A SunCam online continuing education course

Manual on Uniform Traffic Control Devices (MUTCD): Introduction and Overview of Signs

by

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COURSE DESCRIPTION

The Manual on Uniform Traffic Control Devices (MUTCD) (*1*) provides national standards and guidance with respect to location, shape, size, and color for roadway signs, markings, and signals. Such guidance and standards are intended to enhance transportation safety and efficiency and provide uniformity of such devices to drivers across of the United States.

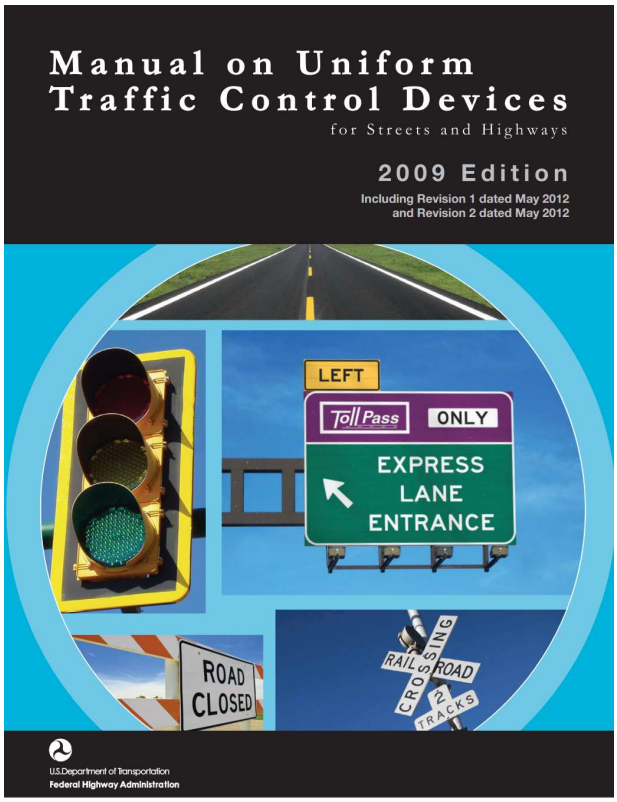

Figure 1. Manual on Uniform Traffic Control Devices 2009 Edition Cover

In this course, you will learn about:

- General guidelines for traffic control devices
- How to utilize the MUTCD effectively
- Sign functions and purposes
- Sign types and designs
- General sign guidance on shapes, color, dimensions, location and more

Source of artwork is the MUTCD 2009 Edition and photos are by Scott or Leslie Washburn, unless noted otherwise.

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INTRODUCTION AND HISTORY

With the arrival of the automobile, people and goods started to travel farther on roadways. In order to keep the automobile method of travel safe and efficient, traffic control devices were developed. A centerline pavement marking was first painted in Michigan in 1911 and the first stop sign was erected in Detroit in 1915.(*2*) Before long, a national need to standardize these devices led to the first edition of the Manual on Uniform Traffic Control Devices (MUTCD) published in 1935. Ten editions over 80 years followed as the dynamic document changed from research, implementation and experiment. Traffic control devices today include signs, signals, markings, and other devices used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, bikeway, or private road open to public travel (see definition in MUTCD Section 1A.13.) While private roadways are exempt from regulation by the MUTCD, it is recommended that its guidance be followed.

Table 1. Evolution of the MUTCD (Table I-1.)

Year	Name	Month/Year Revised
1927	Manual and Specifications for the Manufacture, Display, and Erection of U.S. Standard Road Markers and Signs (for rural roads)	4/29, 12/31
1930	Manual on Street Traffic Signs, Signals, and Markings (for urban streets)	No revisions
1935	**Manual on Uniform Traffic Control Devices and Highways (MUTCD)**	2/39
1942	Manual on Uniform Traffic Control Devices and Highways – War Emergency Edition	No revisions
1948	Manual on Uniform Traffic Control Devices and Highways	9/54
1961	Manual on Uniform Traffic Control Devices and Highways	
1971	Manual on Uniform Traffic Control Devices and Highways	11/71,4/72, 3/73, 10/73, 6/74, 6/75, 9/76, 12/77
1978	Manual on Uniform Traffic Control Devices and Highways	12/79, 12/83, 9/84, 3/66
1988	Manual on Uniform Traffic Control Devices and Highways	1/90, 3/92, 9/93, 11/94, 12/96, 6/98, 1/00
2000	Manual on Uniform Traffic Control Devices and Highways – Millennium Edition	7/02
2003	Manual on Uniform Traffic Control Devices and Highways	11/04, 12/07
2009	Manual on Uniform Traffic Control Devices and Highways	

In accordance with 23 U.S.C. 109(d) and 402(a), the MUTCD is incorporated by reference in 23 Code of Federal Regulations (CFR), Part 655, Subpart F (*3*) and shall be recognized as the national

standard for all traffic control devices and can be found on the U.S. Department of Transportation Federal Highway Administration website at https://mutcd.fh wa.dot.gov/. Since the MUTCD is a federal regulation, it has legal authority, which guides government agencies such as states, counties, and cities to prevent or limit liability in a crash. In 1979 the Federal Highway Administration (FHWA) took over management of the MUTCD and established a formal amendment process. The National Committee on Uniform Traffic Control Devices (*4*) advises the FHWA on the content of the MUTCD and its interpretation.

The manual is structured into nine parts:

- Part 1. General
- Part 2. Signs
- Part 3. Markings
- Part 4. Highway Traffic Signals
- Part 5. Traffic Control Devices for Low-Volume Roads
- Part 6. Temporary Traffic Control
- Part 7. Traffic Control for School Areas
- Part 8. Traffic Control for Railroad and Light Rail Transit Grade Crossings
- Part 9. Traffic Control for Bicycle Facilities

This course focuses on an introduction to Part 1. General, an overview of Part 2A. Signs, and a brief overview of Parts 2B-2N Signs.

PART 1. GENERAL

Purpose and Principles of Traffic Control Devices (Sections 1A.01 and 1A.02)

"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, 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 uniform and efficient operation of all elements of the traffic stream in a manner intended to minimize the occurrences of crashes." (*1*)

"The MUTCD contains the basic principles that govern the design and use of traffic control devices for all streets, 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. The MUTCD'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." (*1*)

"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." (*1*)

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

1. *Fulfill a need*
2. *Command attention*
3. *Convey a clear, simple meaning*
4. *Command respect from road users*
5. *Give adequate time for proper response (1)*

Design, Placement and Operation, Maintenance and Uniformity of Traffic Control Devices (Sections 1A.03-1A.06)

Traffic control devices should be designed with a combinations of features such as size, shape, color, composition, lighting or retroreflection, and contrast in order to to draw attention to the devices. Design standards should only be modified when there is a a demonstrated need.

Devices should be placed and operated in a uniform and consistent manner within the road user's view such that the road user has enough time to respond in both day and night conditions. Unnecessary devices should be removed.

Functional and phyical maintenance should be performed to maintain proper legibility and visibility and otherwis keep devices in good working condition. Uniformity of devices and use is necessary for perception and reaction time as well as to give everyone the same interpretation for use, law enforcement, and traffic courts.

Responsibility for and Authority for Placement of Traffic Control Devices (Sections 1A.07-1A.08)

"The responsibility for the design, placement, operation, maintenance, and uniformity of traffic control devices shall rest with the public agency or the official having jurisdiction, or in the case of private roads open to public travel, with the private owner or private official having jurisdiction. 23 CFR 655.603 adopts the MUTCD as the national standard for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel." (*1*)

Definitions of Headings, Words, and Phrases in the MUTCD (Section 1A.13)

Text headings in the MUTCD have specific meaning based on the following wording defined as:

> Standard (Shall)—is a standard statment that is required, mandatory or a specifically prohibitive practice typically using the verb shall. The verbs "should" and "may" are not used in standard statements. All standard statements are labeled, and the text appears in bold type.
>
> Guidance (Should)—is a guidance statement of recommendation, but not mandatory, practice in typical situations, with deviations allowed if justified by engineering judgment or study typically using the verb should. The verbs "shall" and "may" are not used in guidance statements.
>
> Option (May)—is a statement of practice that is a permissive condition and carries no requirement or recommendation typically using the verb may. Option statements sometime contain allowable modifications to a standard or guidance statement. The verbs "shall" and "should" are not used in option statements.
>
> Support—a support statement is informational and does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. The verbs "shall," "should," and "may" are not used in support statements.

A definition of terms can be found in Section 1A.13 pages 11-23 of the MUTCD as well as acronyms. Figure 2 provides an example of the use of the above-defined text headings, with highlighting added.

