

# SIGNING UPDATES

# MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), 2009 EDITION

CLIFF REUER

SDLTAP – WESTERN SATELLITE

605-773-5108

605-209-8932 (c)

# MUTCD – 2009 EDITION

## Manual on Uniform Traffic Control Devices

for Streets and Highways

2009 Edition



U.S. Department of Transportation  
Federal Highway Administration

# MUTCD

☐ <http://mutcd.fhwa.dot.gov/>

☐ Purchase At:

<http://www.atssa.com/>

# RESPONSIBILITY

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

### Standard:

01 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 (see definition in [Section 1A.13](#)). When a State or other Federal agency manual or supplement is required, that manual or supplement shall be in substantial conformance with the National MUTCD.

# AUTHORITY

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

### Standard:

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

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

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

# STANDARD – GUIDANCE – OPTION - SUPPORT

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

### Standard:

01 When used in this Manual, the text headings of Standard, Guidance, Option, and Support shall be defined as follows:

**Standard**—a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. All Standard statements are labeled, and the text appears in bold type. The verb "shall" is typically used. The verbs "should" and "may" are not used in Standard statements. Standard statements are sometimes modified by Options. Standard statements shall not be modified or compromised based on engineering judgment or engineering study.

**Guidance**—a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. All Guidance statements are labeled, and the text appears in unbold type. The verb "should" is typically used. The verbs "shall" and "may" are not used in Guidance statements. Guidance statements are sometimes modified by

# STANDARD – GUIDANCE – OPTION - SUPPORT

## Options.

**Option**—a statement of practice that is a permissive condition and carries no requirement or recommendation.

**Option statements sometime contain allowable modifications to a Standard or Guidance statement. All Option statements are labeled, and the text appears in unbold type. The verb "may" is typically used. The verbs "shall" and "should" are not used in Option statements.**

**Support**—an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. Support statements are labeled, and the text appears in unbold type. The verbs "shall," "should," and "may" are not used in Support statements.

# RETROREFLECTIVITY

## Section 2A.07 Retroreflectivity and Illumination

### Standard:

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

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

# SECTION 2A.08 – TABLE 2A-3

**Table 2A-3. Minimum Maintained Retroreflectivity Levels<sup>1</sup>**

Sign Color	Sheeting Type (ASTM D4956-04)				Additional Criteria
	Beaded Sheeting			Prismatic Sheeting	
	I	II	III	III, IV, VI, VII, VIII, IX, X	
White on Green	W*; G ≥ 7	W*; G ≥ 15	W*; G ≥ 25	W ≥ 250; G ≥ 25	Overhead
	W*; G ≥ 7	W ≥ 120; G ≥ 15			Post-mounted
Black on Yellow or Black on Orange	Y*; O*	Y ≥ 50; O ≥ 50			2
	Y*; O*	Y ≥ 75; O ≥ 75			3
White on Red	W ≥ 35; R ≥ 7				4
Black on White	W ≥ 50				–
<sup>1</sup> The minimum maintained retroreflectivity levels shown in this table are in units of cd/lx/m <sup>2</sup> measured at an observation angle of 0.2° and an entrance angle of -4.0°.					
<sup>2</sup> For text and fine symbol signs measuring at least 48 inches and for all sizes of bold symbol signs					
<sup>3</sup> For text and fine symbol signs measuring less than 48 inches					
<sup>4</sup> Minimum sign contrast ratio ≥ 3:1 (white retroreflectivity ÷ red retroreflectivity)					
* This sheeting type shall not be used for this color for this application.					
<b>Bold Symbol Signs</b>					
<ul style="list-style-type: none"> <li>• W1-1,2 – Turn and Curve</li> <li>• W1-3,4 – Reverse Turn and Curve</li> <li>• W1-5 – Winding Road</li> <li>• W1-6,7 – Large Arrow</li> <li>• W1-8 – Chevron</li> <li>• W1-10 – Intersection in Curve</li> <li>• W1-11 – Hairpin Curve</li> <li>• W1-15 – 270 Degree Loop</li> <li>• W2-1 – Cross Road</li> <li>• W2-2,3 – Side Road</li> <li>• W2-4,5 – T and Y Intersection</li> <li>• W2-6 – Circular Intersection</li> <li>• W2-7,8 – Double Side Roads</li> </ul>		<ul style="list-style-type: none"> <li>• W3-1 – Stop Ahead</li> <li>• W3-2 – Yield Ahead</li> <li>• W3-3 – Signal Ahead</li> <li>• W4-1 – Merge</li> <li>• W4-2 – Lane Ends</li> <li>• W4-3 – Added Lane</li> <li>• W4-5 – Entering Roadway Merge</li> <li>• W4-6 – Entering Roadway Added Lane</li> <li>• W6-1,2 – Divided Highway Begins and Ends</li> <li>• W6-3 – Two-Way Traffic</li> <li>• W10-1,2,3,4,11,12 – Grade Crossing Advance Warning</li> </ul>		<ul style="list-style-type: none"> <li>• W11-2 – Pedestrian Crossing</li> <li>• W11-3,4,16-22 – Large Animals</li> <li>• W11-5 – Farm Equipment</li> <li>• W11-6 – Snowmobile Crossing</li> <li>• W11-7 – Equestrian Crossing</li> <li>• W11-8 – Fire Station</li> <li>• W11-10 – Truck Crossing</li> <li>• W12-1 – Double Arrow</li> <li>• W16-5P,6P,7P – Pointing Arrow Plaques</li> <li>• W20-7 – Flagger</li> <li>• W21-1 – Worker</li> </ul>	
<b>Fine Symbol Signs</b> (symbol signs not listed as bold symbol signs)					
<b>Special Cases</b>					
<ul style="list-style-type: none"> <li>• W3-1 – Stop Ahead: Red retroreflectivity ≥ 7</li> <li>• W3-2 – Yield Ahead: Red retroreflectivity ≥ 7; White retroreflectivity ≥ 35</li> <li>• W3-3 – Signal Ahead: Red retroreflectivity ≥ 7; Green retroreflectivity ≥ 7</li> <li>• W3-5 – Speed Reduction: White retroreflectivity ≥ 50</li> <li>• For non-diamond shaped signs, such as W14-3 (No Passing Zone), W4-4P (Cross Traffic Does Not Stop), or W13-1P,2,3,6,7 (Speed Advisory Plaques), use the largest sign dimension to determine the proper minimum retroreflectivity level.</li> </ul>					

