Table 2C-1. Warning Sign and Plaque Sizes (Sheet 1 of 4)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Horizontal Alignment	W1-1,2,3,4,5	2C.07	30 x 30*	36 x 36	36 x 36	36 x 36	—	48 x 48
One-Direction Large Arrow	W1-6	2C.10	48 x 24	48 x 24	60 x 30	60 x 30	—	60 x 30
Two-Direction Large Arrow	W1-7	2C.43	48 x 24	48 x 24	—	—	—	60 x 30
Chevron Alignment	W1-8	2C.08	18 x 24	18 x 24	30 x 36	36 x 48	—	24 x 30
Combination Horizontal Alignment/Intersection	W1-10,10a,10b, 10c,10d,10e	2C.09	36 x 36	36 x 36	36 x 36	48 x 48	—	—
Hairpin Curve	W1-11	2C.07	30 x 30	30 x 30	36 x 36	48 x 48	—	48 x 48
Truck Rollover	W1-13	2C.11	36 x 36	36 x 36	36 x 36	48 x 48	—	48 x 48
270-degree Curve	W1-15	2C.07	30 x 30	30 x 30	36 x 36	48 x 48	—	48 x 48
Intersection Warning	W2-1,2,3,3a, 4,5,6,7,8	2C.41	30 x 30	30 x 30	36 x 36	—	24 x 24	48 x 48
Traffic Entering When Flashing	W2-10	2C.42	36 x 36	36 x 36	48 x 48	—	—	—
Traffic Approaching When Flashing	W2-11	2C.42	36 x 36	36 x 36	48 x 48	—	—	—
Stop, Yield, Signal Ahead	W3-1,2,3	2C.35	30 x 30	30 x 30	48 x 48	48 x 48	30 x 30	—
Be Prepared to Stop	W3-4	2C.35	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30	—
Reduced Speed Limit Ahead	W3-5	2C.40	36 x 36	36 x 36	48 x 48	48 x 48	—	—
XX MPH Speed Zone Ahead	W3-5a	2C.40	36 x 36	36 x 36	48 x 48	48 x 48	—	—
Variable Speed Zone Ahead	W3-5b	2C.40	36 x 36	36 x 36	48 x 48	48 x 48	—	—
XX MPH Truck Speed Zone Ahead	W3-5c	2C.40	36 x 36	36 x 36	48 x 48	48 x 48	—	—
Draw Bridge	W3-6	2C.36	36 x 36	36 x 36	48 x 48	—	—	60 x 60
Ramp Meter Ahead	W3-7	2C.37	36 x 36	36 x 36	—	—	—	—
Ramp Metered When Flashing	W3-8	2C.37	36 x 36	36 x 36	—	—	—	—
Merge	W4-1	2C.45	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30*	—
Lane Ends	W4-2	2C.47	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30*	—
Added Lane	W4-3	2C.46	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30*	—
Cross Traffic Does Not Stop (plaque)	W4-4P	2C.66	24 x 12	24 x 12	36 x 18	—	—	48 x 24
Traffic From Left (Right) Does Not Stop (plaque)	W4-4aP	2C.66	24 x 12	24 x 12	36 x 18	—	—	48 x 24
Oncoming Traffic Does Not Stop (plaque)	W4-4bP	2C.66	24 x 12	24 x 12	36 x 18	—	—	48 x 24
Entering Roadway Merge	W4-5	2C.45	36 x 36	36 x 36	48 x 48	48 x 48	—	—
No Merge Area (plaque)	W4-5aP	2C.45	18 x 24	18 x 24	24 x 30	24 x 30	—	—
Entering Roadway Added Lane	W4-6	2C.46	36 x 36	36 x 36	48 x 48	48 x 48	—	—
Heavy Merge from Right (Left)	W4-7	2C.49	36 x 36	36 x 36	48 x 48	48 x 48	—	
Single Lane Transition	W4-8	2C.48	36 x 36	36 x 36	36 x 36	48 x 48	—	48 x 48
Road Narrows	W5-1	2C.17	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30*	—
Narrow Bridge	W5-2	2C.18	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30*	—
Narrow Underpass	W5-2a	2C.18	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30*	
One Lane Bridge	W5-3	2C.19	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30*	—
One Lane Underpass	W5-3a	2C.19	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30*	
Divided Highway	W6-1	2C.20	36 x 36	36 x 36	48 x 48	48 x 48	—	—
Divided Highway Ends	W6-2	2C.21	36 x 36	36 x 36	48 x 48	48 x 48	—	—
Two-Way Traffic	W6-3	2C.51	36 x 36	36 x 36	48 x 48	48 x 48	—	—
Two-Way Traffic (3-Lane)	W6-5	2C.52	36 x 36	36 x 36	48 x 48	—	—	—
Two-Way Traffic (3-Lane)	W6-5a	2C.52	36 x 36	36 x 36	48 x 48	—	—	—
Hill	W7-1	2C.14	30 x 30*	36 x 36	36 x 36	36 x 36	24 x 24*	48 x 48
Hill with Grade	W7-1a	2C.14	30 x 30*	36 x 36	36 x 36	36 x 36	24 x 24*	48 x 48

