FHWA MUTCD Requirements for Radar Speed Feedback Signs

Note: these guidelines are based on the 2009 edition (with 2012 revisions) of the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD). Your state and/or local jurisdiction may have different requirements for radar speed feedback sign design and placement standards to meet their unique safety concerns.

Current MUTCD: https://mutcd.fhwa.dot.gov/htm/2009r1r2/html_index.htm

Summary Table of Letter Height

The table below summarizes the minimum LED text height and minimum static sign text height for posted speeds between 20 and 55 mph:

Posted speed	Minimum LED letter height	Minimum static letter height*
20 mph	12”	4”
25 mph	12”	4”
30 mph	12”	6”
35 mph	12”	6”
40 mph	12”	6”
45 mph	18”	6”
50 mph	18”	6”
55 mph	18”	6”

* For all major roads in urban and suburban areas between 25 and 45 mph, a minimum 4-inch letter height is not suitable—a minimum 6-inch letter height is recommended.

The table below summarizes what applications different static sign colors may be used in:

Static sign background color	Application
White	Not FHWA standard
Yellow	All
Fluorescent Yellow/Green	When installed in school zones
Orange	When being used in work zones

LED Digit Display Color

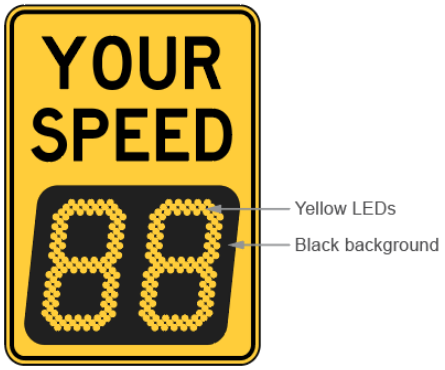
The MUTCD calls the LED digits the sign “legend,” and the backing the digits are on the sign “background.” It covers the legend and background color requirements in Table 2A-5

Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2a.htm#table2A05

The MUTCD references radar speed feedback signs in Chapter 2 when discussing speed limit signs. **It notes the digit color should be yellow on a black background.**

Section 2B.13.20

Guidance: If a changeable message sign displaying approach speeds is installed, the legend YOUR SPEED XX MPH or such similar legend should be displayed. The color of the changeable message legend should be a yellow legend on a black background or the reverse of these colors.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2b.htm#section2B13_para20



Static Sign Color

These are the MUTCD guidelines on sign type:

Section 2A.05.01

Standard: Signs shall be defined by their function as follows:
A. Regulatory signs give notice of traffic laws or regulations.
B. Warning signs give notice of a situation that might not be readily apparent.
C. Guide signs show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2a.htm#section2A05_para01

The MUTCD provides a table of common sign colors with a section for changeable message signs. Below is a condensed version showing only the changeable message sign colors:

Type of Sign	Legend Color	Background Color
Changeable Message Signs		
Regulatory	White, Red (for circle/slash/other red elements of a similar static regulatory sign only)	Black
Warning	Yellow	Black
Temporary Traffic Control	Yellow, Orange	Black
Guide	White	Black

https://mutcd.fhwa.dot.gov/htm/2009/part2/part2a.htm#table2A05

The MUTCD recommends white legends for “Regulatory” signs. It does not recommend that radar speed feedback signs have a white legend/LED color; therefore, they are not “Regulatory” signs.

Remember the MUTCD notes in Section 2B.13.20 (cited above) that radar speed feedback signs should have a “*yellow legend on a black background or the reverse of these colors.”* With reference to the table above, radar speed feedback signs fit into the “Warning” sign category. The MUTCD requires that warning signs have a black legend with a yellow background:

Section 2C.03.01

Standard: Except as provided in Paragraph 2 or unless specifically designated otherwise, all warning signs shall be diamond-shaped (square with one diagonal vertical) with a black legend and border on a yellow background.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2c.htm#section2C03_para01

The static portion of radar speed feedback signs should have a yellow background with black “YOUR SPEED” letters, and the changeable message portion should have a black background with yellow LEDs.

Specific Radar Speed Feedback Sign Mentions in the MUTCD

Radar speed feedback signs are specifically mentioned in two chapters in the MUTCD: Chapter 2B on Regulatory Signs, Barricades, and Gates, and Chapter 2L on Changeable Message Signs. **These signs are categorized as "Changeable Message Signs" within the MUTCD.** Here are the specific references to radar speed feedback signs.

