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United States Department of Agriculture

Forest Service

Technology & Development Program

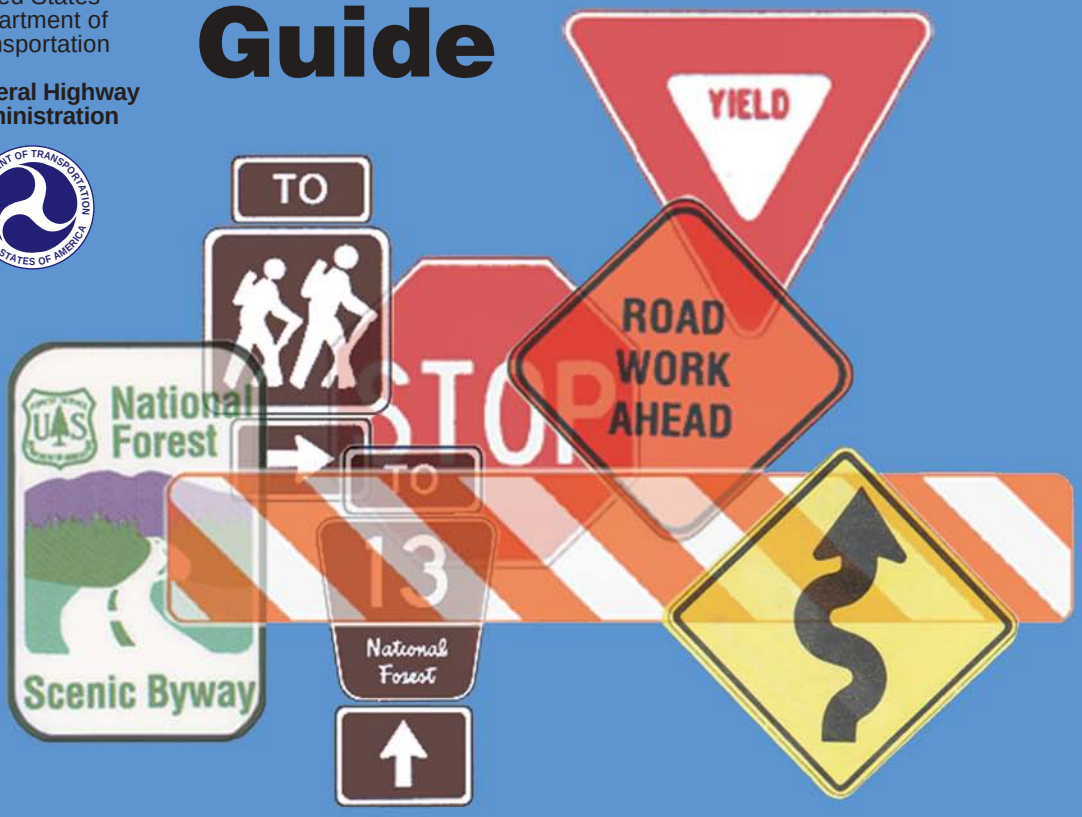
7100–Engineering
July 2003
0371-2812-MTDC

In cooperation with

United States Department of Transportation

Federal Highway Administration

Sign Installation Guide



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Thanks to:

Ted J. Cote—MTDC
James Kautz—MTDC
Cathy Satterfield—FHWA
John Bell—WO
Mike Noland—R-3
Pete Odegard—R-1

Library Card

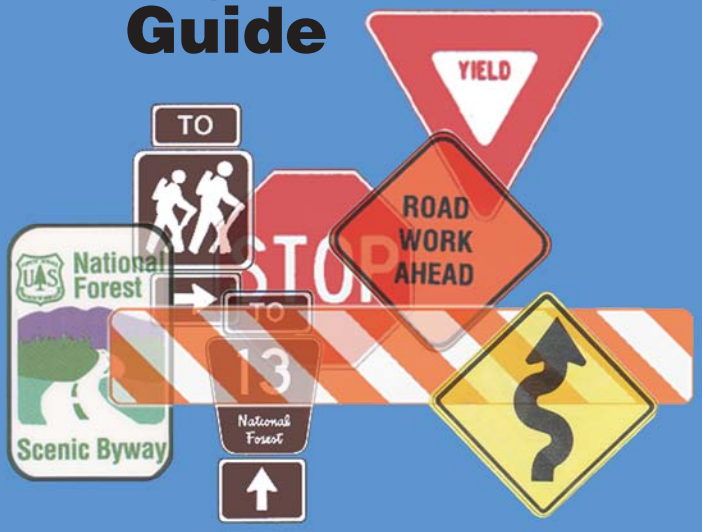
Trent, Andy; Sheehy, Donna. 2003. Sign Installation Guide. Tech. Rep. 0371-2812-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 18 p.

Includes 18 color photographs showing the specifications for placing signs along Forest Service roads. Intended to help new employees or volunteers install road signs.

Keywords: road signs, specifications, standards.

Some photographs in this manual have been digitally altered to remove distracting features.

Sign Installation Guide



Donna Sheehy
Traffic Management Engineer

Andy Trent
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Technology and Development Program
Missoula, MT

6E62H99—Sign Installation Field Guide

June 2003

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Installation Notes

Proper location, position, and erection of signs is very important. The effectiveness of a sign can be compromised if it is not installed correctly. A sign that is confusing, or one that a driver cannot see in time, is useless. This guide contains information needed to install traffic control signs on National Forest System Roads (NFSR) in accordance with the *Manual of Uniform Traffic Control Devices* (MUTCD) and EM-7100-15, *Sign and Poster Guidelines for the Forest Service*. It provides a quick visual reference to field personnel placing and maintaining the most often used signs and markers. It does not include every type of sign or marker used, but should give contractors, cooperators, volunteers, and Forest Service personnel a clear picture of how signs should be installed.

