Series)~~ this
22 Section has been relocated to Section 8B.16

23 ~~Section 10C.12 No Vehicles On Tracks Signs (R15-6, R15-6a)~~ this Section has been relocated to
24 Section 8B.15

25 ~~Section 10C.13 Light Rail Transit Only Lane Signs (R15-4 Series)~~ this Section has been relocated
26 to Section 8B.13

27 ~~Section 10C.14 Do Not Pass Light Rail Transit Signs (R15-5, R15-5a)~~ this Section has been
28 relocated to Section 8B.14

29 ~~Section 10C.15 Highway Rail Grade Crossing Advance Warning Signs (W10 Series)~~ this
30 Section has been combined into Section 8B.06

31 ~~Section 10C.16 Low Ground Clearance Highway Rail Grade Crossing Sign (W10-5)~~ this Section
32 has been combined into Section 8B.23

33 ~~Section 10C.17 Light Rail Transit Approaching Activated Blank Out Warning Sign (W10-7)~~
34 this Section has been relocated to Section 8B.19

35 ~~Section 10C.18 Storage Space Signs (W10-11, W10-11a, W10-11b)~~ this Section has been combined
36 into Section 8B.24

37 ~~Section 10C.19 Skewed Crossing Sign (W10-12)~~ this Section has been combined into Section 8B.25

38 ~~Section 10C.20 Light Rail Transit Station Sign (I-12)~~ this Section has been relocated to Section 8B.26

- 1 ~~Section 10C.21 Emergency Notification Sign (I-13 or I-13a)~~ this Section has been combined into
2 Section 8B.18
- 3 ~~Section 10 C.22 Illumination at Highway Light Rail Transit Crossings~~ this Section has been
4 combined into Section 8A.05
- 5 ~~Section 10C.23 Pavement Markings~~ this Section has been combined into Section 8B.27
- 6 ~~Section 10C.24 Stop Lines~~ this Section has been combined into Section 8B.28
- 7 ~~Section 10C.25 Dynamic Envelope Markings~~ this Section has been combined into Section 8B.29

- 1 ~~CHAPTER 10D. HIGHWAY LIGHT RAIL TRANSIT ACTIVE TRAFFIC CONTROL~~
2 ~~GRADE CROSSING SYSTEMS~~ this Chapter has been combined into Chapter 8C
- 3 ~~Section 10D.01 Introduction~~ this Section has been combined into Section 8C.01
- 4 ~~Section 10D.02 Flashing Light Signals~~ this Section has been relocated to Section 8C.03
- 5 ~~Section 10D.03 Automatic Gates~~ this Section has been combined into Sections 8C.04 and 8C.05
- 6 ~~Section 10D.04 Four-Quadrant Gate Systems~~ this Section has been combined into Section 8C.06
- 7 ~~Section 10D.05 Traffic Control Signals~~ this Section has been relocated to Section 8C.10
- 8 ~~Section 10D.06 Highway Traffic Signal Preemption Turning Restrictions~~ this Section has been
9 combined into Section 8C.10
- 10 ~~Section 10D.07 Use of Traffic Control Signals for Control of Light Rail Transit Vehicles at~~
11 ~~Grade Crossings~~ this Section has been relocated to Section 8C.11
- 12 ~~Section 10D.08 Pedestrian and Bicycle Signals and Crossings~~ this Section has been relocated to
13 Section 8C.13

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3 **CONGRESSIONAL LEGISLATION**

4 **PUBLIC LAW 102-240-DEC. 18, 1991 (INTERMODAL SURFACE TRANSPORTATION**
5 **EFFICIENCY ACT OF 1991)**

6 **Section 1077. REVISION OF MANUAL** — Not later than 90 days after the date of the enactment of this
7 Act, the Secretary shall revise the Manual of Uniform Traffic Control Devices and such other regulations and
8 agreements of the Federal Highway Administration as may be necessary to authorize States and local
9 governments, at their discretion, to install stop or yield signs at any rail-highway grade crossing without
10 automatic traffic control devices with 2 or more trains operating across the rail-highway grade crossing per
11 day.