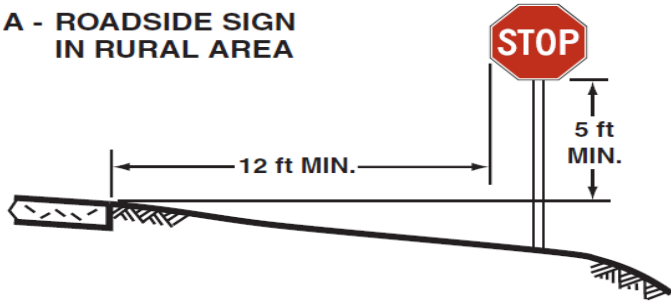
# RETROREFLECTOMETERS

- ❑ SDDDT -- Possibly Has Meters Available.
  - Contact Laurie Schultz 605-773-4759

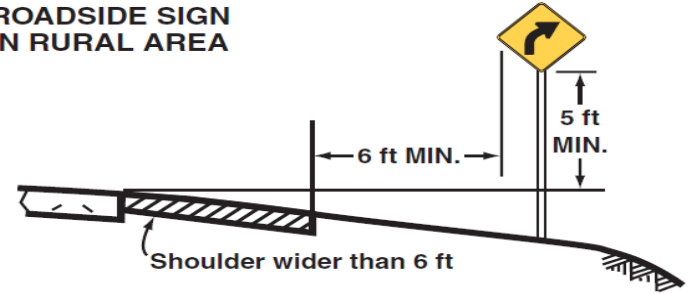
# HEIGHT & LATERAL PLACEMENT

Figure 2A-2. Examples of Heights and Lateral Locations of Sign Installations

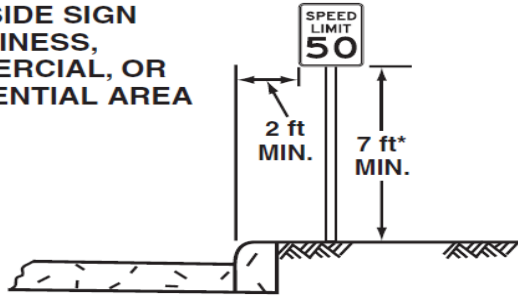
A - ROADSIDE SIGN  
IN RURAL AREA



B - ROADSIDE SIGN  
IN RURAL AREA

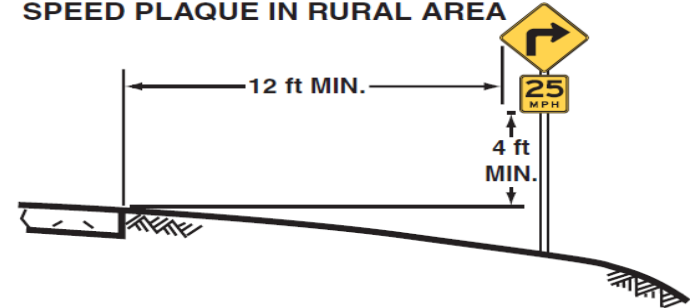


C - ROADSIDE SIGN  
IN BUSINESS,  
COMMERCIAL, OR  
RESIDENTIAL AREA