Before any signs are installed on the ground, this guide assumes that:

- A sign plan has been completed and approved that determines appropriate sign messages and correct locations according to chapter 3, EM-7100-15.
- Engineering judgment has been used in determining the need for and placement of all regulatory and warning signs.
- All traffic control signs meet MUTCD and Forest Service standards.

Uniform positioning of signs is highly desirable. However, because no two roads or situations are exactly alike, standards and guidelines may need to be modified to fit the sign to the road.

This guide should be kept in the glove box of vehicles used by personnel installing signs. A quick check of the guide should ensure far fewer errors in installations. The guide is not intended to serve as a substitute for training, but is intended to help trained personnel charged with installing and maintaining signs.

Refer to *Manual on Uniform Traffic Control Devices* and EM-7100-15, *Sign and Poster Guidelines for the Forest Service,* for complete information.

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Typical Installations

Low-volume rural roads

State and county requirements may vary. Check with local jurisdiction when installing signs on county, State, or Federal roads.

A written agreement must be in place to install signs in other jurisdictions.

Use 7 ft min. (secondary sign 6 ft min.) in:

- Urban areas
- Business, commercial, or residential areas
- Parking or pedestrian movement areas
- Areas with view obstructions

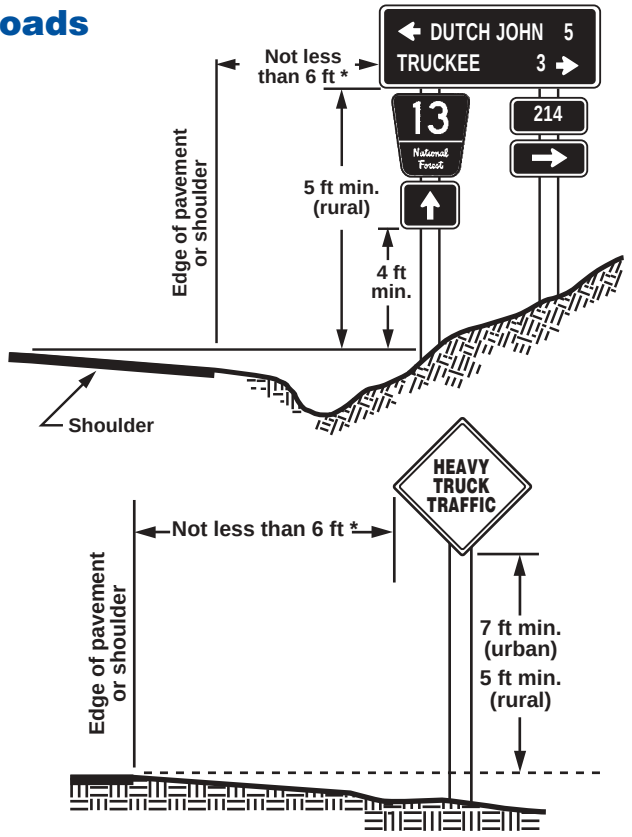
Signs should not obscure each other or be hidden from view by other objects. Avoid locations such as:

- Dips in the road
- Just beyond the crest of a hill
- Where sign may interfere with normal operation of facility
- Trees and foilage that could cover sign
- Snow removal areas

Signs should be erected on separate posts except where one sign supplements another or where route or directional signs must be grouped.

Mount top of sign flush with top of post. A 1-in gap is allowable between multiple (stacked) signs to allow for expansion/contraction.

Locate signs on right-hand side of the road unless specific standards require otherwise.



*On **low-volume roads** (fewer than 400 vehicles per day) a lateral offset of not less than 2 ft from the roadway edge to the roadside edge of a sign may be used where roadside features such as terrain, shrubbery, and/or trees prevent standard lateral placement.