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

Standard:

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

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

03 **Secondary legends shall not be used on STOP sign faces.**

04 **At intersections where all approaches are controlled by STOP signs (see Section 2B.07), an ALL WAY supplemental plaque (R1-3P) shall be mounted below each STOP sign. The ALL WAY plaque (see Figure 2B-1) shall have a white legend and border on a red background.**

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

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

Support:

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

Guidance:

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

Option:

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

Support:

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

Figure 2B-1. STOP and YIELD Signs and Plaques

Figure 2. STOP sign (R1-1 and ALL WAY Plaque (R1-3P)

PART 2. SIGNS

General (Sections 2A.01-2A.04)

The function of signs are:

- To convey information
- Essential where special regulations apply or where hazards are not self-evident
- Helpful for information on routes, directions, destinations, etc.
- Not ordinarily needed to confirm rules of the road

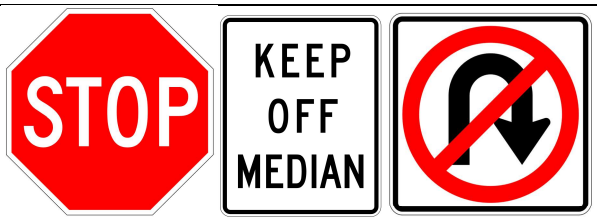
Figure 3. Examples of common signs

General standards for signs are all necessary signs **shall** be in place before a facility is opened. Signs required by road conditions or restrictions **shall** be removed immediately when those conditions cease to exist or the restrictions are withdrawn. Identical conditions **should** be marked with the same type of sign and engineering judgment is essential as a supplement to MUTCD.

Care should be taken to not install too many signs. However, frequent display of route markers and directional signs is encouraged.

Classifications of Signs (Section 2A.05)

Signs are classified into three different categories, depending on their function: regulatory, warning and guide signs.

Sign Function Classification	**Examples**
Regulatory -give notice of traffic laws or regulations	
Warning – give notice of situation that might not be readily apparent	
Guide Signs – show route designation, destinations, directions, distances, services, points of interest and other geographical, recreational, or cultural information. (*1*)	

Design of* Signs (*Section 2A.06)

Design components include shape, color, message content and format, dimensions, illumination and retroreflectivity. Signs at a basic level will be legible to the intended. Standard wordings as shown in this Manual shall be used for sign legends. Word messages should be as brief as possible and lettering should be large enough to provide the necessary legibility distance.

Retrofectivity and Illuminaton (Sections 2A.07-8)

Regulatory and warning signs, unless otherwise noted in the MUTCD, shall be reflectorized or illuminated to show the same shape and color both by day and night. All overhead sign installations should be illuminated when an engineering study shows that retroreflection will not perform effectively. Street or highway lighting does not meet the requirements for sign illumination and are not to beconsidered satisfactory options.

The illuminaton and retroreflection of sign elements is summarized in the MUTCD Table 2A-1 and Table 2A-2 below.

Table 2. MUTCD illumination and retroreflection of sign elements

Table 2A-1. Illumination of Sign Elements

Means of Illumination	Sign Element to be Illuminated
Light behind the sign face	• Symbol or word message • Background • Symbol, word message, and background (through a translucent material)
Attached or independently mounted light source designed to direct essentially uniform illumination onto the sign face	• Entire sign face
Light emitting diodes (LEDs)	• Symbol or word message • Portions of the sign border
Other devices, or treatments that highlight the sign shape, color, or message: Luminous tubing Fiber optics Incandescent light bulbs Luminescent panels	• Symbol or word message • Entire sign face

Table 2A-2. Retroreflection of Sign Elements

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

Ambient light conditions

Reflecting direct light source

Figure 4. Example of retroreflection sign material

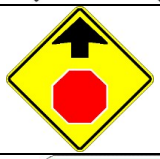
A variety of materials can be used effectively for signs. Nothing in the MUTCD should be interpreted to exclude any new material that meets the standard requirements for color and legibility, both by day and by night.

Shapes (Section 2A.09)

Particular shapes shall be used exclusively for specific signs, such as an ocatogon for a stop sign. Dimensions of signs shall follow those outlined in Section 1A.11 and Table 2A-4 unless engineering judgement determines another size is appropriate.

Table 3. Sign shapes

Shape		Signs
Octagon		Stop*
Equilateral Triangle (1 point down)		Yield"*

Circle		Grade Crossing Advance Warning*
Pennant Shape/Isosceles Triangle (longer axis horizontal)		No Passing*
Pentagon (pointed up)		School Advance Warning Sign (squared botom corners)* County Route Sign (tapered bottom corners)*
Crossbuck (two rectangles in an ”X” configuration)		Grade Crossing *
Diamond		Warning Series
Rectangle (incuding square)	 	Regulartory Series Guide Series** Warning Series
Trapezoid		Recreational and Cultural Interest Area Series National Forest Route Sign
Shield		Interstate Route Marker

* This sign shall be exclusively the shape shown.
** Guide series includes general service, specific service, tourist-oriented directional, general information, recreational and cultural interest area, and emergency management signs.

Color Code (Section 2A.10)

The color code values shall be as described in quick reference Table 2A-5, Common Uses of Sign Colors.(*1*) Whenever the color white is designated, it is a silver-colored retroreflective coating or material that reflects white light. Standard colors such as red, green, yellow, and orange can use fluorescent alternatives. Two colors have been reserved for future needs: coral and light blue.

The following demonstrates examples of colors for signs but is not all inclusive (see MUTCD Table 2A-5 for a more complete listing).

Black

Background color on regulation signs: • ONE WAY signs • Certain truck signs • Night speed limit signs	
Message color on white, yellow, and orange signs	

Blue

Background color for information signs related to motorist services.	
Evacuation Route Marker.	

Brown

Background color for guide and information signs related to points of recreational or cultural interest.	

Orange

Background color for construction and maintenance signs and **shall not** be used for any other purpose.	

Green

Background color for: • Guide and informational signs, other than those using brown or white • Milepost signs	
Legend color with a white background for permissive parking regulations	
Circular outline permissive symbol	

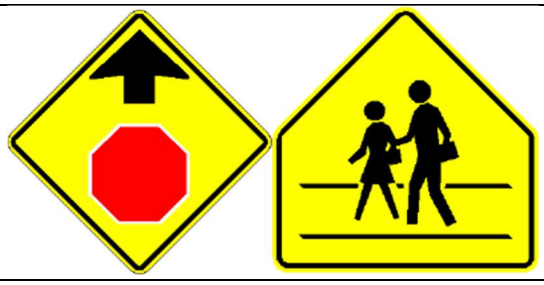
Red

Background color for: • STOP signs • Multi-way supplemental plates • DO-NOT-ENTER messages • WRONG WAY signs	
Interstate route markers	
Legend color for: • YIELD signs • Parking prohibition signs	
Circular outline and diagonal bar prohibitory symbol	

White

Background color for: • Route marker signs • Guide Signs • Regulatory signs, except STOP signs	
Message color on brown, green, blue, black, and red signs.	

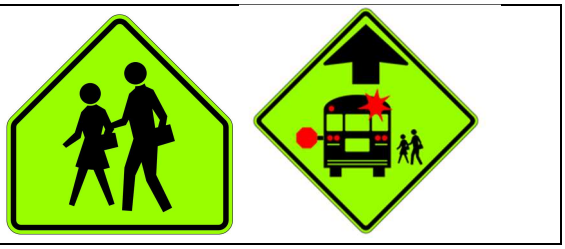
Yellow

Background color for warning signs, except where orange is specified, and for school signs (Part 7).	

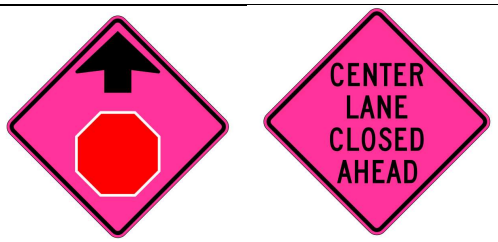
Purple

Lanes restricted to use only by vehicles with registered electronic toll collection (ETC) accounts.	

Fluorescent Yellow-Green

Background color for: • pedestrian warning signs • bicycle warning signs • playground warning signs • school bus and school warning signs	

Fluorescent Pink

Background color for: • incident management	

Dimensions (Section 2A.11)

The Standard Highway Signs book provides sign layouts in detail, prescribing dimensions that shall be standard for application on public highways. (*5*) Sign dimensions should be increased in size where greater legibility or emphasis is needed. Whenever practical, the overall dimensions of the sign plates should be increased in 6-inch increments.

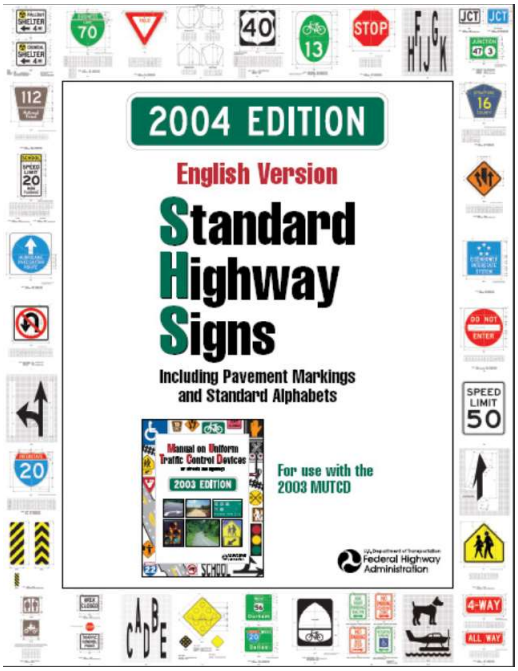


Figure 5. Standard highway Signs manual

Figure 6 presents an example of dimension guidelines for a speed limit sign.