Section 2B.13.19

Option: A changeable message sign that displays to approaching drivers the speed at which they are traveling may be installed in conjunction with a Speed Limit sign.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2b.htm#section2B13_para19

Section 2B.13.20

Guidance: If a changeable message sign displaying approach speeds is installed, the legend YOUR SPEED XX MPH or such similar legend should be displayed. The color of the changeable message legend should be a yellow legend on a black background or the reverse of these colors.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2b.htm#section2B13_para20

Section 2L.02.07

Support: Section 2B.13 contains information regarding the design of changeable message signs that are used to display variable speed limits that change based on ambient or operational conditions, or that display the speed at which approaching drivers are traveling.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2l.htm#section2L02_para07

LED Digit Size

The MUTCD gives specific requirements for the radar speed feedback sign letter height.

Section 2L.04.06

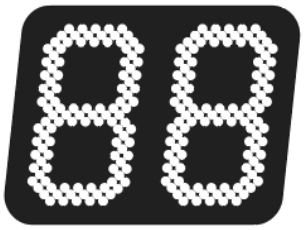
Guidance: Except as provided in Paragraph 18, word messages on changeable message signs should be composed of all upper-case letters. ***The minimum letter height should be 18 inches for changeable message signs on roadways with speed limits of 45 mph or higher. The minimum letter height should be 12 inches for changeable message signs on roadways with speed limits of less than 45 mph.***
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2l.htm#section2L04_para06

While it does not specifically mention letter width, the MUTCD notes that the width-to-height ratio of the characters must be relatively square.

Section 2L.04.06

Guidance: The width-to-height ratio of the sign characters should be between 0.7 and 1.0. The stroke width-to-height ratio should be 0.2.

Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2l.htm#section2L04_para08



Compliant width-to-height ratio of 0.7

Non-compliant width-to-height ratio of 0.4

"YOUR SPEED" Letter Height

While the MUTCD does not specifically state the letter height requirements for the static portion of radar speed feedback signs ("YOUR SPEED"), it does note general letter height requirements for other sign types.

Section 2A.13.02

Guidance: Word messages should be as brief as possible, and the lettering should be large enough to provide the necessary legibility distance. A minimum specific ratio of 1 inch of letter height per 30 feet of legibility distance should be used.

Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2a.htm#section2A13_para02

In Chapter 2's section on Guide Signs, the MUTCD advises:

Section 2D.06.03

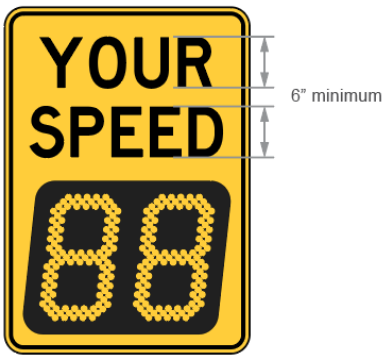
Standard: The principal legend on guide signs shall be in letters and numerals at least 6 inches in height for all upper-case letters, or a combination of 6 inches in height for upper-case letters and 4.5 inches in height for lower-case letters. On low-volume roads (as defined in Section 5A.01) with speeds of 25 mph or less, and on urban streets with speeds of 25 mph or less, the principal legend shall be in letters at least 4 inches in height for all upper-case letters, or a combination of 4 inches in height for upper-case letters and 3 inches in height for lower-case letters.

Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2d.htm#section2D06_para03

While this standard is for Guide Signs specifically, Speed Limit signs and others follow similar requirements. Most Speed Limit signs have a minimum letter height of 6 inches.

For all major roads in urban and suburban areas between 25 and 45 mph, a minimum 4-inch letter height is not suitable—a minimum 6-inch letter height is recommended.

Roads under 25 mph



Roads over 25 mph

Legibility of Radar Speed Signs

Good legibility is crucial for radar speed feedback signs. Below are the MUTCD requirements for changeable message sign legibility.

> **Section 2L.02.04**
> *Guidance: Changeable message signs used on roadways with speed limits of 55 mph or higher should be visible from 1/2 mile under both day and night conditions.* ***The message should be designed to be legible from a minimum distance of 600 feet for nighttime conditions and 800 feet for normal daylight conditions.*** *When environmental conditions that reduce visibility and legibility are present, or when the legibility distances stated in the previous sentences in this paragraph cannot be practically achieved, messages composed of fewer units of information should be used and consideration should be given to limiting the message to a single phase.*
> *Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2l.htm#section2L03_para04*

This is a good general guideline for most roads; however, depending on the street type and its speed, more or less legibility distance may be required.

The American Association of State Highway and Transportation Officials (AASHTO) publishes a manual called *A Policy on Geometric Design of Highways and Streets*. This manual is commonly referred to as the "Green Book" and is frequently cited by the MUTCD and other agencies as the standard industry guide to current highway and street design research and practices.