Table 2C-1. Warning Sign and Plaque Sizes (Sheet 4 of 4)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Traffic Circle (plaque)	W16-12P	2C.41	24 x 18	24 x 18	—	—	—	—
Roundabout (plaque)	W16-12aP	2C.41	24 x 12	24 x 12	—	—	—	—
When Flashing (plaque)	W16-13P	2C.55	24 x 18	24 x 18	—	—	—	—
New (plaque)	W16-15P	2C.60	24 x 12	24 x 12	—	—	—	—
Notice (plaque)	W16-18P	2A.11	24 x 12	24 x 12	—	—	—	—
Except Bicycles (plaque)	W16-20P	2C.68	24 x 12	24 x 12	—	—	—	—
Speed Hump	W17-1	2C.27	30 x 30*	36 x 36	—	—	24 x 24*	48 x 48
No Traffic Signs	W18-1	2C.33	30 x 30*	36 x 36	—	—	24 x 24*	36 x 36
Freeway Ends XX Miles	W19-1	2C.22	—	—	—	144 x 48	—	—
Expressway Ends XX Miles	W19-2	2C.22	—	—	144 x 48	—	—	—
Freeway Ends	W19-3	2C.22	—	—	—	48 x 48	—	—
Expressway Ends	W19-4	2C.22	—	—	48 x 48	—	—	—
All Traffic Must Exit	W19-5	2C.22	—	—	90 x 48	90 x 48	—	—
New Traffic Pattern Ahead	W23-2	2C.38	36 x 36	36 x 36	—	—	—	—
New Signal Operation Ahead	W23-2a	2C.38	36 x 36	36 x 36	48 x 48	48 x 48	—	—
Oncoming Traffic Has (May Have) Extended Green	W25-1,2	2C.44	24 x 30	24 x 30	—	—	—	—
Watch for Stopped Traffic	W26-1	2C.39	36 x 36	36 x 36	48 x 48	48 x 48	—	—

* The minimum size required for diamond-shaped warning signs facing traffic on multi-lane conventional roads shall be 36 x 36 per Section 2C.03

Notes:

1. Larger signs may be used when appropriate
2. Dimensions are shown as width x height, in inches

04 **The minimum size for supplemental warning plaques that are not included in Table 2C-1 shall be as shown in Table 2C-2.**

Option:

05 If a diamond-shaped warning sign is placed on the left-hand side of a multi-lane roadway to supplement the installation of the same warning sign on the right-hand side of the roadway, the minimum size identified in the Single Lane column in Table 2C-1 may be used.