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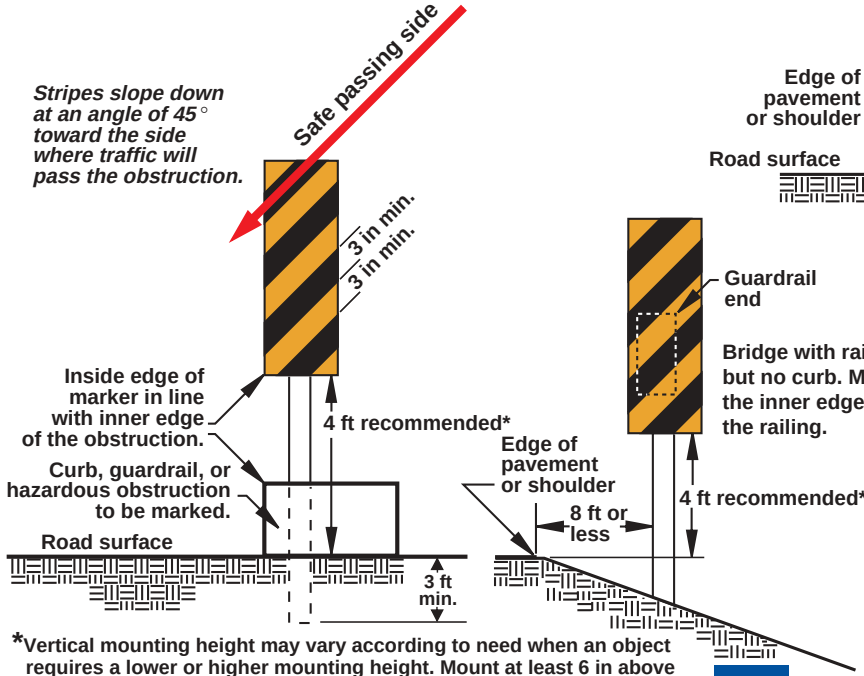
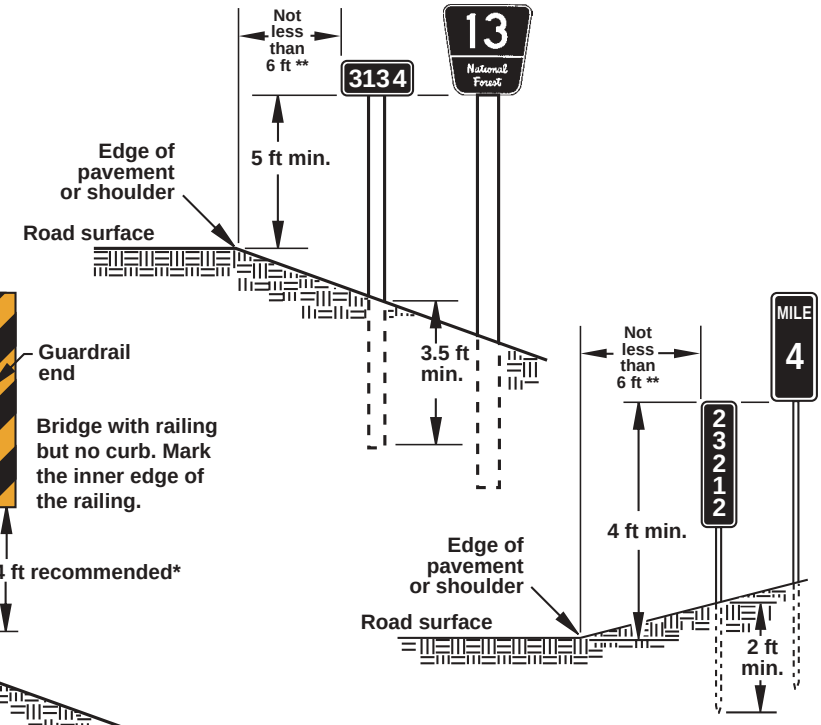
Typical Marker Installations

Object Markers



*Vertical mounting height may vary according to need when an object requires a lower or higher mounting height. Mount at least 6 in above road surface.

Route Markers



**Not less than 2 ft for low-volume roads

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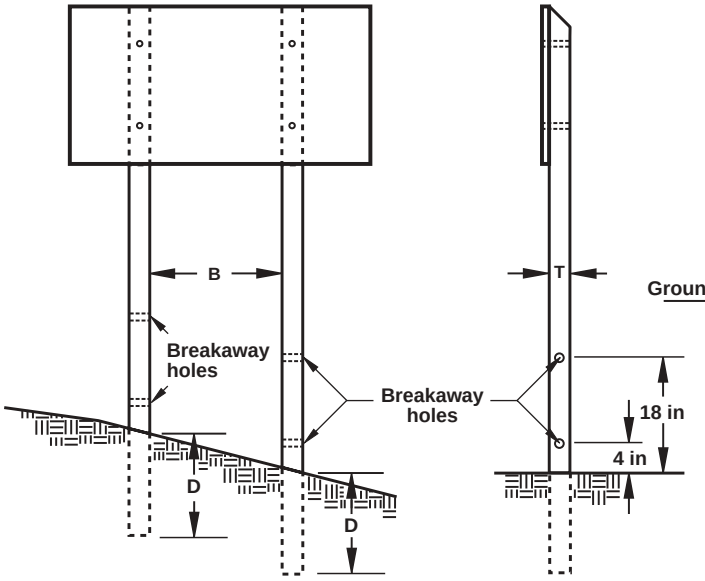
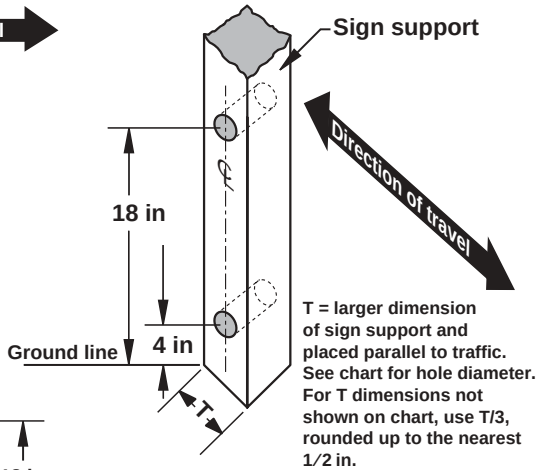
Wooden Breakaway Sign Support Guidelines



Typical Breakaway Support



T = larger dimension of sign support and placed parallel to traffic. See chart for hole diameter. For T dimensions not shown on chart, use T/3, rounded up to the nearest 1/2 in.

Typical Hole Spacing Detail

Breakaway design is required for all posts (new and existing) with a cross-sectional area of 24 sq. in or more, whenever the installation is within the traffic runoff area.

Breakaway holes must be perpendicular to direction of vehicle travel. Dimension T is parallel to direction of vehicle travel and is the larger of the dimensions.

Field drill posts and treat holes with preservative.