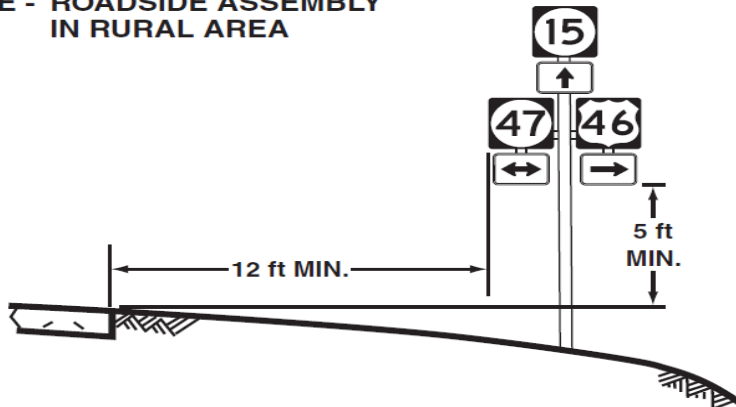


\*Where parking or pedestrian movements are likely to occur

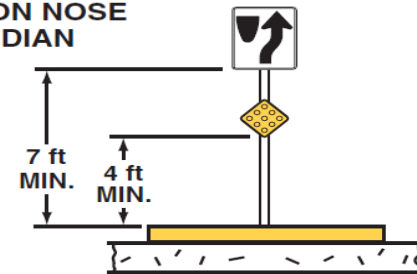
D - WARNING SIGN WITH ADVISORY  
SPEED PLAQUE IN RURAL AREA



E - ROADSIDE ASSEMBLY  
IN RURAL AREA



F - SIGN ON NOSE  
OF MEDIAN

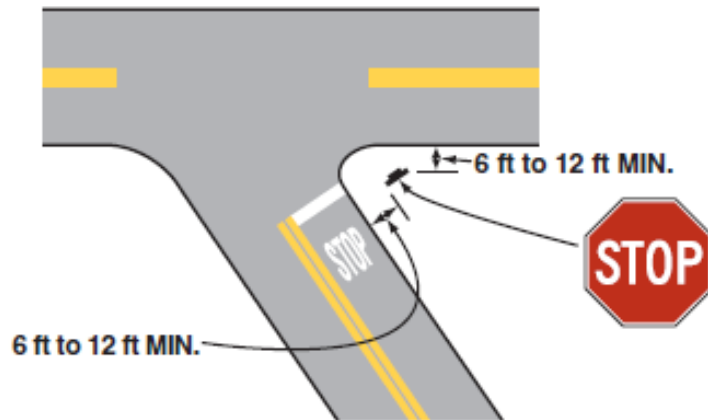


H - OVERHEAD SIGN

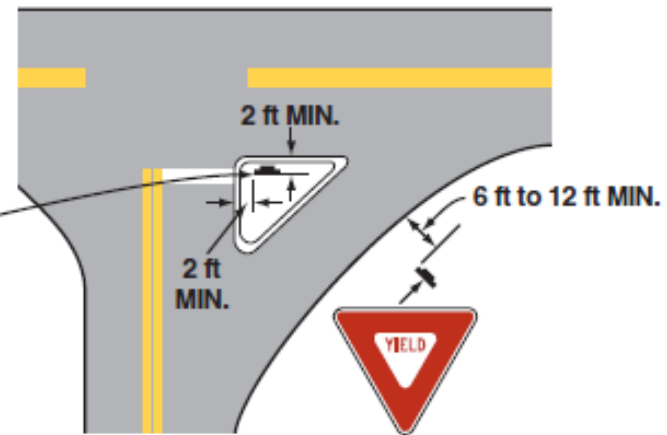
# HEIGHT REQUIREMENT

- Seven foot from ground to top of sign.
  - Usually obtained by going down in in slope.
  - Crash test indicates sign will go over top of vehicle.