R2-1
SPEED LIMIT (ENGLISH)

*Optically space numerals about centerline

	A	B	C	D	E	F	G	H	J	K	L
	18	24	.375	.625	3	3 E	2	8 E	7.188	5.5	1.5
C	24	30	.375	.625	4	4 E	2	10 E	9.563	7.313	1.5
	36	48	.625	.875	6	6 E	5	14 E	14.375	11	2.25
	48	60	.75	1.25	8	8 E	6	16 E	19.125	14.625	3

COLORS: LEGEND — BLACK
BACKGROUND — WHITE (RETROREFLECTIVE)

Figure 6. Dimension guidelines for speed limit sign
Source: Standard Highway Signs manual (*5*)

Symbols (Section 2A.12)

"Symbol designs shall in all cases be unmistakably similar to those shown in the MUTCD (*1*) and the "Standard Highway Signs" book." (*5*) Most symbols are oriented facing left, but mirror images are acceptable, for example as shown in Figure 7. It is appropriate to make minor image changes in the proportion of symbols, width of borders, or layout of word messages, but all shapes and colors shall be as indicated.

Figure 7. Symbol sign mirror image example

All symbol signs which are readily recognizable by the public may be erected without educational plaques. New warning or regulatory symbol signs not readily recognizable by the public shall be accompanied by an educational plaque which is to remain in place for at least three years after initial installation.

Word Messages (Section 2A.13)

"Standard wording and lettering in the MUTCD shall be used for sign legends. "Word messages should be as brief as possible, and lettering should be large enough to provide the necessary legibility distance. Abbreviations should be kept to a minimum." (*1*)	
Sign lettering shall be in upper-case letters of the type approved in the Standard Highway Signs manual.	

Street signs should include only words that are commonly recognized and understood, such as Ave, Blvd, St, N (for north).	
"Fractions shall be displayed with the numerator and denominator diagonally arranged about the solidus (slanted line or forward slash). The overall height of the fraction is measured from the top of the numerator to the bottom of denominator, each of which is vertically aligned with the upper and lower ends of the solidus. The overall height of the fraction shall be determined by the height of the numerals within the fraction and shall be 1.5 times the height of an individual numeral within the fraction." (*1*)	

Destination names may be in lower-case lettering, with initial upper-case. It is sometimes permissible to put long names in slightly smaller lettering than would otherwise be required.	

"The Standard Alphabet shall not be stretched, compressed, warped, or otherwise manipulated." (*1*)	**SLOW** SLOW	Yes No

Sign Borders (Section 2A.14)

"Unless otherwise provided, each sign illustrated in the MUTCD shall have a border of the same color as the legend, at or just inside the edge. The corners of all sign borders shall be rounded, except for STOP signs. A dark border on a light background should be set in from the edge, while a light border on a dark background should extend to the edge of the sign. "(*1*)

Figure 8. Sign borders examples

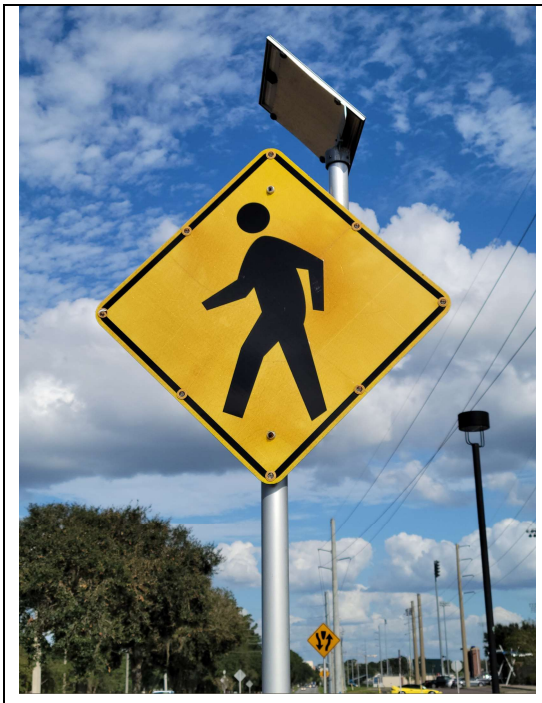
Enhanced Conspicuity for Standard Signs (Section 2A.15)

There are many options for drawing attention to regulatory, warning or guide signs. A new plaque shall not be used alone. Strobe lights shall not be used in signage. Engineering judgment may consider the following list outlined in the MUTCD.

A. "Increasing the size of a standard regulatory, warning, or guide sign
B. Doubling-up of a standard regulatory, warning, or guide sign by adding a second identical sign on the left-hand side of the roadway (example shown in Figure 9)
C. Adding a solid yellow or fluorescent yellow rectangular "header panel" above a standard regulatory sign, with the width of the panel corresponding to the width of the standard regulatory sign. A legend of "NOTICE," "STATE LAW," or other appropriate text may be added in black letters within the header panel for a period of time determined by engineering judgement.
D. Adding a NEW plaque (see Section 2C.62) above a new standard regulatory or warning sing, for a period of time determined by engineering judgement, to call attention to the new sign.
E. Adding one or more red or orange flags (cloth or retroreflective sheeting) above a standard regulatory or warning sing, with the flags oriented so as to be at 45 degrees to the vertical.
F. Adding a solid yellow, a solid fluorescent yellow, or a diagonally striped black and yellow (or black and fluorescent yellow) strip of retroreflective sheeting at last 3 inches wide around the perimeter of a standard warning sign. This may be accomplished by affixing the standard warning sing on a background that is 6 inches larger than the size of the standard warning sign.
G. Adding a warning beacon (see Section 4L.03) to a standard regulatory (other than a STOP or a Speed Limit sign), warning, or guide sign. (example shown in Figure 11)
H. Adding a speed limit sign beacon (see Section 4L-04) to a standard Speed Limit sign.
I. Adding a stop beacon (see Section 4L.05) to a STOP sign.
J. Adding light emitting diode (LED) units within the symbol or legend of a sign or border of a standard regulatory, warning, or guide sign, as provided in Section 2A.07.
K. Adding a strip of retroreflective material to the sign support in compliance with the provisions of Section 2A.21.
L. Using other methods that are specifically allowed for certain signs as described elsewhere in this Manual" (*1*)

Example of doubling up of warning signs is demonstrated in Figure 9. Figure 10 is an example of LEDs installed in a sign border and Figure 11 is a beacon to draw attention to a pedestrian warning sign.

Figure 9. Placement of warning sign on both right and left to draw attention



Light emitting diodes off

Light emitting diodes on

Figure 10. Flashing light emitting diode (LED) units

Figure 11. Supplemental flashing beacon

A hazard identification beacon may be used only to supplement an appropriate warning or regulatory sign.

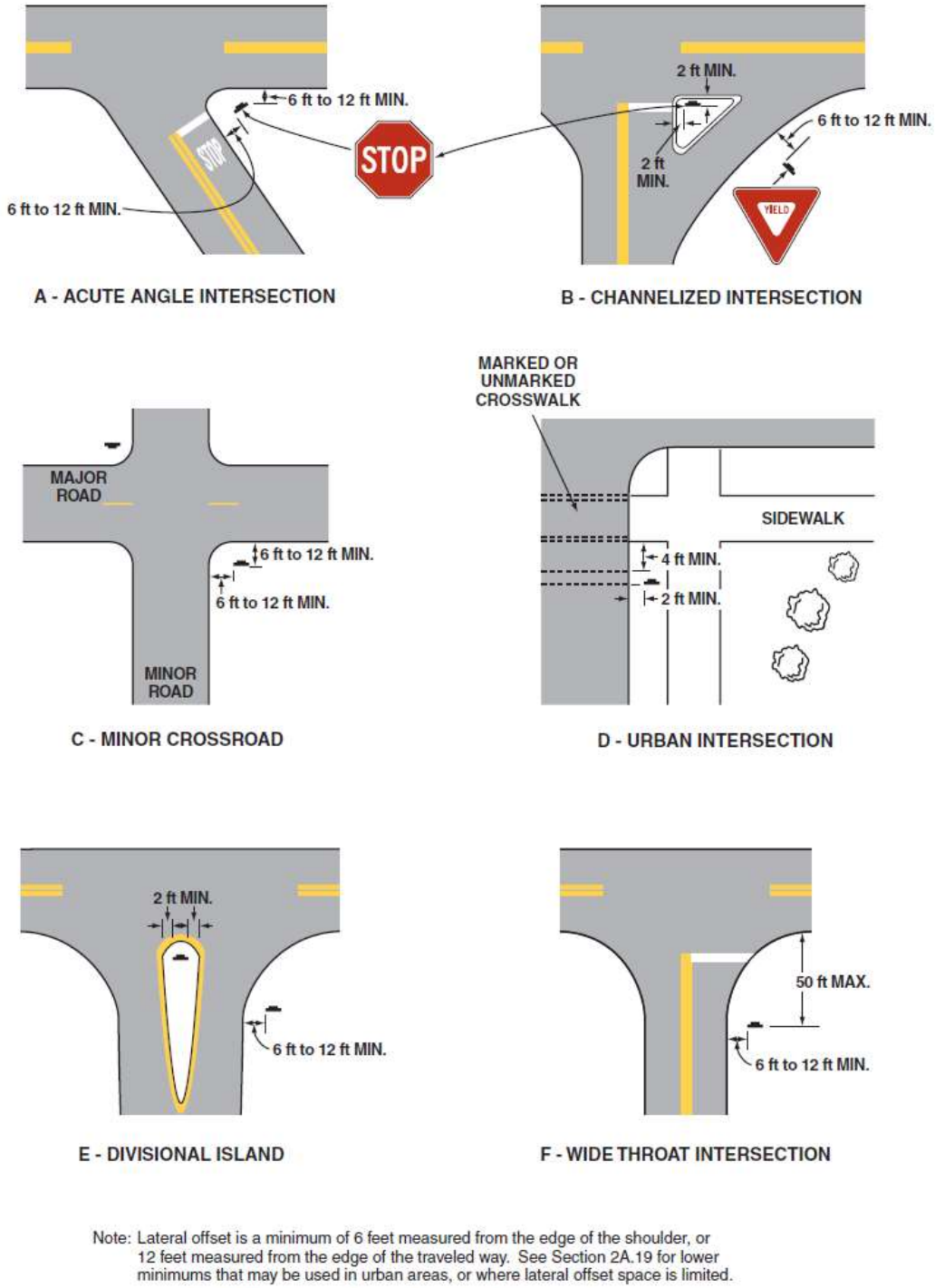
Standardization of Location (Section 2A.16)

The general rule is to locate signs on the right-hand side of the roadway. Overhead signs are often necessary for freeways. Signs in other locations ordinarily should be considered only as supplementary. Some signs require different reactions from the driver and shall be spaced apart to give the driver time to react. Figures 12 and 13 Provide location of typical signs at and approach to intersections.

