

Radar Speed Signs & Vehicle Speed Feedback Signs and Plaques

SIGN PLACEMENT AND DETECTION APPLICATION GUIDE



Introduction

The content provided by Carmanah Technologies in this guide is for general informational purposes only. Please consult your local or state transportation department(s) for detailed recommendations and guidelines on installations.

Proper engineering judgment should always be exercised in the selection, application, and installation of radar speed signs.

This guide illustrates the current industry recommendations for:

- Placement and detection of radar speed signs based on driver perception/reaction ranges at various speeds
- Sign legibility at various speeds and applications
- Assembly and installation options
- MUTCD guidelines for optional features and readability



References

This application guide is based on the following sources:

- AASHTO: [A Policy on Geometric Design of Highways and Streets: Chapter 3.2.3 Decision Sight Distance](#)
- NCHRP Report 613: [Guidelines for Selection of Speed Reduction Treatments at High-Speed Intersections](#)
- NCHRP Report 737: [Design Guidance for High-Speed to Low-Speed Transition Zones for Rural Highways](#)
- MUTCD 11th Ed.: https://mutcd.fhwa.dot.gov/pdfs/11th_Edition/mutcd11thedition.pdf



Placement, Detection, and Legibility



Detection Distance Guidelines

The table below suggests detection distances for a radar speed sign that give drivers sufficient time to react to the sign's message and safely self-correct their speeds (based on AASHTO's guidelines for minimum deceleration lengths).

		Desired speed (mph)					
		15	20	25	30	35	40
30	110 ft. 250 ft.	110 ft. 200 ft.	110 ft. 170 ft.	- -	- -	- -	
	360 ft.	310 ft.	280 ft.	-	-	-	
35	130 ft. 295 ft.	130 ft. 250 ft.	130 ft. 190 ft.	130 ft. 160 ft.	- -	- -	
	425 ft.	380 ft.	320 ft.	290 ft.	-	-	
40	150 ft. 350 ft.	150 ft. 310 ft.	150 ft. 255 ft.	150 ft. 220 ft.	150 ft. 190 ft.	- -	
	500 ft.	460 ft.	405 ft.	370 ft.	340 ft.	-	
45	170 ft. 450 ft.	170 ft. 385 ft.	170 ft. 345 ft.	170 ft. 305 ft.	170 ft. 255 ft.	170 ft. 225 ft.	
	620 ft.	555 ft.	515 ft.	475 ft.	425 ft.	395 ft.	
50	190 ft. 495 ft.	190 ft. 450 ft.	190 ft. 415 ft.	190 ft. 380 ft.	190 ft. 330 ft.	190 ft. 270 ft.	
	685 ft.	640 ft.	605 ft.	570 ft.	520 ft.	460 ft.	
55	210 ft. 535 ft.	210 ft. 510 ft.	210 ft. 480 ft.	210 ft. 440 ft.	210 ft. 400 ft.	210 ft. 340 ft.	
	745 ft.	720 ft.	690 ft.	650 ft.	610 ft.	550 ft.	
60	230 ft. 635 ft.	230 ft. 595 ft.	230 ft. 565 ft.	230 ft. 520 ft.	230 ft. 485 ft.	230 ft. 425 ft.	
	865 ft.	825 ft.	795 ft.	750 ft.	715 ft.	655 ft.	

Legend	
P	D

Total

P = Perception-reaction distance (ft.)

The distance traveled at the initial speed as the driver perceives the sign and decides how to react accordingly.

D = Deceleration distance (ft.)

The recommended distance for the driver to slow to the desired speed (adapted from the AASHTO Green Book's section on minimum deceleration lengths, pages 10–115).

Total = Detection distance (ft.)