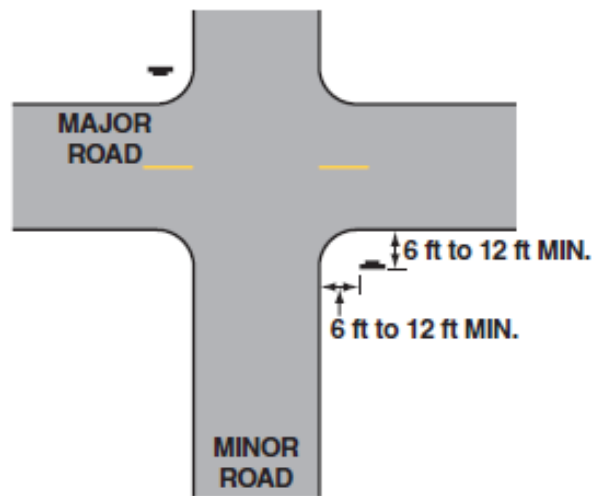
Figure 2A-3. Examples of Locations for Some Typical Signs at Intersections



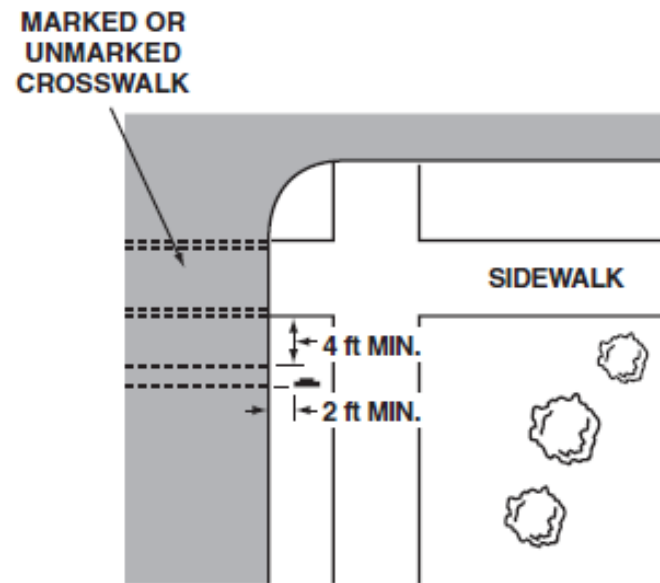
A - ACUTE ANGLE INTERSECTION



B - CHANNELIZED INTERSECTION

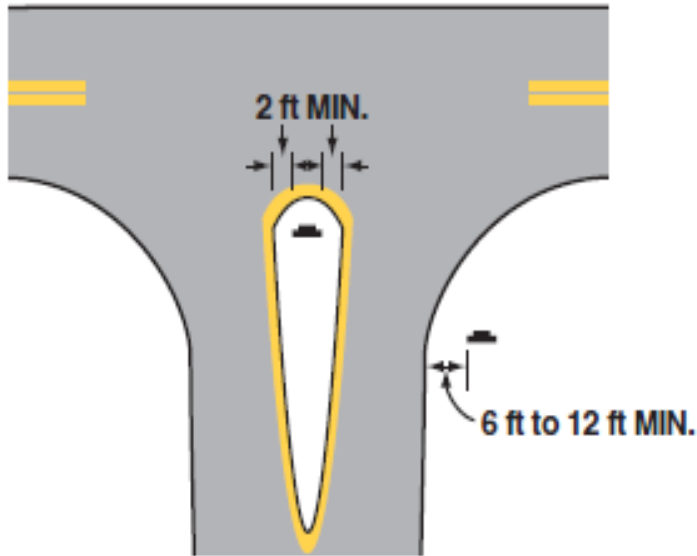


C - MINOR CROSSROAD

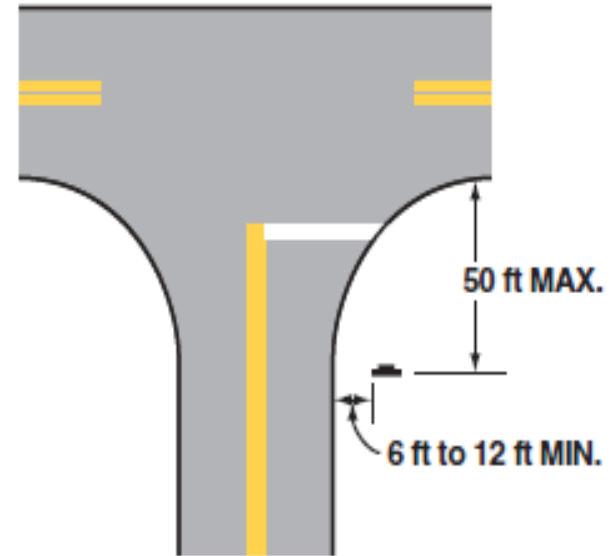


D - URBAN INTERSECTION

# FIGURE 2A-3 (Con't)



**E - DIVISIONAL ISLAND**



**F - WIDE THROAT INTERSECTION**

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 2B-1. STOP and YIELD Signs and Plaques