12 **PUBLIC LAW 102-388-OCT. 6, 1992 (DEPARTMENT OF TRANSPORTATION AND RELATED**
13 **AGENCIES APPROPRIATIONS ACT, 1993)**

14 **Section 406** — The Secretary of Transportation shall revise the Manual of Uniform Traffic Control Devices
15 to include —

16 (a) a standard for a minimum level of retroreflectivity that must be maintained for pavement
17 markings and signs, which shall apply to all roads open to public travel; and

18 (b) a standard to define the roads that must have a centerline or edge lines or both, provided that
19 in setting such standard the Secretary shall consider the functional classification of roads, traffic
20 volumes, and the number and width of lanes.

21 **PUBLIC LAW 104-59-NOV. 28, 1995 (NATIONAL HIGHWAY SYSTEM DESIGNATION ACT OF**
22 **1995)**

23 **Section 205. RELIEF FROM MANDATES** —

24 (c) **METRIC REQUIREMENTS** —

25 (1) **PLACEMENT AND MODIFICATION OF SIGNS** — The Secretary shall not require the
26 States to expend any Federal or State funds to construct, erect, or otherwise place or to modify any
27 sign relating to a speed limit, distance, or other measurement on a highway for the purpose of having
28 such sign establish such speed limit, distance, or other measurement using the metric system.

29 (2) **OTHER ACTIONS** — Before September 30, 2000, the Secretary shall not require that any
30 State use or plan to use the metric system with respect to designing or advertising, or preparing plans,
31 specifications, estimates, or other documents, for a Federal-aid highway project eligible for assistance
32 under title 23, United States Code.

33 (3) **DEFINITIONS** — In this subsection, the following definitions apply:

34 (A) **HIGHWAY** — The term ‘highway’ has the meaning such term has under section 101 of
35 title 23, United States Code.

36 (B) **METRIC SYSTEM** — the term ‘metric system’ has the meaning the term ‘metric system
37 of measurement’ has under section 4 of the Metric Conversion Act of 1975 (15 U.S.C. 205c).

38 **Section 306. MOTORIST CALL BOXES** — Section 111 of title 23, United States Code, is amended by
39 adding at the end the following:

40 (c) **MOTORIST CALL BOXES** —

41 (1) **IN GENERAL** — Notwithstanding subsection (a), a State may permit the
42 placement of motorist call boxes on rights-of-way of the National Highway System. Such
43 motorist call boxes may include the identification and sponsorship logos of such call
44 boxes.

45 (2) **SPONSORSHIP LOGOS** —

46 (A) **APPROVAL BY STATE AND LOCAL AGENCIES** — All call box
47 installations displaying sponsorship logos under this subsection shall be approved by
48 the highway agencies having jurisdiction of the highway on which they are located.

49 (B) **SIZE ON BOX** — A sponsorship logo may be placed on the call box in a
50 dimension not to exceed the size of the call box or a total dimension in excess of 12
51 inches by 18 inches.

52 (C) **SIZE ON IDENTIFICATION SIGN** — Sponsorship logos in a dimension not
53 to exceed 12 inches by 30 inches may be displayed on a call box identification sign
affixed to the call box post.

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(D) SPACING OF SIGNS — Sponsorship logos affixed to an identification sign on a call box post may be located on the rights-of-way at intervals not more frequently than 1 per every 5 miles.

(E) DISTRIBUTION THROUGHOUT STATE — Within a State, at least 20 percent of the call boxes displaying sponsorship logos shall be located on highways outside of urbanized areas with a population greater than 50,000.

(3) NONSAFETY HAZARDS — The call boxes and their location, posts, foundations, and mountings shall be consistent with requirements of the Manual on Uniform Traffic Control Devices or any requirements deemed necessary by the Secretary to assure that the call boxes shall not be a safety hazard to motorists.

Section 353(a) SIGNS — Traffic control signs referred to in the experimental project conducted in the State of Oregon in December 1991 shall be deemed to comply with the requirements of Section 2B-4 of the Manual on Uniform Traffic Control Devices of the Department of Transportation.

Section 353(b) STRIPES — Notwithstanding any other provision of law, a red, white, and blue center line in the Main Street of Bristol, Rhode Island, shall be deemed to comply with the requirements of Section 3B-1 of the Manual on Uniform Traffic Control Devices of the Department of Transportation.

METRIC CONVERSIONS

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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.