06 Signs and plaques larger than those shown in Tables 2C-1 and 2C-2 may be used (see Section 2A.11).

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

Size of Warning Sign	Size of Supplemental Plaque			
	Rectangular			Square
	1 Line	2 Lines	Arrow	
24 x 24	24 x 12	24 x 18	21 x 15	18 x 18
30 x 30				
36 x 36	30 x 18	30 x 24	30 x 21	24 x 24
48 x 48				

Notes:

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

Guidance:

07 *The minimum size for all diamond-shaped warning signs facing traffic on exit and entrance ramps at major interchanges connecting an Expressway or Freeway with an Expressway or Freeway (see Section 2E.11) should be the size identified in Table 2C-1 for the mainline roadway classification (Expressway or Freeway). If a minimum size is not provided in the Freeway column, the Expressway size should be used. If a minimum size is not provided in the Freeway or the Expressway column, the Oversized size should be used.*

08 *The minimum size for all diamond-shaped warning signs facing traffic on exit and entrance ramps at all other interchanges (see Section 2E.11) should be 36 x 36 inches.*

09 *The typical size of warning signs used on low-volume rural roads with operating speeds of 30 mph or less should be in accordance with the minimum column of Table 2C-1.*

Section 2C.04 Placement of Warning Signs

Support:

01 Information on the placement of warning signs is contained in Sections 2A.13 through 2A.18.

02 The time needed for detection, recognition, decision, and reaction is called the Perception-Response Time (PRT). Table 2C-3 is provided as an aid for determining warning sign location. The distances shown in Table 2C-3 can be adjusted for roadway features, other signing, and to improve visibility.

Guidance:

03 *Warning signs should be placed so that they provide an adequate PRT. The distances contained in Table 2C-3 should be applied with engineering judgment.*

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

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

Table 2C-3. Guidelines for Advance Placement of Warning Signs

Posted or 85th-Percentile Speed	Advance Placement Distance[1]									
	Condition A: Speed reduction and lane changing in heavy traffic[2]	Condition B: Deceleration to the listed advisory speed (mph) for the condition								
		0[3]	10[4]	20[4]	30[4]	40[4]	50[4]	60[4]	70[4]	80[4]
20 mph	225 ft	115 ft	N/A[5]	—	—	—	—	—	—	—
25 mph	325 ft	155 ft	N/A[5]	N/A[5]	—	—	—	—	—	—
30 mph	460 ft	200 ft	N/A[5]	N/A[5]	—	—	—	—	—	—
35 mph	565 ft	250 ft	N/A[5]	N/A[5]	N/A[5]	—	—	—	—	—
40 mph	670 ft	305 ft	100 ft[6]	100 ft[6]	N/A[5]	—	—	—	—	—
45 mph	775 ft	360 ft	125 ft	100 ft[6]	100 ft[6]	N/A[5]	—	—	—	—
50 mph	885 ft	425 ft	200 ft	175 ft	125 ft	100 ft[6]	—	—	—	—
55 mph	990 ft	495 ft	275 ft	225 ft	200 ft	125 ft	N/A5	—	—	—
60 mph	1,100 ft	570 ft	350 ft	325 ft	275 ft	200 ft	100 ft[6]	—	—	—
65 mph	1,200 ft	645 ft	450 ft	400 ft	350 ft	275 ft	200 ft	100 ft[6]	—	—
70 mph	1,250 ft	730 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	—	—
75 mph	1,350 ft	820 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft[6]	—
80 mph	1,475 ft	910 ft	725 ft	700 ft	625 ft	550 ft	450 ft	350 ft	200 ft	—
85 mph	1,600 ft	1,010 ft	825 ft	800 ft	750 ft	675 ft	575 ft	450 ft	300 ft	150 ft

[1] The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B (with the exception of the potential stop condition) 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.

[2] 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 (2018 AASHTO Policy, Table 3-3, Decision Sight Distance, Avoidance Maneuver E) and adjusted for a legibility distance of 180 feet for the appropriate sign.

[3] 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 2018 AASHTO Policy, Table 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second^2.

[4] 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^2, and adjusted for a sign legibility distance of 250 feet.

[5] 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.

[6] The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

Note: Warning signs that advise road users about conditions that are not related to a specific location, such as Deer Crossing or SOFT SHOULDER, can be installed in an appropriate location, based on engineering judgment.