R1-1

December 2009



R1-3P



R1-2

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

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.

# STOP SIGN WARRANTS

- **Section 2B.06 STOP Sign Applications**

*Guidance:*

- 01 *At intersections where a full stop is not necessary at all times, consideration should first be given to using less restrictive measures such as YIELD signs (see Sections 2B.08 and 2B.09).*
- 02 *The use of STOP signs on the minor-street approaches should be considered if engineering judgment indicates that a stop is always required because of one or more of the following conditions:*
  - A. *The vehicular traffic volumes on the through street or highway exceed 6,000 vehicles per day;*
  - B. *A restricted view exists that requires road users to stop in order to adequately observe conflicting traffic on the through street or highway; and/or*

# STOP SIGN WARRANTS

*C. Crash records indicate that three or more crashes that are susceptible to correction by the installation of a STOP sign have been reported within a 12-month period, or that five or more such crashes have been reported within a 2-year period. Such crashes include right-angle collisions involving road users on the minor-street approach failing to yield the right-of-way to traffic on the through street or highway.*

Support:

03 The use of STOP signs at grade crossings is described in Sections 8B.04 and 8B.05.

# STOP SIGN WARRANTS

## Section 2B.07 Multi-Way Stop Applications

Support:

- 01 Multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multi-way stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multi-way stop control is used where the volume of traffic on the intersecting roads is approximately equal.
- 02 The restrictions on the use of STOP signs described in Section 2B.04 also apply to multi-way stop applications.

*Guidance:*

- 03 *The decision to install multi-way stop control should be based on an engineering study.*
- 04 *The following criteria should be considered in the engineering study for a multi-way STOP sign installation:*
- A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.*
  - B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.*

# STOP SIGN WARRANTS

- **Section 2B.07 Multi-Way Stop Applications (Con't)**

*C. Minimum volumes:*

*1. The vehicular volume entering the intersection from the major street approaches (total of both*

*approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and*

*2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but*

*3. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.*

*D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.*

# Stop Sign Warrants

- **Section 2B.07 Multi-Way Stop Applications (Con't)**

- Option:

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

A. The need to control left-turn conflicts;

B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and

D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

# WARNING SIGNS

Figure 2C-1. Horizontal Alignment Signs and Plaques



W1-1



W1-1a



W1-2



W1-2a



W1-3



W1-4



W1-5



W1-6



W1-8



W1-10



W1-10a



W1-10b



W1-10c



W1-10d



W1-10e



W1-11



W1-13



W1-15



W13-1P



W13-2



W13-3



W13-6



W13-7

Note: Turn arrows and reverse turn arrows may be substituted for the curve arrows and reverse curve arrows on the W1-10 series signs where appropriate.

# WARNING SIGN PLACEMENT

**Table 2C-4. Guidelines for Advance Placement of Warning Signs**

Posted or 85th-Percentile Speed	Advance Placement Distance <sup>1</sup>								
	Condition A: Speed reduction and lane changing in heavy traffic <sup>2</sup>	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0 <sup>3</sup>	10 <sup>4</sup>	20 <sup>4</sup>	30 <sup>4</sup>	40 <sup>4</sup>	50 <sup>4</sup>	60 <sup>4</sup>	70 <sup>4</sup>
20 mph	225 ft	100 ft <sup>6</sup>	N/A <sup>5</sup>	—	—	—	—	—	—
25 mph	325 ft	100 ft <sup>6</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	—	—	—	—	—
30 mph	460 ft	100 ft <sup>6</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	—	—	—	—	—
35 mph	565 ft	100 ft <sup>6</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	—	—	—	—
40 mph	670 ft	125 ft	100 ft <sup>6</sup>	100 ft <sup>6</sup>	N/A <sup>5</sup>	—	—	—	—
45 mph	775 ft	175 ft	125 ft	100 ft <sup>6</sup>	100 ft <sup>6</sup>	N/A <sup>5</sup>	—	—	—
50 mph	885 ft	250 ft	200 ft	175 ft	125 ft	100 ft <sup>6</sup>	—	—	—
55 mph	990 ft	325 ft	275 ft	225 ft	200 ft	125 ft	N/A <sup>5</sup>	—	—
60 mph	1,100 ft	400 ft	350 ft	325 ft	275 ft	200 ft	100 ft <sup>6</sup>	—	—
65 mph	1,200 ft	475 ft	450 ft	400 ft	350 ft	275 ft	200 ft	100 ft <sup>6</sup>	—
70 mph	1,250 ft	550 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	—
75 mph	1,350 ft	650 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft <sup>6</sup>