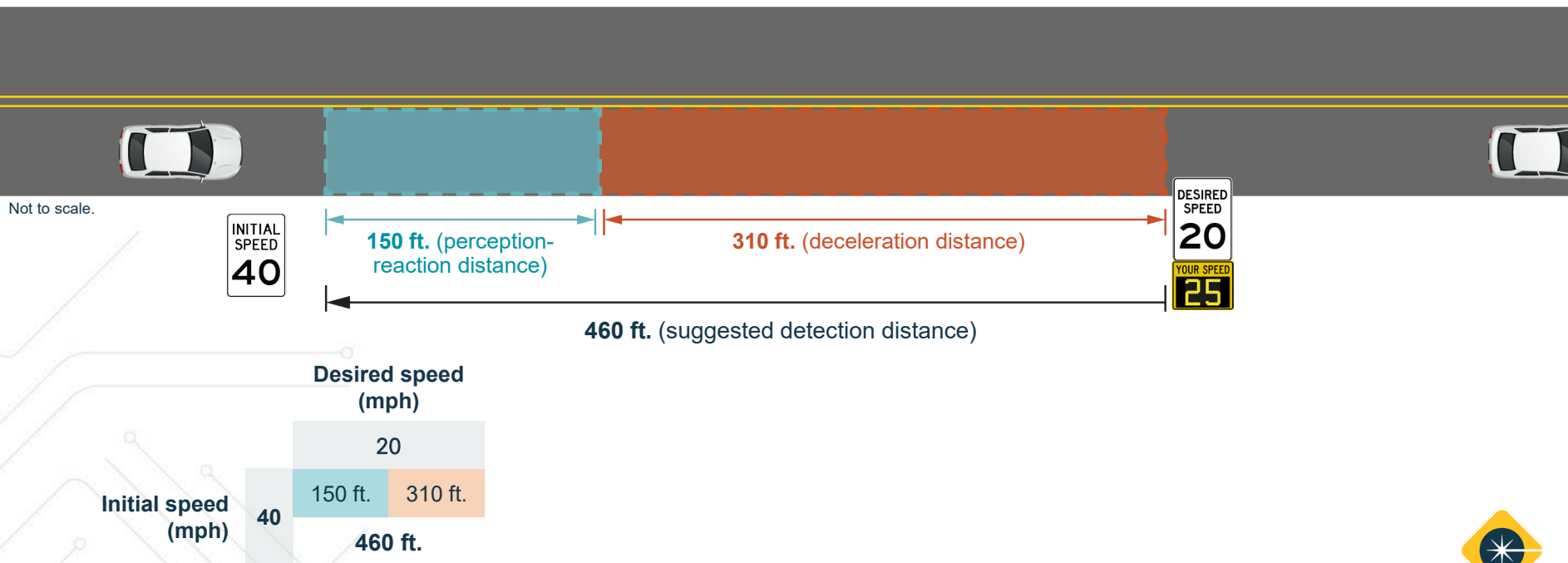
The distance at which the radar speed sign should detect a vehicle.