02 The following list identifies treatments that might be used in advance of or within a change in horizontal alignment:

A. Horizontal alignment (Turn (W1-1), Curve (W1-2, W1-10 series, W1-11, W1-13, W1-15), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), Exit Speed (W13-2), Ramp Speed (W13-3), and Combination Horizontal Alignment (Advisory Exit or Ramp Speed W13-6 through W13-11)) signs (see Sections 2C.07, 2C.09, and 2C.12)
B. Advisory Speed (W13-1P) plaque (see Section 2C.59)
C. Chevron Alignment (W1-8) signs (see Section 2C.08)
D. Delineators (see Chapter 3G)
E. One-Direction Large Arrow (W1-6) sign (see Section 2C.10)
F. Raised Retroreflective Pavement Markers (see Sections 3B.15 through 3B.17)
G. Sign or marking conspicuity enhancements (see Section 2A.11)
H. Wide edge lines (see Section 3A.04)
I. Pavement word, symbol and arrow markings (symbol or words) (see Sections 3B.20 through 3B.22)
J. Vehicle Speed Feedback Sign (see Section 2C.13)
K. Speed reduction markings (see Section 3B.28)

03 In addition, considerations other than traffic control devices, such as improved surface friction (high friction surface treatments), pavement edge treatments, lighting improvements, increased superelevation, and rumble strips (see Chapter 3K), might be used in advance of or within a change in horizontal alignment.

Guidance:

04 *Except as provided in Section 2C.06, the selection of traffic control devices used to warn road users of a change in horizontal alignment or to provide guidance in navigating the change in horizontal alignment should be based on consideration of one or more of the following factors:*

A. The speed of traffic on the approach to the change in horizontal alignment
B. The recommended advisory speed for the change in horizontal alignment
C. The difference between the speed limit and the advisory speed, or the speed differential for the change in horizontal alignment
D. Daily traffic volumes on the roadway
E. The typical mix of vehicle types on the roadway
F. Sight distance throughout the change in horizontal alignment
G. Other types of traffic control devices that are used in advance of and within the change in horizontal alignment on the same roadway segment
H. The crash history of the change in horizontal alignment
I. The presence of driveways or intersections within the curve radius

Section 2C.06 Device Selection for Changes in Horizontal Alignment

Standard:

01 **The criteria shown in Chart A of Table 2C-4 shall be used to determine the need for devices for changes in horizontal alignment. If the use of a device or devices is indicated by Chart A of Table 2C-4, then Chart B of Table 2C-4 shall be used to specify the type(s) of devices to be used in advance of, and/or along, a horizontal curve, except as provided in Paragraphs 3, 5, and 6 of this Section. The speed differential in Chart B of Table 2C-4 shall be the difference between the horizontal curve's advisory speed and the roadway's posted speed limit, statutory speed limit, or the 85th-percentile speed on the approach to the curve.**

Support:

02 Chart A of Table 2C-4 represents existing AADT, type of roadway, and whether or not there are existing markings.

Option:

03 A One-Direction Large Arrow (W1-6) sign may be used in place of or to supplement delineators (see Chapter 3G) or Chevron Alignment (W1-8) signs when:

A. Site conditions limit the number of delineators or Chevron Alignment signs that are visible; or
B. The number of delineators or Chevron Alignment signs that can be installed within the change in horizontal alignment is less than the number determined by the spacing specified in Sections 2C.08 or 3G.04.

04 Additional or supplemental devices may be used for a change in horizontal alignment on the basis of engineering judgment.

05 Devices for changes in horizontal alignment may be omitted when the speed limit on the approach to an alignment change is 20 mph or less.

Table 2C-4. Application of Traffic Control Devices for Changes in Horizontal Alignment

A - Determination of the Need for Devices for Changes in Horizontal Alignment[1]

Roadway Type	AADT			
	Less than 1,000	1,000-2,999	3,000-3,999	Greater than 3,999
Freeways and Expressways	Required	Required	Required	Required
Arterial or Collector without Pavement Markings	Optional	Recommended	Required	Required
Arterial or Collector with Pavement Markings[2]	Optional	Recommended	Recommended	Required
All other roadways	Optional	Optional	Optional	Optional

[1] If devices are determined to be needed, the selection of the device(s) is based on Chart B below.

[2] An arterial or collector is considered to have pavement markings when either a center line, edge lines, or both are present.