Breakaway design post sizes

Post size (in)	Hole diameter (in)	D minimum depth (ft)	B minimum breakaway distance (ft)
4 by 4	None	3	—
4 by 6 drilled	1.5	4	—
6 by 6 drilled	2	4	7
6 by 8 drilled	3	4	7

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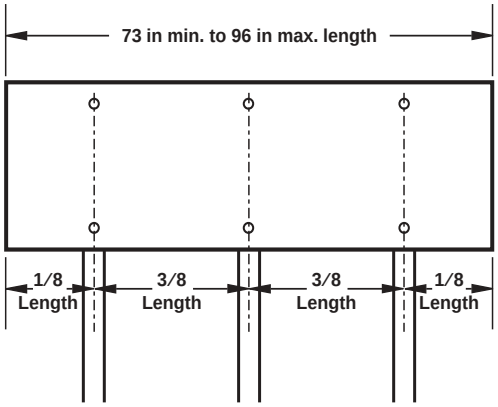
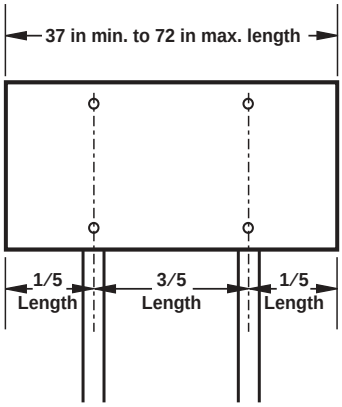
Typical Post Spacing and Size Requirements

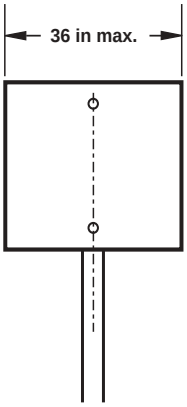
Nonbreakaway Installations



Typical Three-Post Detail



Typical Two-Post Detail



Typical Single-Post Detail

Spacing applies only for signs that have not been predrilled.

Nonbreakaway signs should be installed outside the clear zone, behind a guardrail or a nontraversable ditch.

Maximum Board Size Relationship

Post Size (in)	Maximum sign area (sq. ft)			
	1 sign	2 signs	3 signs	4 signs
4 by 4	10	20	—	—
4 by 6	15	35	45	—
6 by 6	20	50	75	100

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Advance Sign Placement Distances

Minimum Placement Distances

Regulatory signs—Place at or before the point the prohibition begins.
Warning signs—Place in advance of the condition using the following table.

Signs are to be placed where they provide adequate time for response, considering such things as approach speed, road conditions, etc.

Wet pavement or gravel—24- by 24-in signs

85 percent speed or posted speed (mph)*	[1] Condition requires a stop (ft)	[2] Condition requires deceleration to advisory speed listed (mph) (ft)				Additional distance on downgrade (percent) (ft)			
		10	20	30	40	3	6	9	12
20	nsm**	nsm	—	—	—	5	10	20	30
25	nsm	150	—	—	—	8	15	30	45
30	150	200	150	—	—	10	20	45	65
35	200	250	225	—	—	15	35	60	90
40	275	325	300	275	—	20	45	75	120
45	350	400	350	300	—	25	55	95	150
50	425	475	450	375	275	30	70	120	185
55	500	550	525	450	350	35	85	145	225

[1] Driver may be required to come to a complete stop (such as at stop signs or pedestrian crossings).

[2] Driver will probably be required to decrease speed (such as advisory speed for a curve or intersection).

* For higher speeds, refer to MUTCD.

**nsm = no suggested minimum. At these speeds, sign location depends on physical conditions at the site.

The table shows the minimum distances a warning sign should be placed in advance of a condition. The minimum distance is the stopping distance after the sign can be read.

Sign placement distances are based on legibility provided by 24-in signs. If 30- or 36-in signs are used, decrease the placement distances by 50 ft. If 48-in signs are used, decrease the placement distances by 125 ft.

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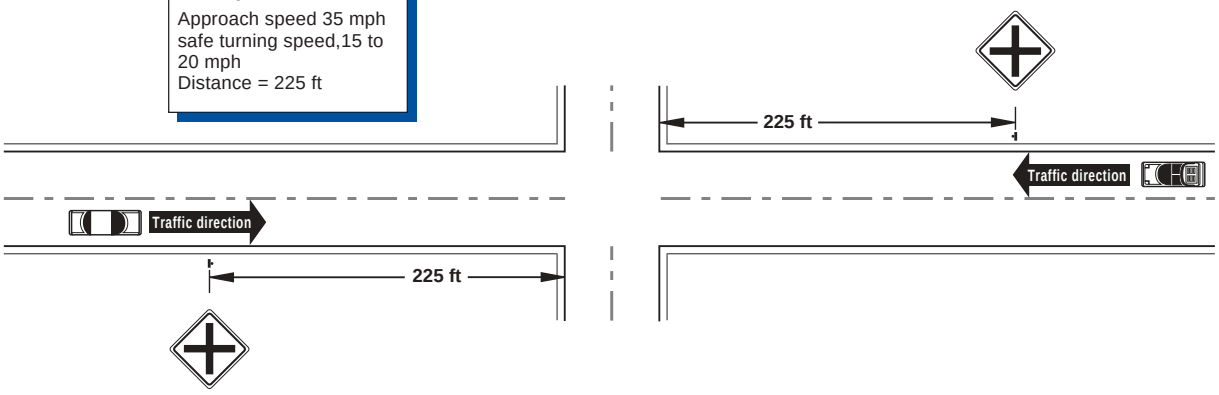
(Advance Sign Placement Distances continued)

Example:
Approach speed 35 mph
safe turning speed,15 to 20 mph
Distance = 225 ft



Advance placement distances should have been determined according to the chart on page vii. However, on-the-ground situations do not always fit the given distances for sign placement. Some shifting may be needed when rocks, trees, holes, or other obstructions preclude the use of given distances. Engineering judgment needs to be used to ensure that signs are placed to be visible in time for drivers to react to the sign's message.