Signs should be located

- To optimize nighttime visibility
- To minimize the effects of mud spatter and debris
- In conformance with safety factors related to fixed obstacles near the roadway
- So that they do not obscure each other
- So that they are not hidden from view by other roadside objects.
- So that do not obscure approaching vehicles sight distance

Order of priority is important where space is limited. Regulatory and warning signage whose information is critical should be displayed in advance of guide signing. There is more flexibility in the placement of signs with less important information, or alternatively can be removed to avoid a situation of sign clutter. A regulatory sign normally is placed where its mandate or prohibition applies.



Note: Lateral offset is a minimum of 6 feet measured from the edge of the shoulder, or 12 feet measured from the edge of the traveled way. See Section 2A.19 for lower minimums that may be used in urban areas, or where lateral offset space is limited.

Figure 12. Examples of locations for some typical signs at intersections
Source: MUTCD Figure 2A-3

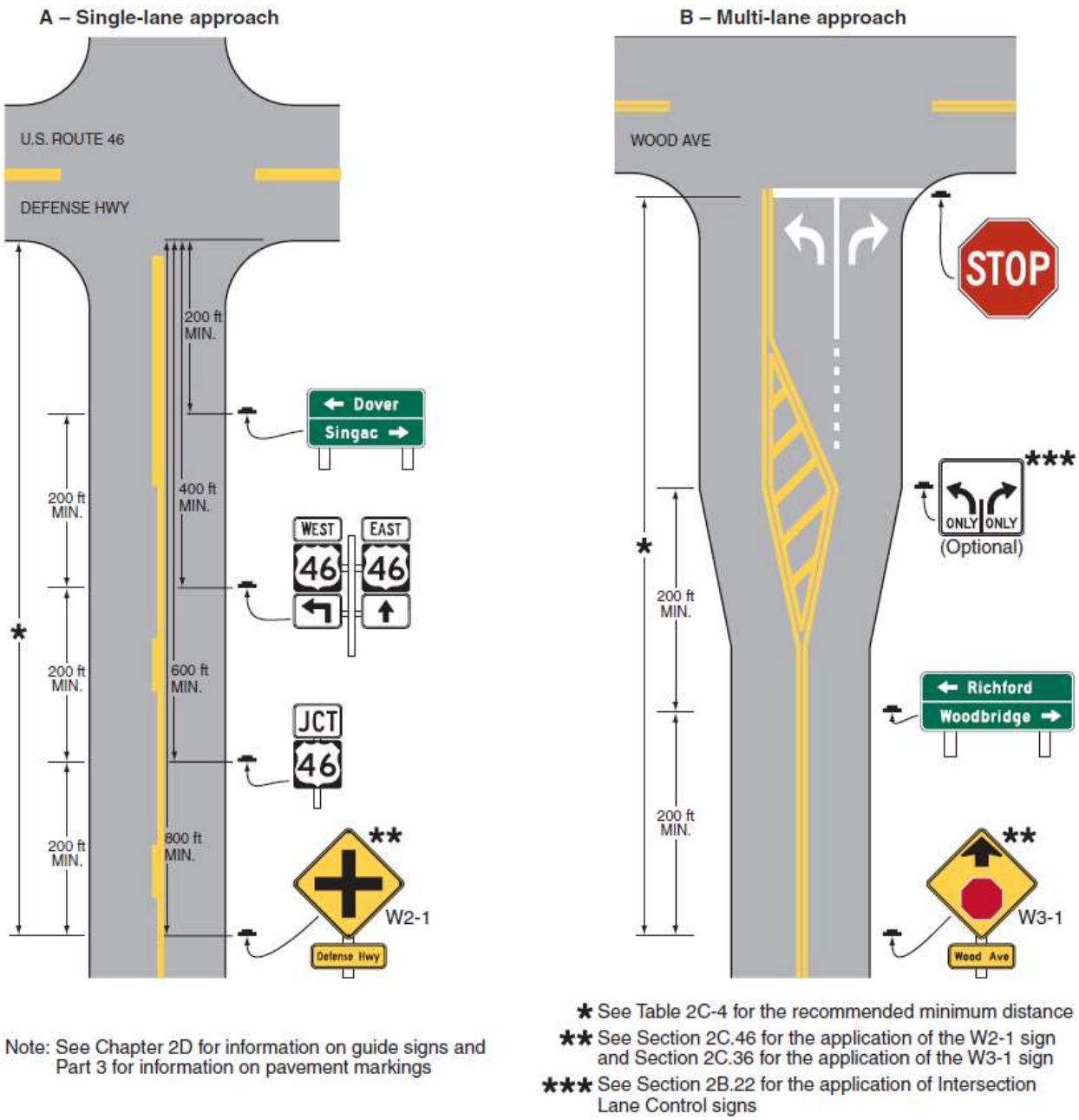


Figure 13. Relative locations of regulatory, warning, and guide signs on an intersection approach
Source: MUTCD Figure 2A-4

Overhead Sign Installations (Section 2A.17)

When there is not enough space on the freeway roadside, an overhead sign (see Figure 14 for example) may be used under certain conditions. Some of these conditions to consider are listed below.

"A. Traffic volume at or near capacity
B. Complex interchange design
C. Three or more lanes in each direction
D. Restricted sight distance
E. Closely spaced interchanges
F. Multi-lane exits
G. Large percentage of trucks
H. Street lighting background
I. High speed traffic
J. Consistency of sign message location
K. Insufficient space for ground mounting
L. Junction of two freeways
M. Left exit ramps" (*1*)

Figure 14. Overhead sign installation example

Mounting Height (Section 2A.18)

The minimum mounting height for a sign is 5 feet, measured from the bottom of the sign to the elevation of the near edge of the pavement, in a rural setting. In business, commercial, and residential districts of an urban setting where pedestrian or parking movement occurs, the minimum mounting height is 7 feet. The bottom height minimum for a secondary sign may be 1 foot less than the 5-foot minimum for rural and 7-foot minimum for urban settings. The minimum clearance for an overhead sign shall be 17 feet from the bottom of the sign to the pavement and shoulder.