Detection Distance Example

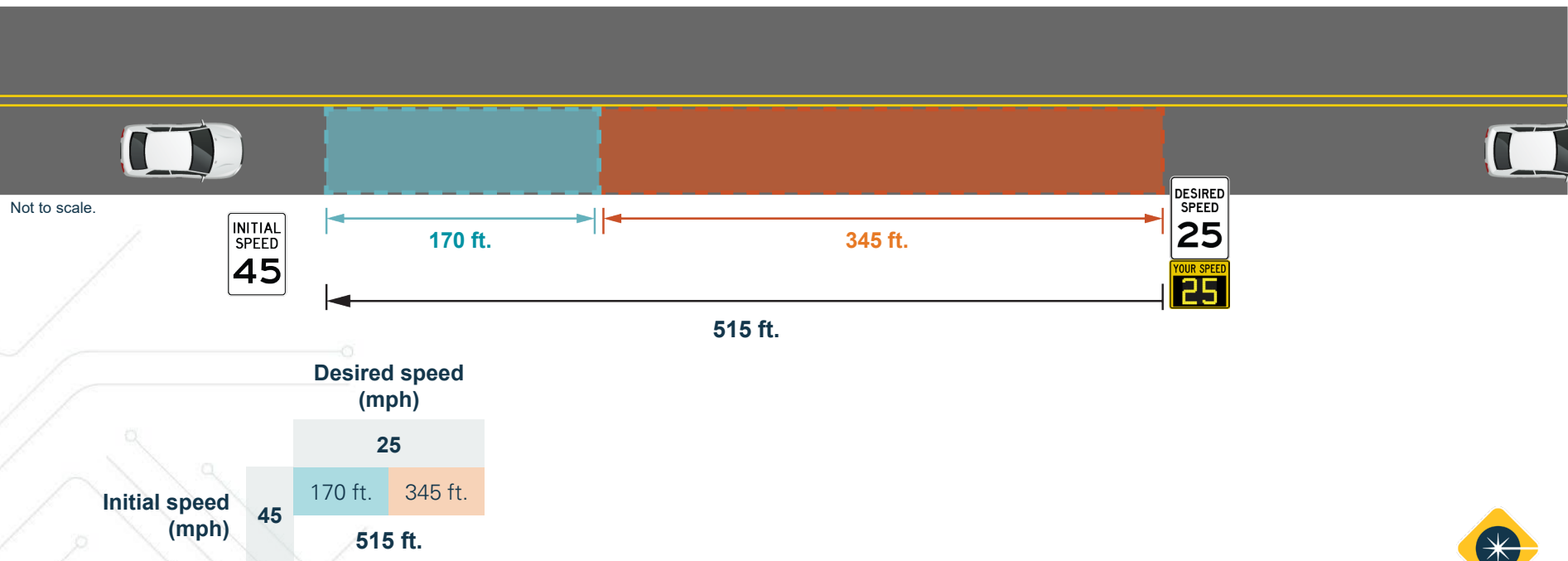
The graphic below shows the suggested perception-reaction, deceleration, and radar detection distances for an initial speed of 40 mph to a desired speed of 20 mph.

At the speeds below, the radar speed sign should be configured so that the sign detects a vehicle at approximately 460 ft. away, allowing the driver enough time to safely react.



Detection Distance – Residential

At the speeds around this residential area (45 mph before and 25 mph within the residential area), the radar speed sign should be configured so the sign detects a vehicle at approximately 515 ft. away, allowing the driver enough time to safely react.