Guide signs—Placed at varying locations depending on purpose, need, and speed of traffic. Use the chart on page vii as a guide. MUTCD indicates placing the sign 200 ft before the condition.

Signs requiring different decisions by the driver must be spaced sufficiently far apart for decisions to be made safely. In situations where two or more signs are needed at approximately the same location, the order of priority is:

1. Regulatory
2. Warning
3. Guide

Distances are for level roadways. Increase placement distance on negative grades of 3 percent or greater. Placement distance on upgrades may be reduced by one-half the distance listed for downgrades.

On the Ground

Signs may be shifted left or right to improve their visibility, to avoid obscuring other signs, or to enhance safety of operations.

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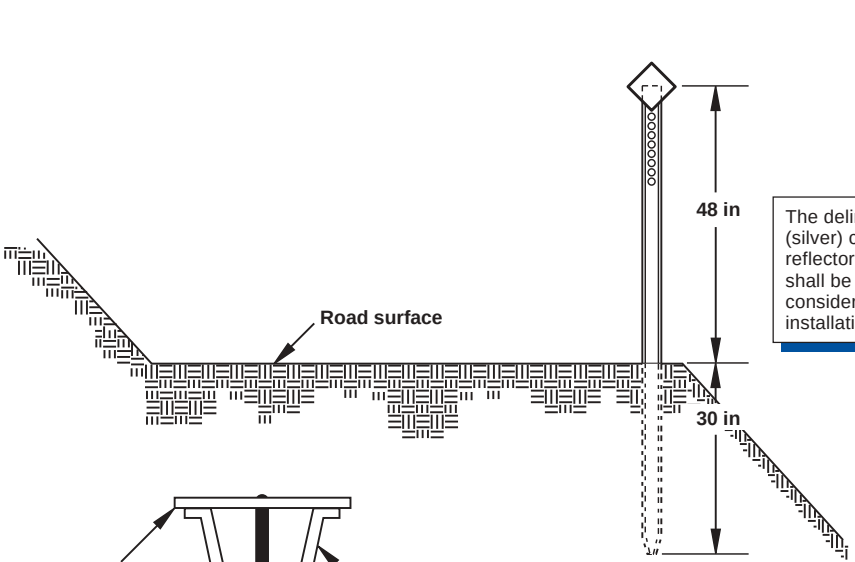
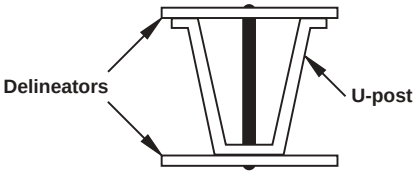
Delineator Details

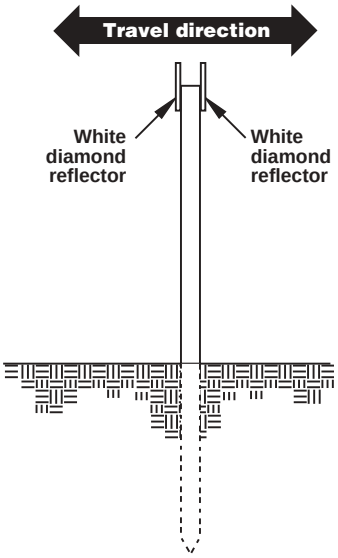




Top View

Bidirectional delineator

The delineators shall be 4- by 4-in (silver) crystal on both sides, Type 1 reflectorized. The delineator housing shall be the bidirectional type and is considered part of the delineator installation.



Notes:

1. Delineator posts may be galvanized steel U-posts, 1.12 lb per lineal foot, 6.5 ft long, or flexible fiberglass posts.
2. Reflectors may be fastened to posts using rivets or other suitable, nonremovable fasteners.
3. For each direction of travel, install delineators with white reflectors on the right and left side of the road. Exception: yellow reflectors are only used on the left of divided highways or one-way roads.

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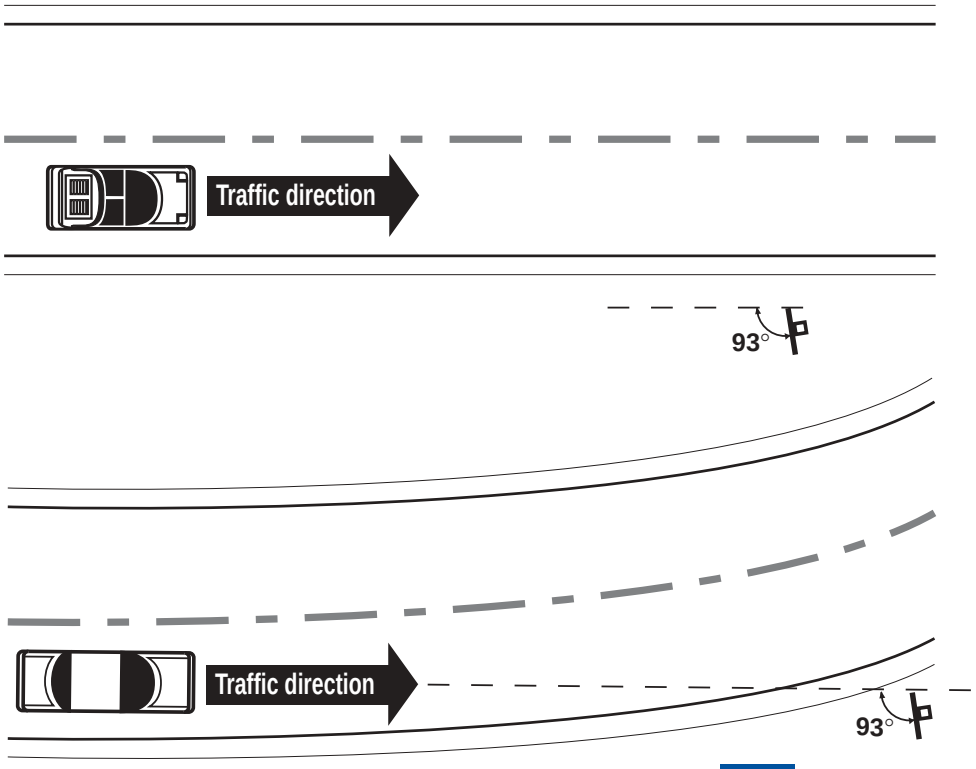
Orientation Angle