Chapter 3 of AASHTO's "Green Book" defines decision sight distance, a guideline for ensuring streets and their various elements have sufficient visibility for drivers at distances that give them enough time to react safely.

> **Chapter 3.2.3**
> *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*.
> *Link:* https://carmanahtraffic.com/wp-content/uploads/pdf/approvals-compliance/AASHTO-A-Policy-on-Geometric-Design-of-Highways-Chapter-3.pdf

The AASHTO manual notes that traffic signs and signals should be installed according to these sight recommendations.

> **Chapter 3.6.5**
> *Signing, marking, and signal plans should be coordinated with horizontal and vertical alignment, sight distance obstructions, operational speeds and maneuvers, and other applicable items before completion of design.*
> *Link:* https://carmanahtraffic.com/wp-content/uploads/pdf/approvals-compliance/AASHTO-A-Policy-on-Geometric-Design-of-Highways-chapter-3.6.5.pdf

The table below references the AASHTO manual's recommended decision sight distance for rural, suburban, and urban roads. While the values below are design guidelines more than they are strict requirements, particularly for radar speed feedback signs, they are based on industry best practices and should be considered when determining ideal sign placement.

Table 3-3. Decision Sight Distance

Design speed	Speed/path/direction change on:		
	Rural road	Suburban road	Urban road
15 mph	225 ft	270 ft	310 ft
20 mph	300 ft	355 ft	415 ft
25 mph	375 ft	445 ft	515 ft
30 mph	450 ft	535 ft	620 ft
35 mph	525 ft	625 ft	720 ft
40 mph	600 ft	715 ft	825 ft
45 mph	675 ft	800 ft	930 ft
50 mph	750 ft	890 ft	1030 ft

Note: Values for 15–25 mph were calculated using the equations given on page 3–8 of the AASHTO Green Book.

Installation Location

The MUTCD recommends that:

Section 2L.06.01

Guidance: A CMS that is used in place of a static sign (such as a blank-out or variable legend regulatory sign) should be located in accordance with the provisions of Chapter 2A. The following factors should be considered when installing other permanent changeable message signs:
D. Changeable message signs should not be positioned at locations where the information load on drivers is already high because of guide signs and other types of information.
E. Changeable message signs should not be located in areas where drivers frequently perform lane-changing maneuvers in response to static guide sign information, or because of merging or weaving conditions.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2l.htm#section2L06_para01

It does also state that changeable messages signs should supplement conventional signs rather than substitute them.

Section 2L.04.03

Guidance: Except in the case of a limited-legend CMS (such as a blank-out or electronic-display changeable message regulatory sign) that is used in place of a static regulatory sign or an activated blank-out warning sign that supplements a static warning sign at a separate location, changeable message signs should be used as a supplement to and not as a substitute for conventional signs and markings.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2l.htm#section2L04_para03

Some states may also recommend installing radar speed feedback signs on the same post as speed limit signs. While this is effective in most cases, there may be certain situations where installing a radar speed feedback sign on its own post separate from a speed limit sign is more effective. Keep in mind that some judgment is required to ensure the information load on drivers is not too high.

Radar speed feedback sign installed on same post as Speed Limit sign

Radar speed feedback sign installed on separate post

Flashing Strobes on Radar Speed Feedback Signs

The MUTCD notes twice that rapid flashing effects are not to be used on changeable message signs.

Section 2L.04.01

Standard: Changeable message signs shall not include advertising, animation, rapid flashing, dissolving, exploding, scrolling, or other dynamic elements.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2l.htm#section2L04_para01

Section 2L.05.05

Standard: Techniques of message display such as fading, rapid flashing, exploding, dissolving, or moving messages shall not be used. The text of the message shall not scroll or travel horizontally or vertically across the face of the sign.
Link: https://mutcd.fhwa.dot.gov/htm/2009/part2/part2l.htm#section2L05_para05

After being asked for an official interpretation of whether this applies to radar speed feedback signs, the MUTCD clarified its position:

Interpretation Letter 2(09)-79 (I) - Radar Speed Feedback Signs

*"[I]t is the FHWA's interpretation that the MUTCD **specifically prohibits the use of flashing displays and strobe light technology** on changeable message signs to include radar speed feedback signs."*
Link: https://mutcd.fhwa.dot.gov/resources/interpretations/2_09_79.htm

Other radar speed sign references are available. Click to learn more:

- **Radar Speed Signs Application Guide**
- **School Zone Safety: Radar Speed Signs (9 min. video)**