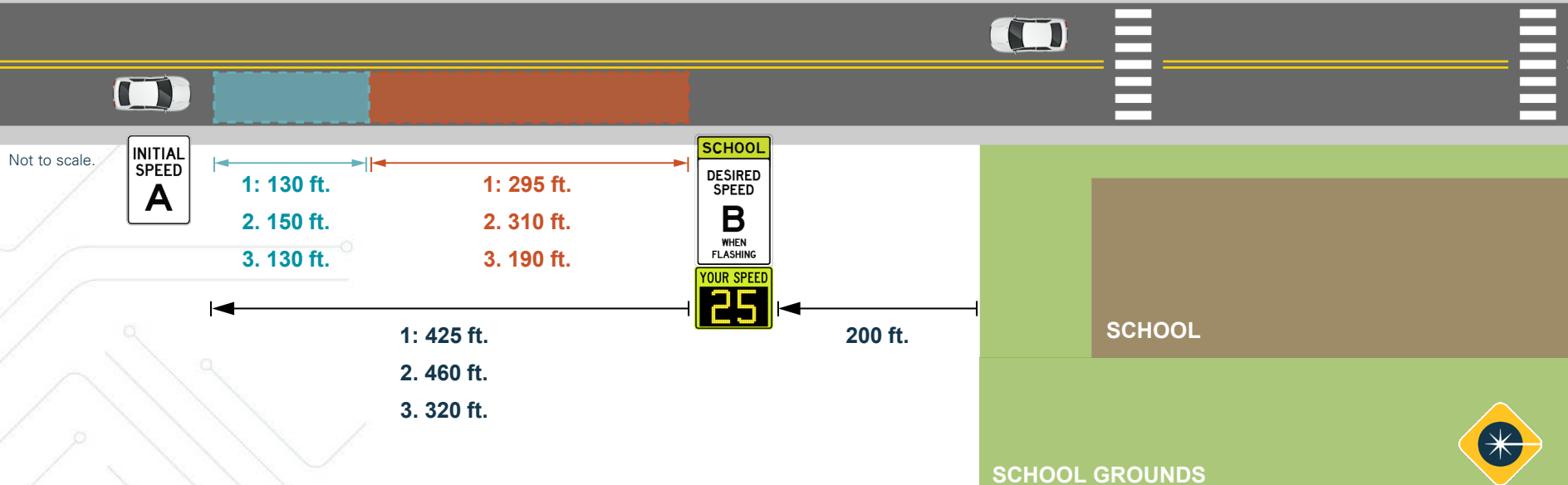
Detection Distance – School Zone

Below are three examples of common school zone speed limits and the suggested detection distance for various initial speeds.

Example #1	A (initial speed)	B (desired speed)	130 ft.	295 ft.	425 ft.
	35	15			

Example #2	A (initial speed)	B (desired speed)	150 ft.	310 ft.	460 ft.
	40	20			

Example #3	A (initial speed)	B (desired speed)	130 ft.	190 ft.	320 ft.
	35	25			



Legibility Distance Guidelines

AASHTO Green Book Chapter 3.2.3: Decision Sight Distance

Decision Sight Distance is the distance needed for a driver to detect an unexpected or otherwise difficult-to-perceive information source or condition in a roadway environment that may be visually cluttered, recognize the condition or its potential threat, select an appropriate speed and path, and initiate and complete complex maneuvers.



825 ft. for
40 mph roads

620 ft. for
30 mph roads

515 ft. for
25 mph roads



Legibility Distance

The table below summarizes AASHTO's recommendations for decision sight distances for rural, suburban, and urban roads.

Table 3-3. Decision Sight Distance

Design speed (mph)	Speed/path/direction change on a:		
	Rural road	Suburban road	Urban road
25	375 ft.	445 ft.	515 ft.
30	450 ft.	535 ft.	620 ft.
35	525 ft.	625 ft.	725 ft.
40	600 ft.	715 ft.	825 ft.
45	675 ft.	805 ft.	930 ft.
50	750 ft.	890 ft.	1030 ft.
55	825 ft.	980 ft.	1135 ft.
60	900 ft.	1070 ft.	1235 ft.

Radar Speed Sign Visibility Test

The images below are from a closed-course visibility test comparing a 12 in. radar speed sign to a 15 in. radar speed sign. From 600 ft. and at 30 mph, the 15 in. digits are more legible than the 12 in.



Installation and Usage



MUTCD Terminology

Radar speed signs, also known as driver feedback signs, radar signs, changeable message signs, or “Your Speed” signs, were referred to as Changeable Message Signs in the MUTCD 10th Ed.

UPDATE: MUTCD 11th Ed. clarifies radar speed signs as **Vehicle Speed Feedback Signs (W13-20)** and **Vehicle Speed Feedback Plaques (W13-20aP)**.

By Jan. 18, 2026, state DOTs are required to adopt the MUTCD 11th Ed. or have their own state MUTCD / supplement that is in substantial conformance with the MUTCD 11th Ed. Therefore, your jurisdiction may be using the MUTCD 10th Ed., the 11th Ed., or a local manual at this time. Both MUTCD 10th Ed. and 11th Ed. are shown in this guide for reference.



W13-20

Vehicle Speed
Feedback Sign





W13-20aP

Vehicle Speed
Feedback Plaque



MUTCD 11th Ed. – Vehicle Speed Feedback Plaque Use

Vehicle Speed Feedback Plaque may be used with a Speed Limit Sign to enhance compliance. Vehicle Speed Feedback Plaque is mounted below the Speed Limit Sign. Sign sizes depend on the roadway.