Signs for motorized traffic control are mounted at approximately right angles to oncoming traffic. It may be necessary to rotate a reflectorized sign slightly off 90 degrees to avoid specular glare reflection off the sign face directly back into the driver's eyes.

An angle of about 93 degrees to the line of approaching traffic is recommended by the U.S. Department of Transportation, Federal Highway Administration.

On curved alignments, the angle should be determined by the course of approaching traffic and from the point at which the sign is to be read.

On grades, it may be necessary to tilt a sign forward or back from vertical to improve the viewing angle.

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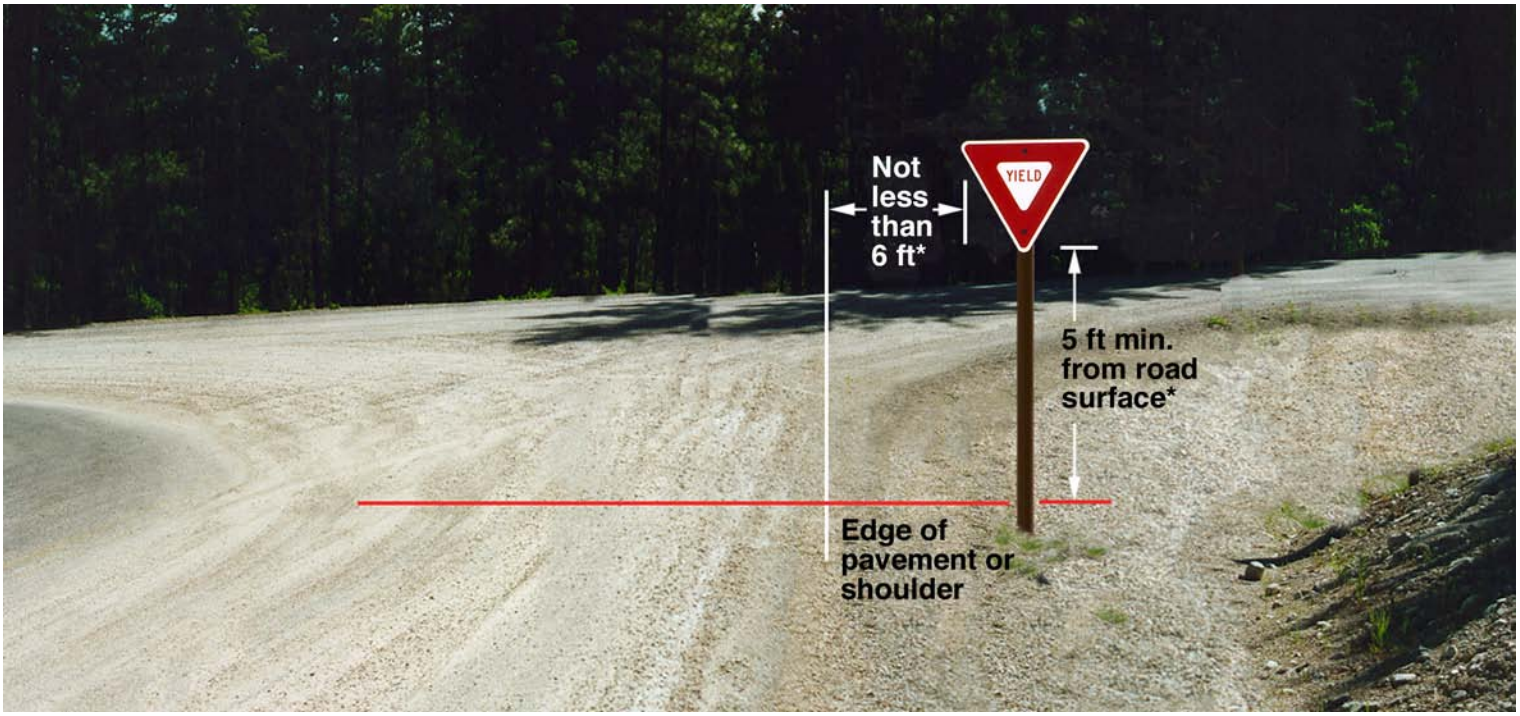

Regulatory Sign

R1-1

R2-1

R12-1

* See page iii for placement exceptions.