<sup>1</sup> The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is appropriate for an alignment warning symbol sign. For Conditions A and B, warning signs with less than 6-inch legend or more than four words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.

<sup>2</sup> Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2005 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.

<sup>3</sup> Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2005 AASHTO Policy, Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second<sup>2</sup>, minus the sign legibility distance of 180 feet.

<sup>4</sup> Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second<sup>2</sup>, minus the sign legibility distance of 250 feet.

<sup>5</sup> No suggested distances are provided for these speeds, as the placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other signs.

<sup>6</sup> The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

**Table 2C-5. Horizontal Alignment Sign Selection**

Type of Horizontal Alignment Sign	Difference Between Speed Limit and Advisory Speed				
	5 mph	10 mph	15 mph	20 mph	25 mph or more
Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W10-1) (see Section 2C.07 to determine which sign to use)	Recommended	Required	Required	Required	Required
Advisory Speed Plaque (W13-1P)	Recommended	Required	Required	Required	Required
Chevrons (W1-8) and/or One Direction Large Arrow (W1-6)	Optional	Recommended	Required	Required	Required
Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp	Optional	Optional	Recommended	Required	Required

Note: Required means that the sign and/or plaque shall be used, recommended means that the sign and/or plaque should be used, and optional means that the sign and/or plaque may be used.

See Section 2C.06 for roadways with less than 1,000 ADT.

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

<b>Advisory Speed</b>	<b>Curve Radius</b>	<b>Sign Spacing</b>
15 mph or less	Less than 200 feet	40 feet
20 to 30 mph	200 to 400 feet	80 feet
35 to 45 mph	401 to 700 feet	120 feet
50 to 60 mph	701 to 1,250 feet	160 feet
More than 60 mph	More than 1,250 feet	200 feet

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

# SPEED LIMIT SIGNS

□ 32-25-9.2. Township road speed limit. Unless otherwise provided pursuant to § 32-25-9.1, no person may drive a vehicle on a township road in excess of fifty-five miles per hour. Driving in excess of the speed limit established in this section is a Class 2 misdemeanor.

□ Resolution Needed To Post Other Than 55 MPH

# SPEED LIMIT SIGNS



R2-1

# MINIMUM MAINTENANCE

- 31-13-1.1. Designation of minimum maintenance road--  
Level of maintenance. The board of township supervisors may designate a secondary road within the township as a minimum maintenance road if the board determines that the road or a segment of the road is used only occasionally or intermittently for passenger and commercial travel. The board shall identify the beginning and end points of the road designated as minimum maintenance. A minimum maintenance road may be maintained at a level less than the minimum standards for full maintenance roads, but shall be maintained at the level required to serve the occasional or intermittent traffic.

# MINIMUM MAINTENANCE

- ❑ 31-13-1.2. Posting of warning signs on minimum maintenance roads. The board of township supervisors shall post signs on a minimum maintenance road to notify the motoring public that it is a minimum maintenance road and that the public travels on the road at its own risk. The signs shall be posted at the entry points to and at regular intervals along a minimum maintenance road. A properly posted sign shall be prima facie evidence that adequate notice of a minimum maintenance road has been given to the motoring public.

# NO MAINTENANCE ??????

- 31-13-1. Township supervisors responsible for secondary roads. The board of township supervisors shall construct, repair, and maintain all of the secondary roads within the township. The board shall, at its annual meeting, designate which secondary roads are full maintenance roads and which are minimum maintenance roads. The board of township supervisors shall publish any resolution designating a secondary road as minimum maintenance if such road is a school route. The designation shall be final, after a lapse of thirty days, unless appealed as provided in chapter 31-3.



**MINIMUM  
MAINTENANCE**

**TRAVEL AT YOUR  
OWN RISK**

# QUESTIONS