		↓ Roadway Application ↓			
		Single Lane Conventional Road	Multi-Lane Conventional Road	Expressway	Freeway
Speed Limit Sign (R2-1)		24 in. W x 30 in. H	30 in. W x 36 in. H	36 in. W x 48 in. H	48 in. W x 60 in. H
Vehicle Speed Feedback Plaque (W13-20aP)		24 in. W x 18 in. H 8 in. min. height changeable characters	30 in. W x 24 in. H 10 in. min. height changeable characters	36 in. W x 30 in. H 12 in. min. height changeable characters	48 in. W x 36 in. H 14 in. min. height changeable characters

Vehicle Speed Feedback Plaque shall not flash, strobe, change color, or use other animated elements in the changeable character display.



MUTCD 11th Ed. – Vehicle Speed Feedback Sign Use

Vehicle Speed Feedback Sign may be used to supplement a horizontal alignment warning sign advisory speed when approaching a curve. Sign sizes depend on the roadway.

		↓ Roadway Application ↓			
		Single Lane Conventional Road	Multi-Lane Conventional Road	Expressway	Freeway
Vehicle Speed Feedback Sign (W13-20)		24 in. W x 30 in. H	30 in. W x 36 in. H	36 in. W x 48 in. H	48 in. W x 60 in. H
		8 in. min. height changeable characters	10 in. min. height changeable characters	12 in. min. height changeable characters	14 in. min. height changeable characters

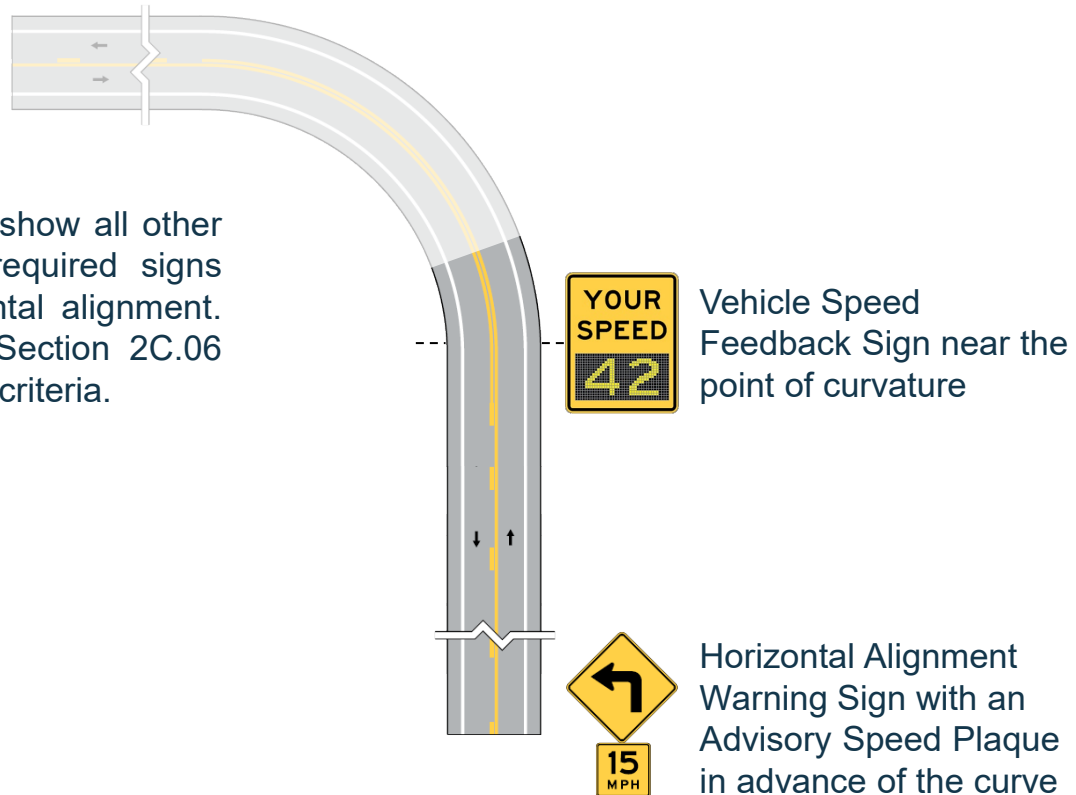
Vehicle Speed Feedback Sign shall not flash, strobe, change color, or use other animated elements in the changeable character display.