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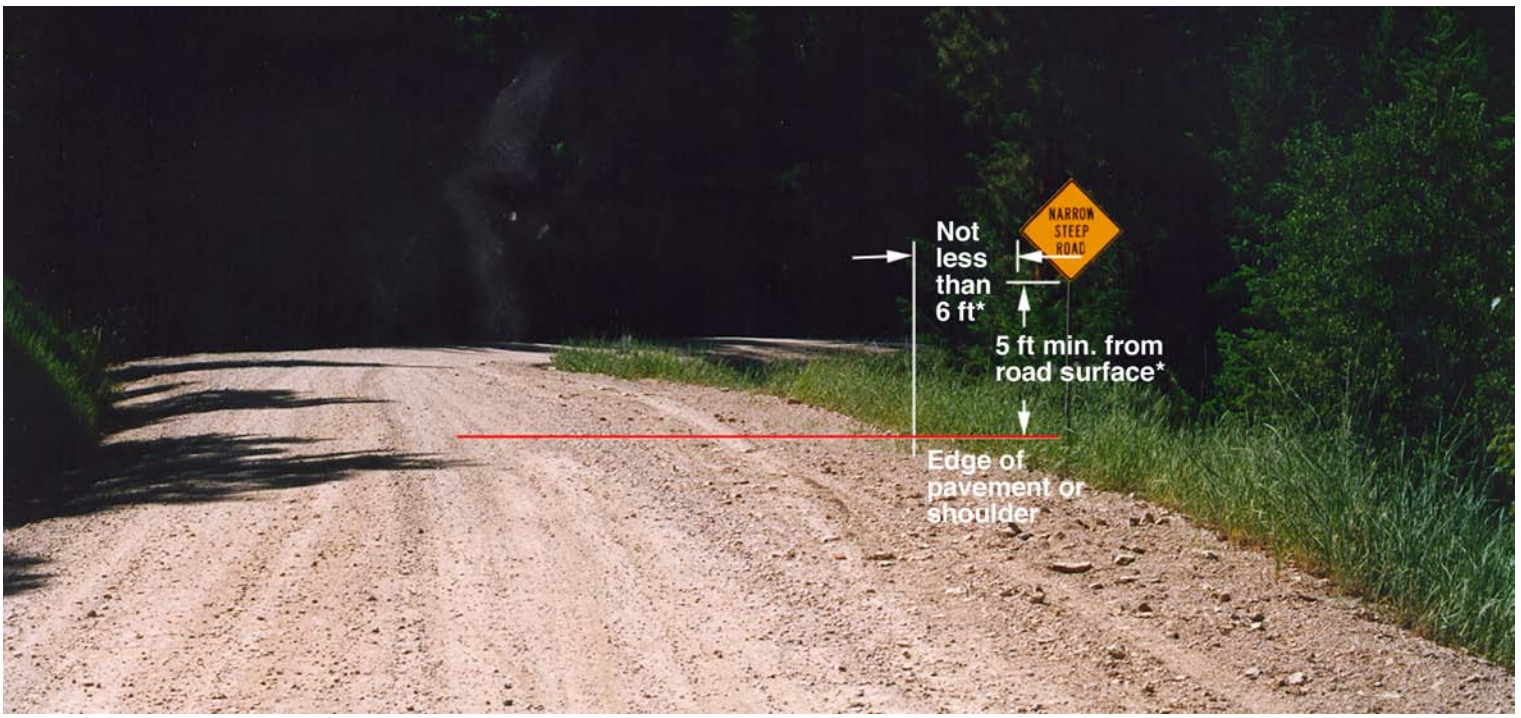

Warning Sign
(no supplemental plaques)

*** See page iii for placement exceptions.**

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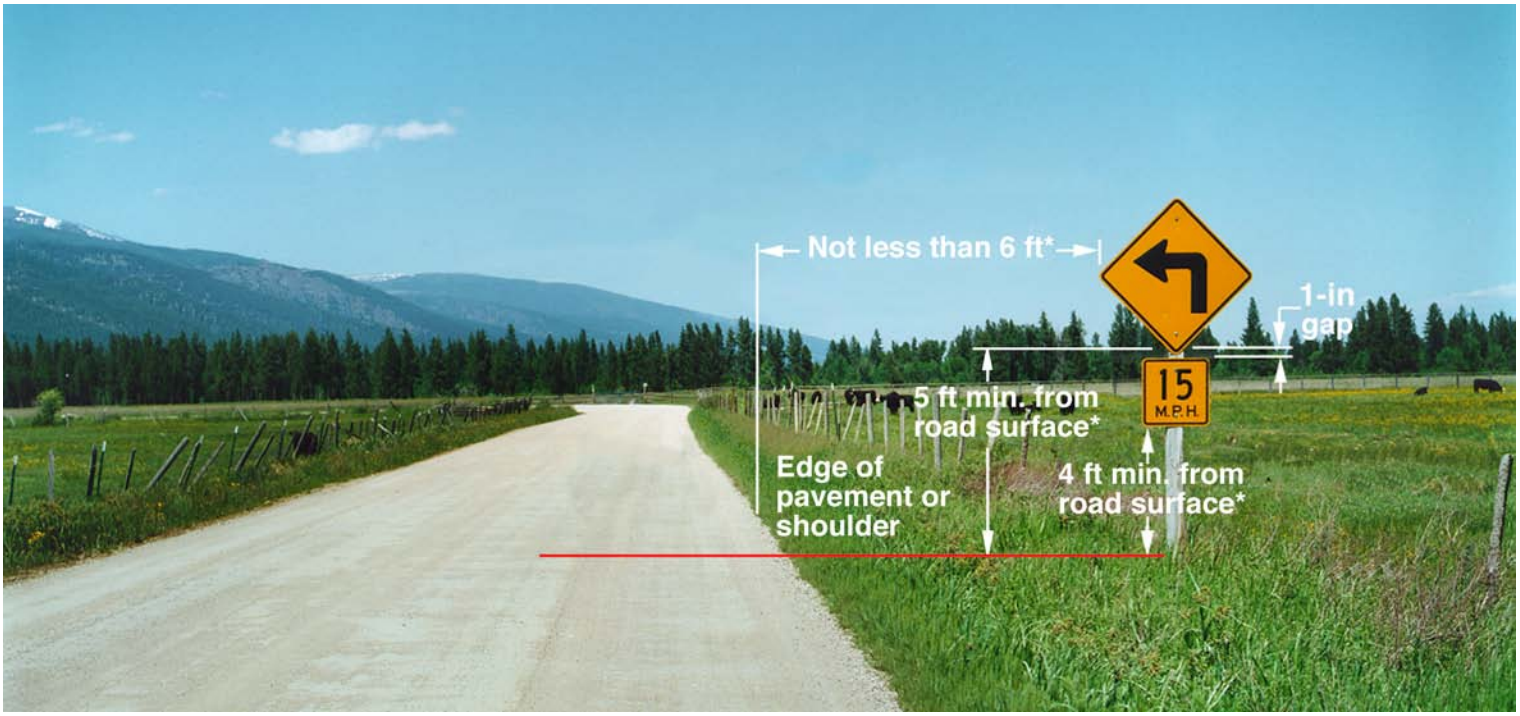