B - Selection of Devices for Changes in Horizontal Alignment

Speed Differential[3]	Devices for Change in Horizontal Alignment[3]
5 mph	Pavement markings or advance horizontal alignment warning sign on paved roadways. Advance horizontal alignment warning sign on unpaved roadways.[4]
10 mph	Advance horizontal alignment warning sign
15 mph	Delineators[5] and advance horizontal alignment warning sign
20 mph or more	Chevrons[5] and advance horizontal alignment warning sign

[3] The provisions for the use of Horizontal Alignment warning signs and devices are contained in Section 2C.06. The need for devices is determined by Chart A above.

[4] A roadway is considered to have pavement markings when either a center line, edge lines, or both are present.

[5] Section 2C.06 contains information about the use of a One Direction Large Arrow (W1-6) sign in place of or to supplement delineators and chevrons.

06 Devices for changes in horizontal alignment may be omitted on urban streets with an AADT of 1,000 vehicles per day or less.

Support:

07 For purposes of selecting traffic control devices for changes in horizontal alignment, an arterial or collector is considered to have pavement markings when either a center line, edge lines, or both are present. Warrants for center lines and edge lines are provided in Sections 3B.02 and 3B.10, respectively.

Section 2C.07 Horizontal Alignment Signs (W1-1 through W1-5, W1-11, and W1-15)

Standard:

01 **If Table 2C-4 indicates that a horizontal alignment sign (see Figure 2C-1) is required, recommended, or allowed, the sign installed in advance of the curve shall be a Curve (W1-2) sign unless a different sign is recommended or allowed by the provisions of this Section.**

Guidance:

02 *A Turn (W1-1) sign should be used instead of a Curve (W1-2) sign in advance of a horizontal curve that has an advisory speed of 30 mph or less.*

03 *Where there are two changes in roadway alignment in opposite directions that are separated by a tangent distance of less than 600 feet, the Reverse Turn (W1-3) sign should be used instead of multiple Turn (W1-1) signs or the Reverse Curve (W1-4) sign should be used instead of multiple Curve (W1-2) signs.*

Support:

04 Figure 2C-2 provides examples of warning signs used for turns and curves.

Option:

05 A Winding Road (W1-5) sign may be used instead of multiple Turn (W1-1) or Curve (W1-2) signs where there are three or more changes in roadway alignment each separated by a tangent distance of less than 600 feet.

06 A NEXT XX MILES (W7-3aP) supplemental distance plaque (see Section 2C.61) may be installed below the Winding Road sign where continuous roadway curves exist for a specific distance.

07 If the curve has a change in horizontal alignment of 135 degrees or more, the Hairpin Curve (W1-11) sign may be used instead of a Turn or Curve sign.

08 If the curve has a change of direction of approximately 270 degrees, such as on a cloverleaf interchange ramp, the 270-degree Loop (W1-15) sign may be used instead of a Turn or Curve sign.

Guidance:

09 *When the Hairpin Curve sign or the 270-degree Loop sign is installed, either a One-Direction Large Arrow (W1-6) sign or Chevron Alignment (W1-8) signs should be installed on the outside of the turn or curve.*

Section 2C.08 Chevron Alignment Sign (W1-8)

Standard:

01 **The use of the Chevron Alignment (W1-8) sign (see Figures 2C-1 and 2C-2) to provide additional emphasis and guidance for a change in horizontal alignment shall be in accordance with the information shown in Table 2C-4.**

Option:

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

Standard:

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

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

Guidance:

05 *The approximate spacing of Chevron Alignment signs on the turn or curve measured from the point of curvature (PC) should be as shown in Table 2C-5.*

06 *The Chevron Alignment signs should be visible for a sufficient distance to provide the road user with adequate time to react to the change in alignment.*

Option:

07 LEDs may be used to enhance the conspicuity of Chevron Alignment signs (see Section 2A.12).

Standard:

08 **The LEDs used in the Chevron Alignment sign shall consist of yellow LEDs outlining the chevron symbol.**

Table 2C-5. Typical Spacing of Chevron Alignment Signs on Horizontal Curves

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

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

10 **Chevron Alignment signs shall not be used to mark obstructions within or adjacent to the roadway, including the beginning of guardrails or barriers, as this is the function of an object marker (see Section 2C.70).**