MUTCD 11th Ed. – Vehicle Speed Feedback Sign Use

Vehicle Speed Feedback Sign may be used to supplement a horizontal alignment warning sign advisory speed when approaching a curve. Vehicle Speed Feedback Sign shall be an independent installation near the point of curvature of a horizontal curve.

This example does not show all other recommended and/or required signs for a change in horizontal alignment. See MUTCD 11th Ed. Section 2C.06 for details and selection criteria.



Vehicle Speed Feedback Sign near the point of curvature




Horizontal Alignment Warning Sign with an Advisory Speed Plaque in advance of the curve



MUTCD 10th Ed. – Changeable Message Sign Use

NOTE: MUTCD 10th Ed. may no longer be the standard in your jurisdiction.

Changeable Message Sign may be used with a Speed Limit Sign to enhance compliance. Sign sizes depend on the roadway. Changeable Message Sign should be, best practice, similar size as the Speed Limit Sign.

		↓ Roadway Application ↓			
		Single Lane Conventional Road	Multi-Lane Conventional Road	Expressway	Freeway
Speed Limit Sign (R2-1)		24 in. W x 30 in. H	30 in. W x 36 in. H	36 in. W x 48 in. H	48 in. W x 60 in. H
Changeable Message Sign for speed limit <45 mph		24 in. W x 30 in. H 12 in. min. height changeable characters	30 in. W x 36 in. H 12 in. min. height changeable characters	36 in. W x 48 in. H 12 in. min. height changeable characters	48 in. W x 60 in. H 12 in. min. height changeable characters
Changeable Message Sign for speed limit ≥45 mph		24 in. W x 30 in. H 18 in. min. height changeable characters	30 in. W x 36 in. H 18 in. min. height changeable characters	36 in. W x 48 in. H 18 in. min. height changeable characters	48 in. W x 60 in. H 18 in. min. height changeable characters



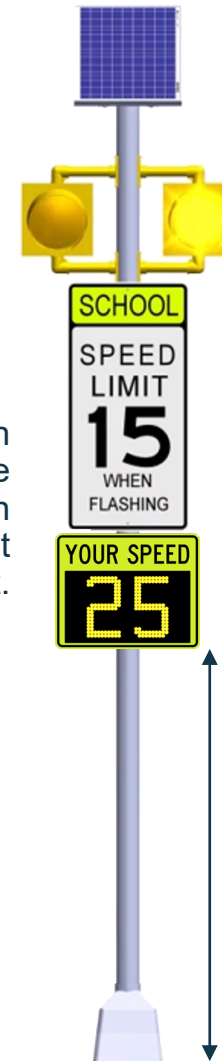
MUTCD 11th Ed. – School Zones Signs and Beacons

A Vehicle Speed Feedback Plaque (W13-20aP) can be combined with a School Speed Limit Assembly or School Speed Limit XX When Flashing Sign (S5-1) and yellow flashing beacons (Section 7B.05).

The radar speed sign calms traffic entering a school zone. The radar speed sign can also operate flashing school zone beacons that warn of the reduced speed limit.

The radar speed sign and school zone beacons can be scheduled to operate during certain dates and times. If a Vehicle Speed Feedback Plaque is used, the changeable characters should only be active during the reduced speed limit (Section 7B.05.12)

Radar speed sign supplements the conventional sign and does not substitute it.



Flashing beacons warn of the reduced speed limit in the school zone.