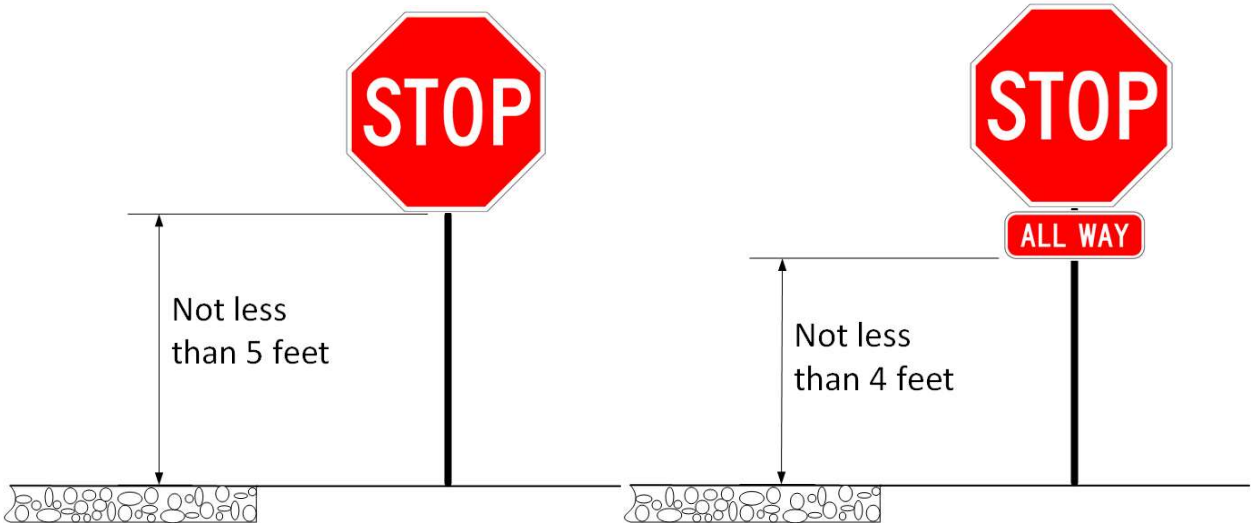


Figure 15. Rural sign mounting heights
Source: Washburn

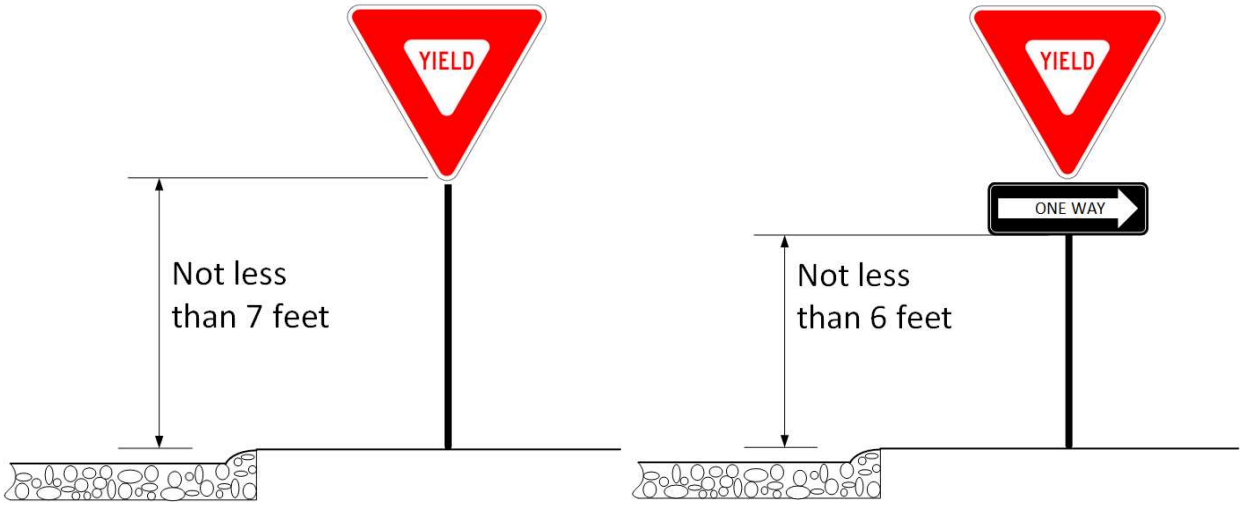


Figure 16. Urban sign mounting heights
Source: Washburn

Lateral Offset (Section 2A.19)

"For overhead sign supports, the minimum lateral offset from the edge of the shoulder (or if no shoulder exists, from the edge of the pavement) to the near edge of overhead sign support (cantilever or sign bridges) shall be 6 feet. Overhead sign supports shall have a barrier or crash cushion to shield them if they are within the clear zone. Post-mounted sign and object marker supports shall be crashworthy (breakaway, yielding, or shielded with a longitudinal barrier or crash cushion) if within the clear zone." More detailed requirements are prescribed for freeway and expressway signs.

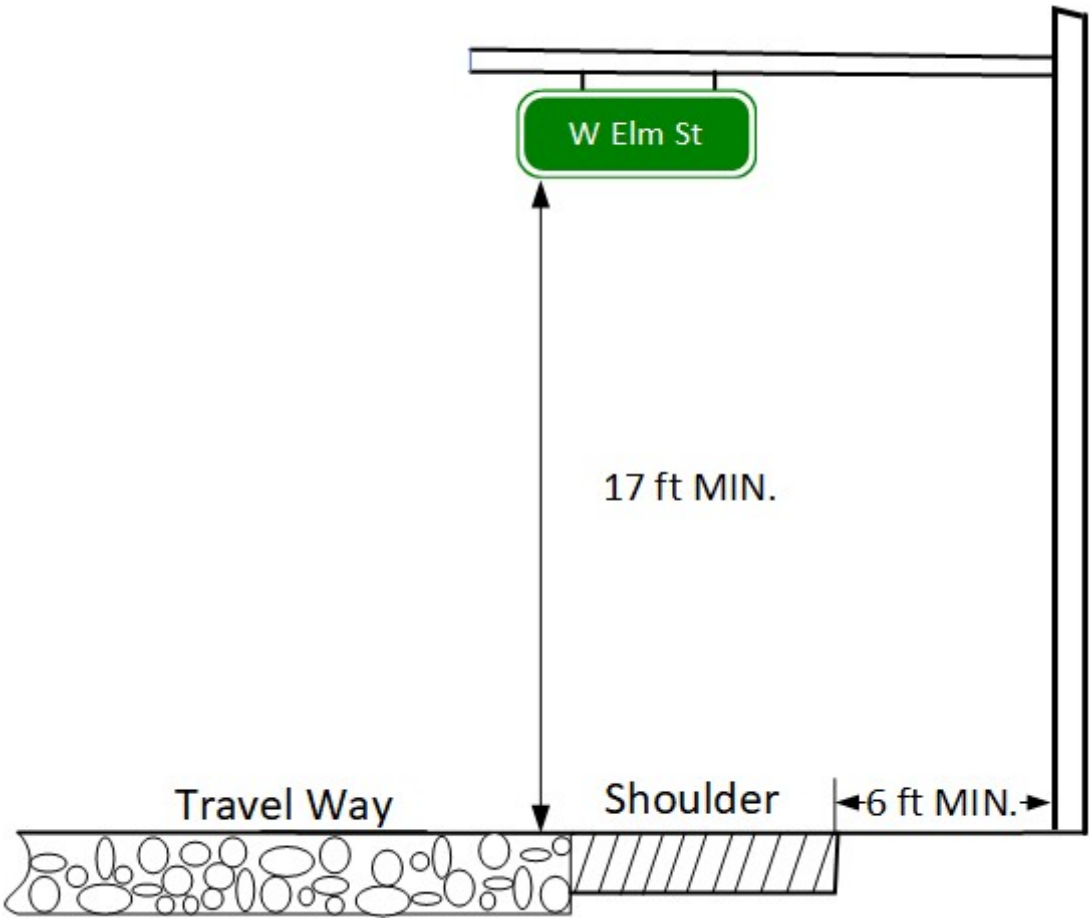


Figure 17. Overhead sign support lateral placement
Source: Washburn

In rural areas, signs should normally not be closer than 6 feet from the edge of the shoulder, and not closer than 12 feet from the edge of the traveled way when no shoulder is present.