11 **Chevron Alignment signs directing traffic to the right shall not be used in the central island of a roundabout or a neighborhood traffic circle.**

Section 2C.09 Combination Horizontal Alignment/Intersection Signs (W1-10 Series)

Option:

01 The Turn (W1-1) sign, the Curve (W1-2) sign, and the Reverse Curve (W1-4) sign may be combined with the Cross Road (W2-1) sign or the Side Road (W2-2 or W2-3) sign to create a combination Horizontal Alignment/Intersection (W1-10 series) sign (see Figure 2C-1) that depicts the condition where an intersection occurs within or immediately adjacent to a turn or curve.

Support:

02 Section 2C.65 contains information about the use of an advance street name plaque to identify an intersecting road.

Guidance:

03 *Elements of the combination Horizontal Alignment/Intersection sign related to horizontal alignment should comply with the provisions of Section 2C.07, and elements related to intersection configuration should comply with the provisions of Section 2C.41. The symbol design should approximate the configuration of the intersecting roadway(s). No more than one Cross Road or two Side Road symbols should be displayed on any one combination Horizontal Alignment/Intersection sign.*

Standard:

04 **The use of the combination Horizontal Alignment/Intersection sign shall be in accordance with the provisions of Section 2C.07 for the appropriate Turn or Curve sign .**

Section 2C.10 One-Direction Large Arrow Sign (W1-6)

Option:

01 A One-Direction Large Arrow (W1-6) sign (see Figure 2C-1) may be used either as a supplement or alternative to Chevron Alignment signs or delineators in order to delineate a change in horizontal alignment (see Figure 2C-2).

02 A One-Direction Large Arrow (W1-6) sign may be used to supplement a Turn (W1-1) or Reverse Turn (W1-3) sign (see Figure 2C-2) to emphasize the abrupt curvature.

Standard:

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

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

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

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

Guidance:

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

Section 2C.11 Truck Rollover Sign (W1-13)

Option:

01 A Truck Rollover (W1-13) sign (see Figure 2C-1) may be used as a supplement to a horizontal alignment warning sign to warn drivers of vehicles with a high center of gravity, such as trucks, tankers, and recreational vehicles, of a curve or turn where there are:

A. Past incidents of truck rollovers at the specific location,
B. High volumes of trucks, or
C. A speed differential (see Section 2C.06) that might pose a greater risk for vehicles with high centers of gravity.

Guidance:

02 *Where engineering judgment determines the need for the installation of a Truck Rollover (W1-13) sign, it should be located downstream of the horizontal alignment warning sign in advance of the curve.*

Standard:

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

Option:

04 The Truck Rollover sign may include conspicuity enhancements, or may be a blank-out sign, activated by the detection of an approaching vehicle with a high center of gravity that is traveling in excess of the recommended speed for the condition.

Support:

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

Section 2C.59 Advisory Speed Plaque (W13-1P) and Confirmation Advisory Speed Plaque (W13-1aP)

Option:

01 The Advisory Speed (W13-1P) plaque (see Figure 2C-1) may be used to supplement an advance warning sign to indicate the advisory speed for a condition.

02 The Confirmation Advisory Speed (W13-1aP) plaque (see Figure 2C-1) may be used to supplement a One-Direction Large Arrow (W1-6) sign on the outside of a turn or curve in line with and at approximately a right angle to approaching traffic.

Standard:

03 **The use of the Advisory Speed and Confirmation Advisory Speed plaques for horizontal curves shall be in accordance with Section 2C.06 and Table 2C-6. The speed differential in Table 2C-6 shall be the difference between the advisory speed for the horizontal curve and the posted speed limit, statutory speed limit, or the 85th percentile speed on the approach to the curve. The Advisory Speed plaque shall also be used where an engineering study indicates a need to advise road users of the advisory speed for other roadway conditions.**

Table 2C-6. Use of Advisory Speed Plaque for Horizontal Alignment Changes

Speed Differential	Use of Advisory Speed Plaque (W13-1P)[1]
5 mph	Optional
10 mph	Recommended
15 mph or more	Required