School Speed Limit XX
When Flashing Sign (S5-1)

Vehicle Speed
Feedback Plaque
(W13-20aP)

7 ft. min.
5 ft. min. rural areas



MUTCD 10th Ed. – School Zones Signs and Beacons

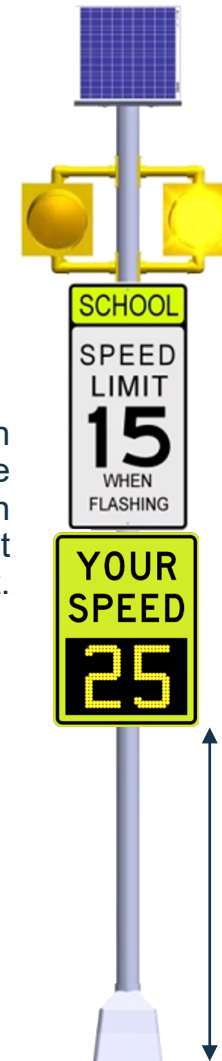
NOTE: MUTCD 10th Ed. may no longer be the standard in your jurisdiction.

A Changeable Message Sign can be combined with a School Speed Limit Assembly or School Speed Limit XX When Flashing Sign (S5-1) and yellow flashing beacons (Section 7B.15).

The radar speed sign calms traffic entering a school zone. The radar speed sign can also operate flashing school zone beacons that warn of the reduced speed limit.

The radar speed sign and school zone beacons can be scheduled to operate during certain dates and times.

Radar speed sign supplements the conventional sign and does not substitute it.



Flashing beacons warn of the reduced speed limit in the school zone.

School Speed Limit XX When Flashing Sign (S5-1)

Changeable Message Sign

7 ft. min.
5 ft. min. rural areas



Characters, Readability, and Optional Features



MUTCD 11th Ed. – Colors

YOUR SPEED shall be a black on a yellow retroreflective background. Changeable characters display the speed of the approaching vehicle and shall be yellow luminous on a black opaque background (Section 2C.13).

Exception: school warning signs shall have a fluorescent yellow-green retroreflective background (Section 7B.01).

Exception: temporary traffic control zone signs shall have an orange background (Section 6H.01).



Yellow
Background



Fluorescent Yellow-Green
Background



School Speed Limit
XX When Flashing
Sign (S5-1)



MUTCD 11th Ed. – Other Characters

Vehicle Speed Feedback Sign and Plaque shall not flash, strobe, change color, or use other animated elements in the changeable character display (Section 2C.13.04).



X Happy and/or sad faces



X Strobe lights

Check with your state/local jurisdiction to see what messaging is permitted.



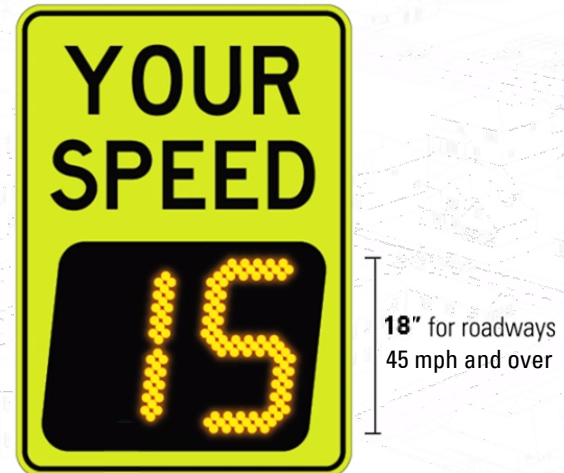
MUTCD 10th Ed. Guidelines – Changeable Character Sizes

NOTE: MUTCD 10th Ed. may no longer be the standard in your jurisdiction.

Minimum digit height for roadways less than 45 mph.



Minimum digit height for roadways 45 mph and over.



MUTCD 10th Ed. – Other Characters

NOTE: MUTCD 10th Ed. may no longer be the standard in your jurisdiction.

Changeable Message Signs shall display only traffic operational, regulatory, warning, and guidance information (Section 2L.01). Changeable message signs shall not include advertising, animation, rapid flashing, dissolving, exploding, scrolling, or other dynamic elements (Section 2L.04). Strobe lights shall not be used to enhance the conspicuity of highway signs (Section 2A.15).



X Happy and/or sad faces



X Strobe lights

Check with your state/local jurisdiction to see what messaging is permitted.