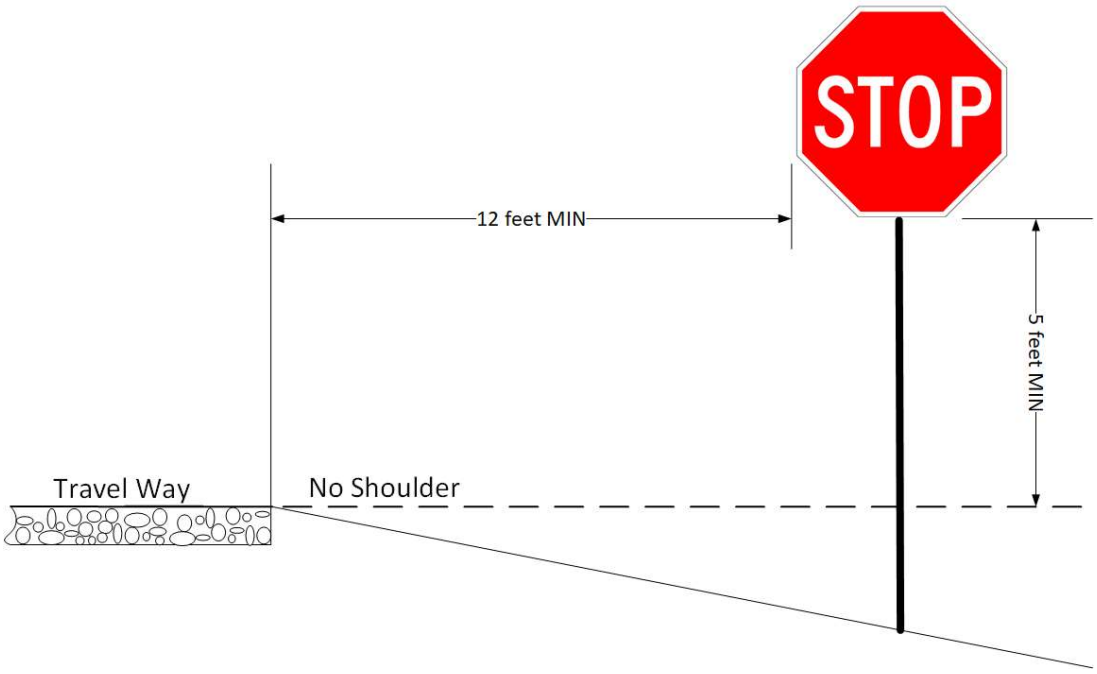


Figure 18. Rural areas lateral sign placement without shoulder
Source: Washburn

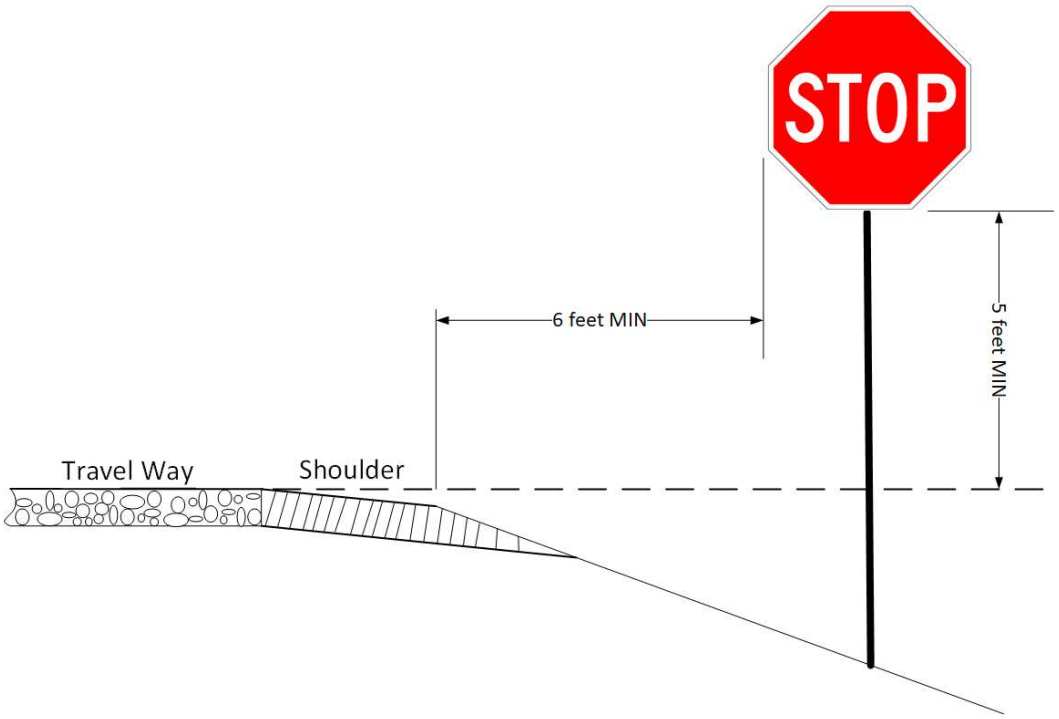


Figure 19. Rural areas lateral sign placement with shoulder
Source: Washburn

For business, commercial, or residential areas in urban environments, a minimum of 2 feet is recommended for sign lateral offset between the near-roadway edge of the sign to the curb face; however, 1 foot from the curb face is permissible where necessary.

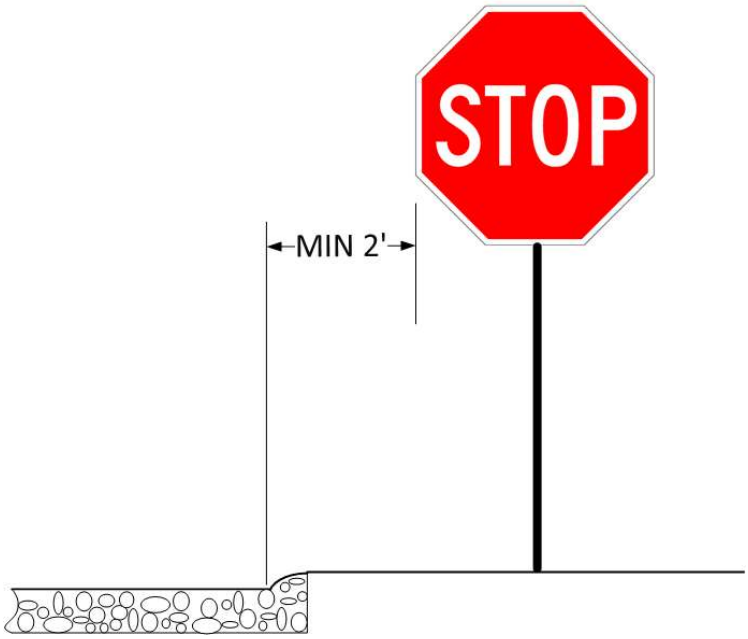


Figure 20. Urban areas lateral sign placement
Source: Washburn

Orientation (Section 2A.20)

"Signs should be vertically mounted at right angles to the direction of, and facing, the traffic that they are intended to serve. Where mirror reflection from the sign face is encountered to such a degree as to reduce legibility, the sign should be turned slightly away from the road. Signs that are placed 30 feet or more from the pavement edge should be turned toward the road. On curved alignments, the angle of placement should be determined by the direction of approaching traffic rather than by the roadway edge at the point where the sign is located." (*1*)

Posts and Mountings (Section 2A.21)

Signs shall be installed to remain in position and resist wind and vandalization. Reflective material may be used on the sign support (see Figure 21 for example). In this situation, the color of the reflective material must be the same as the sign background color, except for YIELD and DO NOT ENTER signs, for which the reflective material color shall be red. When reflective material is used on the sign post/support, it should run from the bottom of the sign to within 2 feet above the surface of the pavement.

Figure 21. Reflective material on sign support

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

- One sign supplements another
- Route or directional signs are grouped to clarify information to motorists
- Regulatory signs that do not conflict with each other are grouped
- Street Name signs are posted with a STOP or YIELD sign

Maintenance (Section 2A.22)

All signs should be kept in proper position, clean and legible at all times. A schedule for inspection, cleaning and replacement should be established and damaged signs should be replaced without undue delay. Government employees should report any damaged signs or signs obscured from weeds, trees, shrubbery, or construction materials (see Figure 22 for example). Illuminated signs will need a regular schedule to replace lightning elements.

Figure 22. Sign maintenance needed

There are numerous use cases for signs. These various applications are organized and described in the following sections:

- Regulatory Signs, Barricades, and Gates (2B)
- Warning Signs and Object Markers (2C)
- Guide Signs-Conventional Roads (2D)
- Guide Signs-Freeways and Expressways (2E)
- Toll Road Signs (2F)
- Preferential and Managed Lane Signs (2G)
- General Information Signs (2H)
- General Service Signs (2I)
- Specific Service Signs (2J)
- Tourist-Oriented Directional Signs (2K)
- Changeable Message Signs (2L)
- Recreational and Cultural Interest Area Signs (2M)
- Emergency Management Signing (2N)

The remainder of this document provides an overview of the content of each of these sections.

Regulatory Signs, Barricades, and Gates (Chapter 2B.)

Regulatory signs inform roadway users of traffic laws or regulations and indicate the applicability of legal requirements that would not otherwise be apparent. A regulatory sign normally is placed where its mandate or prohibition applies. Regulatory signs shall be retroreflective or illuminated, and rectangular unless specified otherwise; for example, a stop sign or yield sign. A prohibitive regulatory sign has red, white and black background color with red, white and black legend color. Permissive regulatory signs have a white background color with a black and green legend color.

Figure 23. Regulatory sign examples

Section 1A.11 of the Standard Highway Signs and Markings" book (*5*) provides the details of size, shape, color and legend that regulatory signs shall include in their design.

Figure 24. Regulatory sign examples

See MUTCD 2B.67 and 2B.68 for further information on barricades and gates.

Warning Signs and Object Markers (Chapter 2C.)

Warning signs will call attention to unexpected conditions on or adjacent to a highway, street, or private road 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 and are placed in advance of the condition to which it calls attention.

- ***Typical Locations and Hazards for Warning Signs***
- *Changes in horizontal alignment*
- *Intersections*
- *Advance warning or control devices*
- *Converging traffic lanes*
- *Narrow roadways*
- *Changes in highway design*
- *Grades*
- *Roadway surface conditions*
- *Railroad crossings*
- *Entrances and crossings*

Warning signs will have a black legend and border on a yellow background unless the sign is associated with a school or school bus. That application will have a black legend and border on a fluorescent yellow-green background.

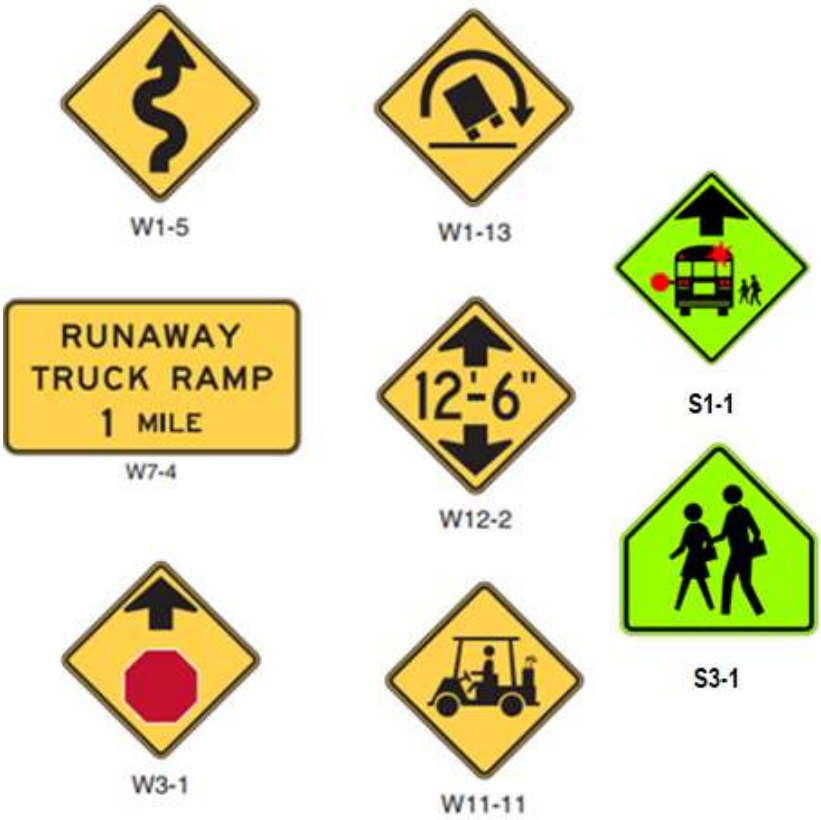
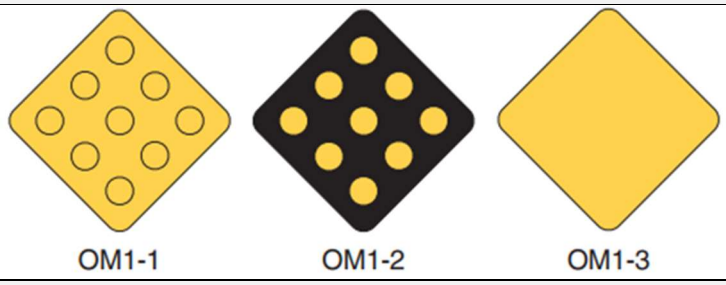
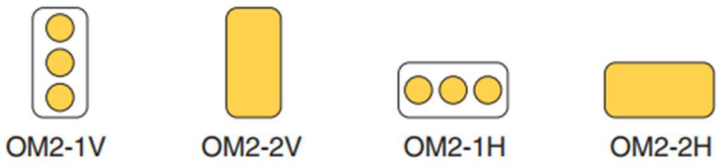
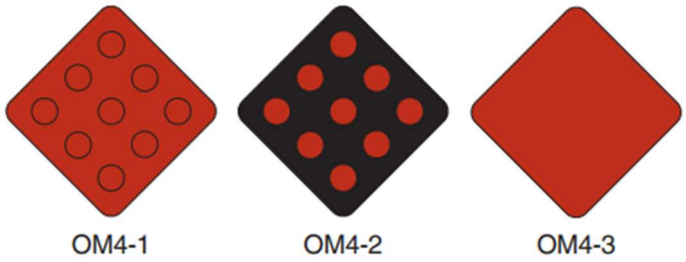