[1] See Section 2C.59

04 **The speed displayed on the Advisory Speed and Confirmation Advisory Speed plaques shall be a multiple of 5 mph.**

05 **Except in emergencies or when the condition is temporary, an Advisory Speed or Confirmation Advisory Speed plaque shall not be installed until the advisory speed has been determined by an engineering study.**

06 **The Advisory Speed plaque shall only be used to supplement an advance warning sign. The Advisory Speed plaque or the Confirmation Advisory Speed plaque shall not be installed as a separate sign installation.**

Guidance:

07 *The Advisory Speed plaque, if used with a sign that is also supplemented with another plaque, such as an Advance Street Name plaque (see Section 2C.65), should be mounted immediately below the primary warning sign with any other plaque mounted below the Advisory Speed plaque.*

Standard:

08 **The Confirmation Advisory Speed plaque shall only be used to supplement a One-Direction Large Arrow (W1-6) sign (see Section 2C.10) or an Exit Gore (E5-1 series) (see Section 2E.26) sign and shall not be installed as a separate sign installation.**

09 **The advisory speed shall be determined by an engineering study that follows established engineering practices.**

Guidance:

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

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

Support:

12 Among the established engineering practices that are appropriate for the determination of the recommended advisory speed for a horizontal curve are the following:

A. Compass method
B. Safety-based method
C. Accelerometer method
D. Design equation method
E. Ball-bank method using the following criteria:
    1. 16 degrees of ball-bank for speeds of 20 mph or less
    2. 14 degrees of ball-bank for speeds of 25 to 30 mph
    3. 12 degrees of ball-bank for speeds of 35 mph and higher

13 The 16, 14, and 12 degrees of ball-bank criteria are comparable to the current AASHTO horizontal curve design guidance. Research has shown that drivers often exceed existing posted advisory curve speeds by 7 to 10 mph.

CHAPTER 3G. DELINEATORS

Section 3G.01 General

Support:

01 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 covered by snow.

02 Delineators are considered guidance devices to help road users navigate the roadway alignment, rather than warning devices.

Option:

03 Delineators may be used on long continuous sections of highway or through short stretches where there are changes in horizontal alignment.

Section 3G.02 Design

Standard:

01 **Delineators shall consist of 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. They shall be mounted on crashworthy (see definition in Section 1C.02) supports.**

02 **Retroreflective elements for delineators shall have a minimum vertical and horizontal dimension of 3 inches, or a minimum diameter dimension of 3 inches when circular.**

Support:

03 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:

04 A vertically-elongated delineator of appropriate size may be used in place of a double delineator.

Section 3G.03 Application

Standard:

01 **The color of delineators shall comply with the color of edge lines stipulated in Sections 3A.03 and 3B.09.**

02 **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 when either Condition A or Condition B is met, as follows:**

A. On tangent sections of freeways and expressways when 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. Roadside delineators are used to lead into all curves, or

B. On sections of roadways where continuous lighting is in operation between interchanges.

Option:

03 Delineators may be provided on other classes of roads.

04 A series of single delineators may be provided on the left-hand side of roadways.

05 Chevron Alignment (W1-8) signs may be used instead of or in addition to standard delineators, as provided in Section 2C.08.

Standard:

06 **Delineators on the left-hand side of a two-way roadway shall be white (see Figure 3G-1).**

Guidance:

07 *A series of single delineators should be provided on the outside of curves on interchange ramps.*

08 *Where median crossovers are provided for official or emergency use on divided highways and where these crossovers are to be marked with pavement markings, a double yellow delineator should be placed on the left-hand side of the through roadway on the far side of the crossover for each roadway.*

09 *Double or vertically-elongated delineators should be installed at approximately 100-foot intervals along acceleration and deceleration lanes.*

10 *A series of delineators should be used wherever guardrail or other longitudinal barriers are present along a roadway or ramp.*

Option:

11 Red delineators may be used on the reverse side of any delineator where it would be viewed by a road user traveling in the wrong direction on that particular ramp or roadway.