Optional Other Characters

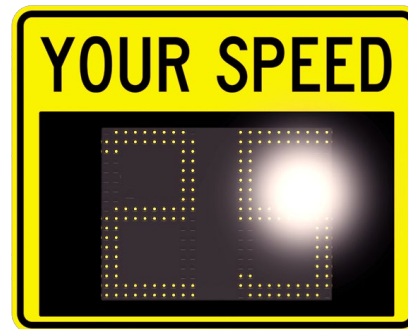
There are a wide range of changeable characters available that do not meet MUTCD standards and guidelines. These characters may be specific to a jurisdiction's local needs, have limited research and data to show them being effective, and/or deemed distracting to drivers.



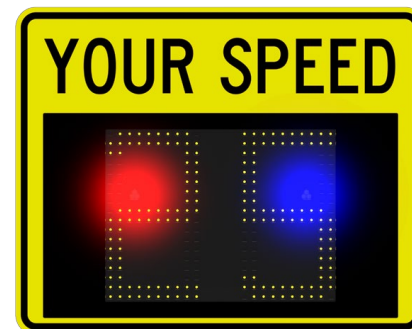
Other colors and characters



Other messages



Strobes



Police-style strobes



Changeable Characters Contrast and Readability

Select a sign with high contrast to maximize readability.

- ▶ A high-quality radar speed sign with good visibility in all lighting conditions
- ▶ An easy-to-read font with smooth, recognizable digits and letters

High contrast between black background and LEDs, **without** ghosted "88" appearing



Watch for poor LED masking leading to "ghosted" digits. This can reduce readability.

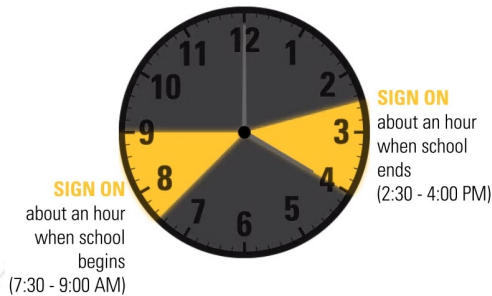


When no vehicles are approaching, the changeable characters shall be off.

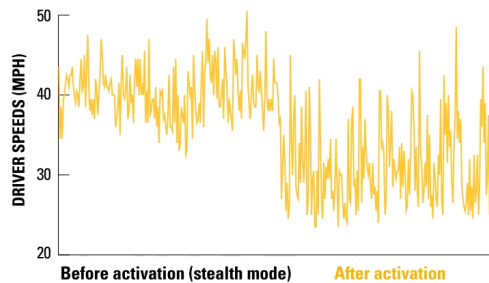


Optional Features

Scheduling function to enforce lower speeds only at certain dates and times. The rest of the time, the changeable characters can be off or operating at a higher speed limit.

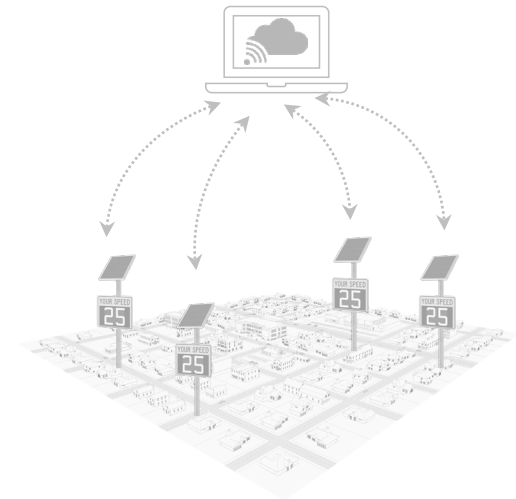


Built-in local data logging of date, time, vehicle speed, operating mode and status, faults, location, and more.



- ▶ Assess current safety measures and determine best solutions

Remote connectivity to access data log, program schedules and settings, or monitor alerts and user access.



Resources

Find more resources on our website:

carmanah.com/resources

Stay connected with us!



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