Figure 25. Warning sign examples

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

Table 4. Object marker examples

Type 1 (obstructions within roadway)	
A marker consisting of nine yellow reflectors, each with a minimum dimension of approximately 3", mounted symmetrically on an 18" yellow or black diamond panel, or, An all yellow reflective diamond panel of the same size	
Type 2 (obstructions adjacent to the roadway)	
A marker consisting of three yellow reflectors, each with a minimum dimension of approximately 3", arranged either horizontally or vertically, or, An all yellow reflective panel, 6" x 12"	
Type 3 (obstructions adjacent to or within the roadway)	
Striped marker consisting of a vertical rectangle approximately 1' x 3' in size with alternating black and reflectorized yellow stripes sloping downward at an angle of 45 degrees toward the side of the obstruction on which traffic is to pass. Minimum width of the yellow stripe shall be 3".	
Type 4 (end of roadway)	
A marker consisting of nine red reflectors, each with a minimum dimension of approximately 3", mounted symmetrically on an 18" diamond, red, or black panel, or, An 18" diamond reflectorized red panel	

Guide Signs-Conventional Roads (Chapter 2D.)

Guide signs are essential to direct road users along streets and highways, to inform them of intersecting routes, to direct them to cities, towns, or other important destinations. They generally provide information to help road users find their way in the most simple, direct manner possible.

The guide signs described in this section apply to all roadways except for freeways and expressways, which are discussed in the section 2E. Conventional road guide signs shall have a green background with white message and be retroreflective or illuminated.

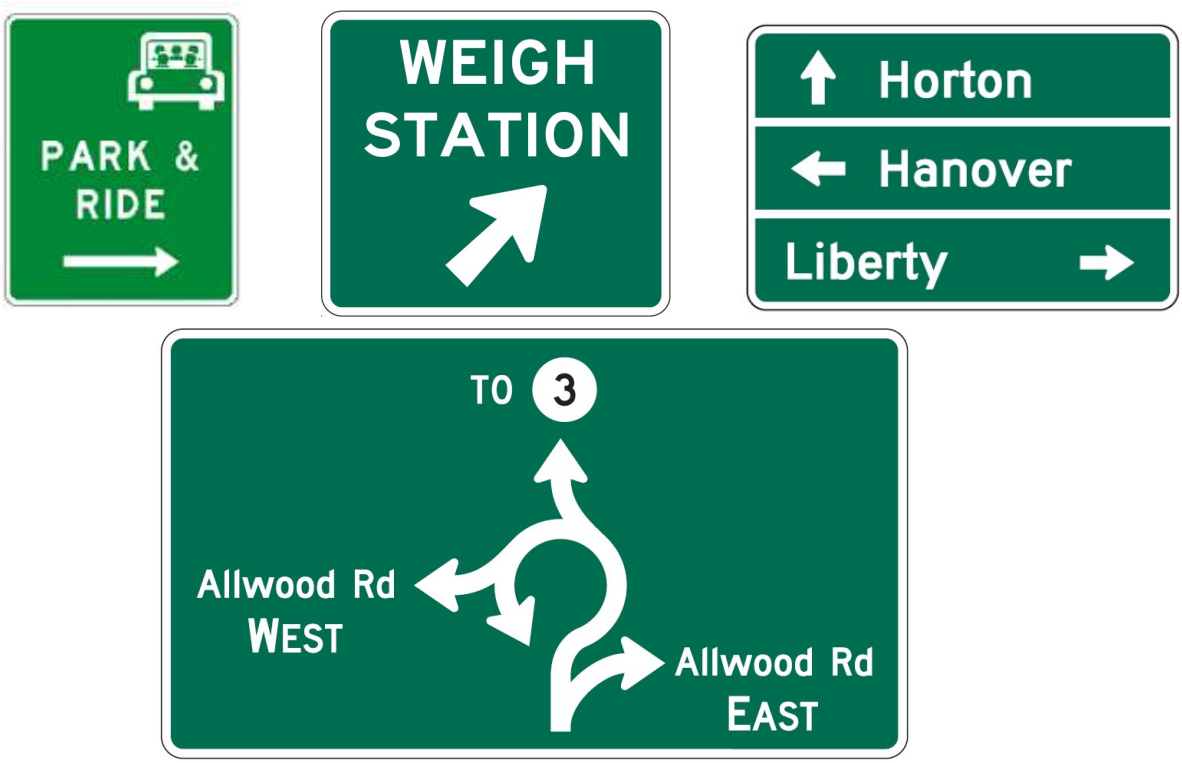


Figure 26. Conventional road guide sign examples

Route signs shall be designed using the "Standard Highway Signs and Markings" book (*5*). Guidelines for example route signs are given in Table 5.

Table 5. Route sign examples

Interstate Route Sign – shall consist of a cutout shield, with the route number in white letters on a blue background, the word INTERSTATE in white upper-case letters on a red background, and a white border	
Off-Interstate Business Route Sign – shall consist of a cutout shield carrying the number of the connecting Interstate route and the words BUSINESS and either LOOP or SPUR in upper-case letters. The legend and border shall be white on a green background, and the shield shall be the same shape and dimensions as the Interstate Route sign	
U.S. Route Sign – shall consist of black numerals on a white shield surrounded by a rectangular black background without a border. This sign shall be used on all U.S. routes and in connection with route sign assemblies on intersecting highways	
State Route Sign – should be rectangular and should be approximately the same size as the U.S. Route sign. State Route signs should also be similar to the U.S. Route sign by containing approximately the same size black numerals on a white area surrounded by a rectangular black background without a border	
County Route Sign – If county road authorities elect to establish and identify a special system of important county roads, a statewide policy for such signing shall be established that includes a uniform numbering system to uniquely identify each route	
Forest Route Sign – Route signs for park and forest roads shall be designed with adequate distinctiveness and legibility and of a size compatible with other route signs used in common assemblies. (*1*)	

Guide Signs-Freeways and Expressways (Chapter 2E.)

Freeway and expressway guide-signing installations should be coordinated to convey clear instructions to the unfamiliar roadway user. An engineering study could identify problems and solutions to many individual locations within the context of an entire route.

"Road users should be guided with consistent signing on the approaches to interchanges, when they drive from one State to another, and when driving through rural or urban areas. Because geographical, geometric, and operating factors regularly create significant differences between urban and rural conditions, the signing should take these conditions into account." (*1*)

"Guide signs on freeways and expressways should serve distinct functions as follows:

A. Give directions to destinations, or to streets or highway routes, at intersections or interchanges;
B. Furnish advance notice of the approach to intersections or interchanges;
C. Direct road users into appropriate lanes in advance of diverging or merging movements;
D. Identify routes and directions on those routes;
E. Show distances to destinations;
F. Indicate access to general motorist services, rest, scenic, and recreational areas; and
G. Provide other information of value to the road user." (*1*)

Toll Road Signs (Chapter 2F.)

Signage for a toll road will depend on whether the road is a freeway, expressway, or a conventional roadway, but typically toll roads are limited-access freeways or expressways. The toll may be for the entire route, or a part of the route, such as a bridge or tunnel. Toll road signs are needed for identifying entrance and exit points, collection points and toll plazas. Purple shall be the sign background color when displaying electronic toll collection (ETC) information. Purple shall be used only for the ETC information and the remaining portions of the sign shall follow appropriate regulatory, warning, and guide signs design guidance.

Figure 27. Toll road sign example (SunPass is name for Florida ETC program)

Preferential and Managed Lane Signs (Chapter 2G.)