Guidance:

12 *Except as provided in Paragraph 13 of Section 3B.12, delineators of the appropriate color should be used to indicate a lane-reduction transition where either an outside or inside lane merges into an adjacent lane.*

13 *When used for lane-reduction transitions, the delineators should be installed adjacent to the lane or lanes reduced for the full length of the transition and should be so placed and spaced to show the reduction (see Section 3B.12 and Figure 3B-14).*

14 *On a highway with continuous delineation on either or both sides, delineators should be carried through transitions.*

Standard:

15 **When used on a truck escape ramp, delineators shall be red.**

Guidance:

16 *Red delineators should be placed on both sides of truck escape ramps.*

Section 3G.04 Placement and Spacing

Guidance:

01 *Except as provided in Paragraph 2 of this Section, delineators should be mounted at a height, measured vertically from the bottom of the lowest retroreflective device to the elevation of the near edge of the roadway, of approximately 4 feet.*

Option:

02 When mounted on the face of or on top of guardrails or other longitudinal barriers, delineators may be mounted at a lower elevation than the normal delineator height recommended in Paragraph 1 of this Section.

Guidance:

03 *Delineators should be placed 2 to 8 feet outside the outer edge of the shoulder, or if appropriate, in line with the roadside barrier that is 8 feet or less outside the outer edge of the shoulder.*

04 *Delineators should be placed at a constant distance from the edge of the roadway, except that where an obstruction intrudes into the space between the pavement edge and the extension of the line of the delineators, the delineators should be transitioned to be in line with or inside the innermost edge of the obstruction. If the obstruction is a guardrail or other longitudinal barrier, the delineators should be transitioned to be just behind, directly above (in line with), or on the innermost edge of the guardrail or longitudinal barrier.*

05 *Delineators should not present a vertical or horizontal clearance obstacle for pedestrians.*

06 *Delineators should be spaced 200 to 530 feet apart on mainline tangent sections. Delineators should be spaced 100 feet apart on ramp tangent sections.*

Option:

07 On a highway with continuous delineation on either or both sides, the spacing between a series of delineators may be closer.

08 When uniform spacing is interrupted by such features as driveways and intersections, delineators which would ordinarily be located within the features may be relocated in either direction for a distance not exceeding ¼ of the uniform spacing. Delineators still falling within such features may be eliminated.

09 Delineators may be transitioned in advance of a lane transition or obstruction as a guide for oncoming traffic.

Guidance:

10 *The spacing of delineators should be adjusted on approaches to and throughout horizontal curves so that several delineators are always simultaneously visible to the road user. The approximate spacing shown in Table 3G-1 should be used.*

11 *The spacing between red delineators that are placed on both sides of a truck escape ramp should not exceed 50 feet for a distance that is sufficient to identify the ramp entrance. The spacing between red delineators that are placed beyond the ramp entrance should be such that adequate guidance is provided based on the length and design of the escape ramp.*

Option:

12 When needed for special conditions, delineators of the appropriate color may be mounted in a closely-spaced manner on the face of or on top of guardrails or other longitudinal barriers to form a continuous or nearly-continuous "ribbon" of delineation.

Support:

13 Examples of delineator installations are shown in Figure 3G-1.

Table 3G-1. Approximate Spacing for Delineators on Horizontal Curves

Radius (R) of Curve	Approximate Spacing (S) on Curve
50 feet	20 feet
115 feet	25 feet
180 feet	35 feet
250 feet	40 feet
300 feet	50 feet
400 feet	55 feet
500 feet	65 feet
600 feet	70 feet
700 feet	75 feet
800 feet	80 feet
900 feet	85 feet
1,000 feet	90 feet

Notes: 1. Spacing for specific radii may be interpolated from table.
2. The minimum spacing should be 20 feet.
3. The spacing on curves should not exceed 300 feet.
4. In advance of or beyond a curve, and proceeding away from the end of the curve, the spacing of the first delineator is 2S, the second 3S, and the third 6S, but not to exceed 300 feet.
5. S refers to the delineator spacing for specific radii computed from the formula $S=3\sqrt{R-50}$.
6. The distances for S shown in the table above were rounded to the nearest 5 feet.