Preferential lanes are lanes designated for special traffic uses such as:

- high-occupancy vehicles (HOVs)
- light rail
- buses
- commercial trucks
- taxis
- bicycles

"Preferential lanes might allow continuous access with the adjacent general-purpose lanes or restrict access only to designated locations. Preferential lanes might be operated in a constant direction or operated as reversible lanes. Some reversible preferential lanes on a divided highway might be operated counter-flow to the direction of traffic on the immediately adjacent general-purpose lanes." (*1*)

A managed lane is a special type of preferential lane (see Sections 2G.03 through 2G.07). It generally refers to a lane that has variable access restrictions, for example:

- A lane that is only usable by HOVs during peak traffic periods and otherwise functions as a general purpose (GP) lane
- A high-occupancy toll (HOT) lane, with toll rates that vary with the congestion level, and also allows use by HOVs

Figure 28. High occupancy vehicle lane sign example

Sections 2G.16 through 2G.18 contain additional information regarding signs for managed lanes that use tolling or pricing as a management strategy. (*1*)

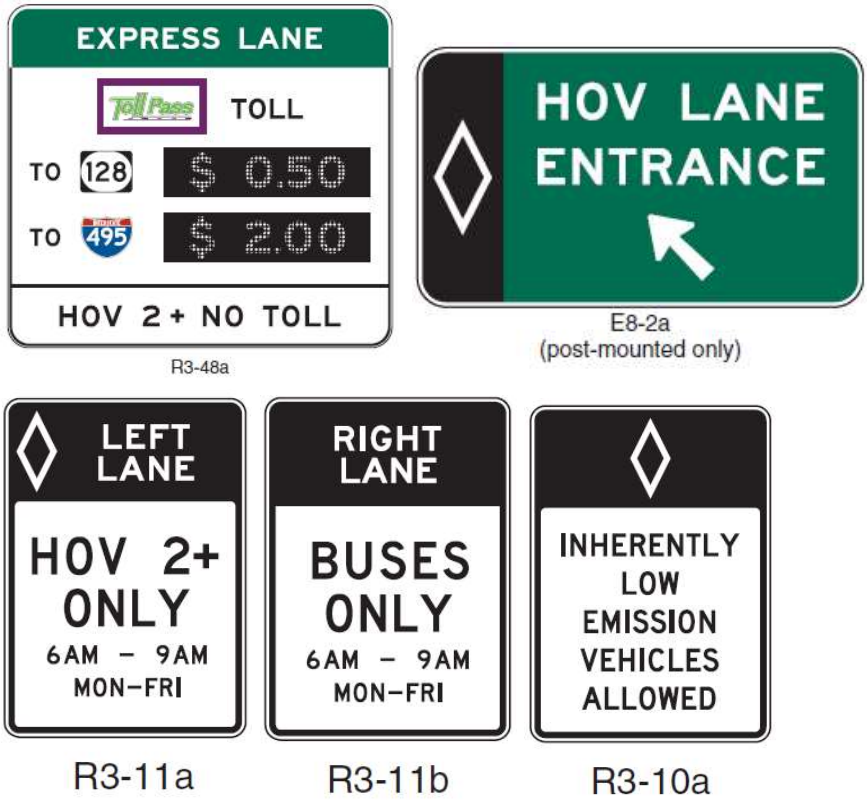


Figure 29. Preferential and managed lane sign examples

General Information Signs (Chapter 2H.)

General information signs in this section of the MUTCD are not directly necessary for guidance but may be of interest to the roadway user. They are rectangular with a white legend and green background and include such items as state lines, city limits, other political boundaries, time zones, stream names, elevations, landmarks, and similar items of geographical interest, and safety and transportation-related messages. Figure 30 shows some examples.

Figure 30. General information signs examples

General Service Signs, Specific Service Signs and Tourist-Oriented Directional Signs (Chapter 2I., 2J., and 2K.)

In urban areas, commercial services such as gas, lodging, and food are typically visible and signage for these items are not needed. Exceptions would include signage for hospitals, law enforcemnt services, and tourist information. General service signs on conventional roadways may be used at highway intersections and where services occur at longer intervals. General service signs will have a blue background with white letters and symbols. Figure 31 shows some examples.

Figure 31. Example of general service and specific service signs for a freeway

Specific service signs are primarily used in rural areas where adequate sign spacing can be maintained. They are typically limited to food, gas, lodging, camping, attractions, and pharmacies. Tourist-oriented directional guide signs are designed to direct roadway users unfamiliar with the area to tourist-oriented businesses. They may be used in conjunction with general service signs.

Changeable Message Signs (Chapter 2L.)

A changeable message sign (CMS) may display one or more messages and shall display only traffic operational, regulatory, warning, and guidance information (see Figure 32 for example).

Advertising, animation, rapid flashing, or dynamic elements such as scrolling are not allowed on CMS's.

Figure 32. Changeable message sign example

CMS Applications
- Incident management and route diversion
- Warning of adverse weather conditions
- Special event applications
- Control at crossing situations
- Lane, ramp, and roadway control
- Priced or other types of managed lanes
- Travel times
- Warning situations
- Traffic regulations
- Speed control
- Destination guidance (*1*)

CMS's may also display messages for state and local highway warning situations, such as safety messages, transportation-related messages, emergency homeland security messages, and America's Missing: Broadcast Emergency Response (AMBER) alert messages.

Recreational and Cultural Interest Area Signs (Chapter 2M.)

Recreational and cultural interest area signs direct the traveling public to either general areas, specific facilities or activities. They shall be square- or rectangular-shaped with a brown background color, a white border, and a white symbol or message (see Figure 33Figure 32 for example). Recreational attractions include such facilities as parks, campgrounds, fishing, and ski areas. Cultural attractions include museums, art galleries, and historical buildings or sites. General information and services for recreation and cultural areas such as bathrooms, first aid, and picnic sites are also included.

Figure 33. Recreational and cultural sign example

Emergency Management Signing (Chapter 2N.)

Emergency management signs provide guidance during disasters or emergencies and direct roadway users. They should have a retroreflective background and shall not displace applicable standard signs. Note that the Stop sign is used in conjunction with the Traffic Control Point sign.

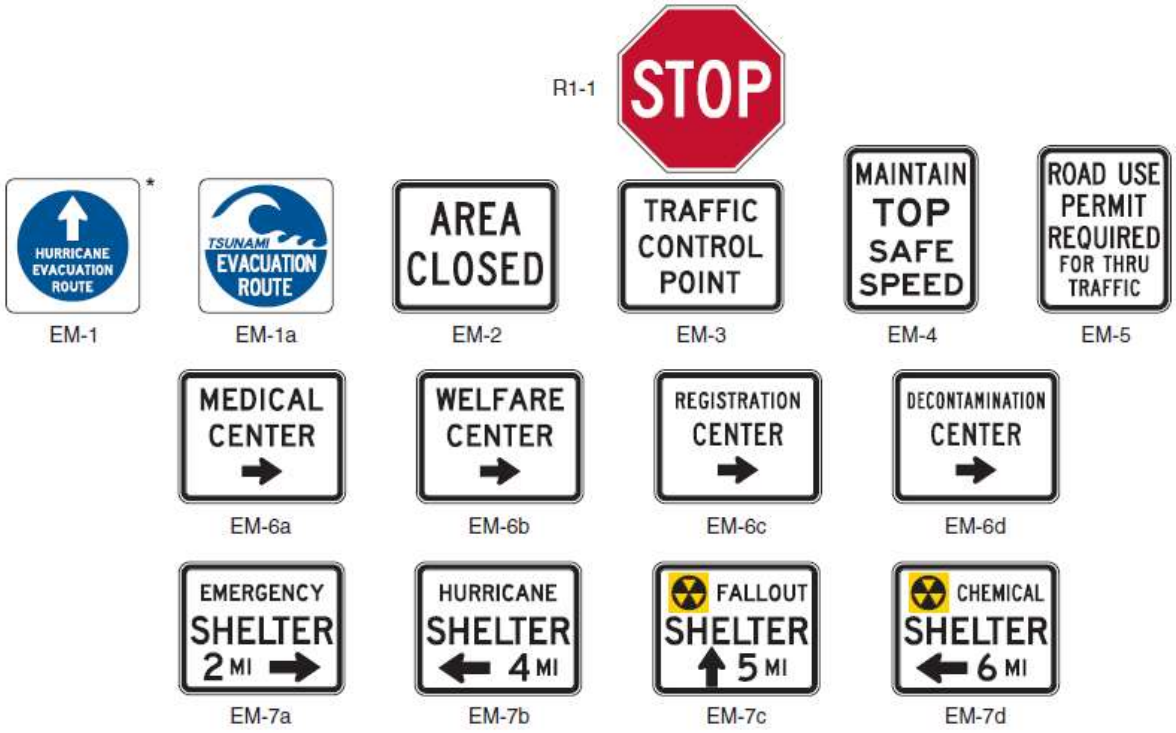


Figure 34. Emergency signing examples

REFERENCES

1. Manual on Uniform Traffic Control Devices **Error! Hyperlink reference not valid.**
2. https://mutcd.fhwa.dot.gov/kno-history.htm
3. https://mutcd.fhwa.dot.gov/res-23cfr655.htm
4. National Committee on Uniform Traffic Control Devices https://ncutcd.org/
5. Standard Highway Signs https://mutcd.fhwa.dot.gov/ser-shs_millennium_eng.htm