Warning Sign With Advisory Speed Plate

Advisory speed plates supplement the warning sign and shall not be used alone.

*** See page iii for placement exceptions.**

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Warning Sign With Advisory Speed Plate and Supplemental Plaque

Advisory speed plates and supplemental plaques are not to be used alone.

*** See page iii for placement exceptions.**

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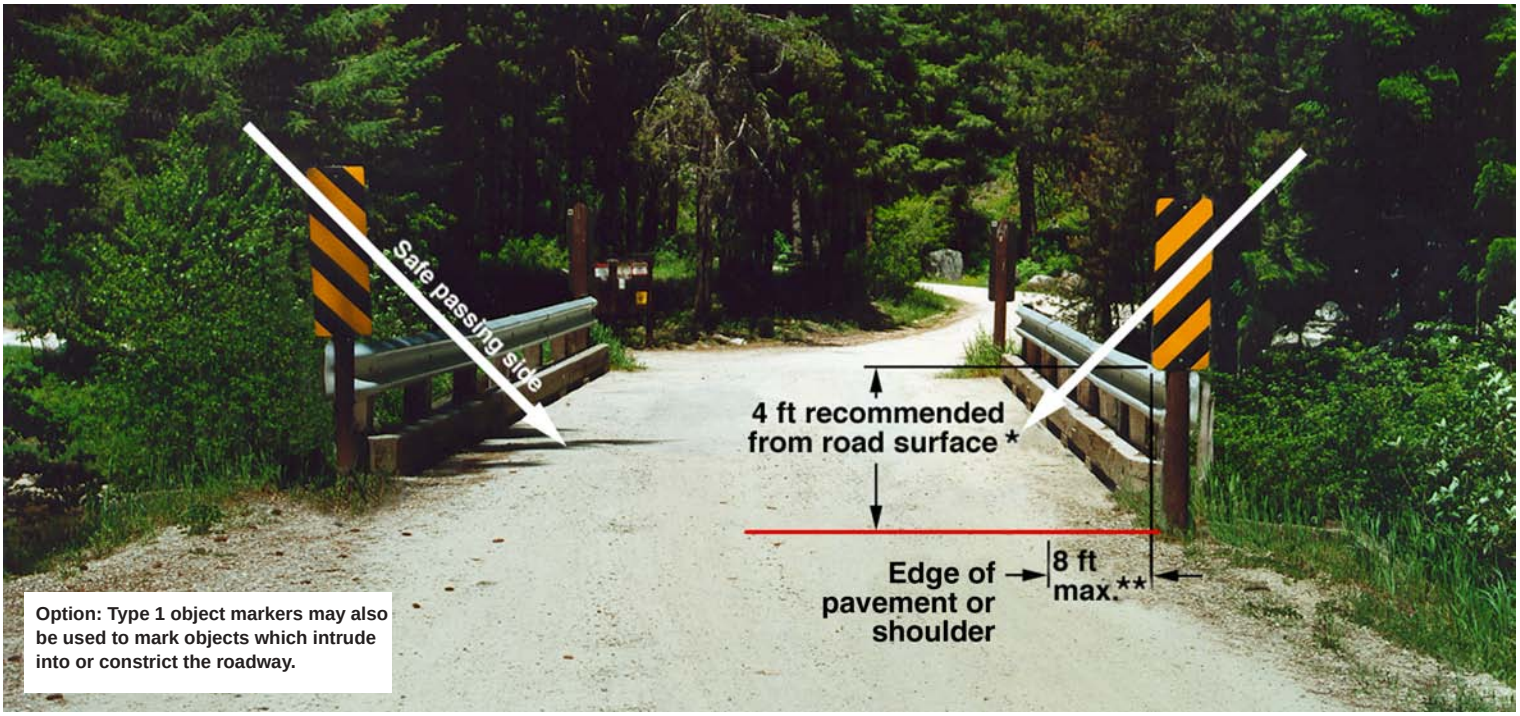

Type 3 Object Marker

(to mark objects which intrude into or constrict the roadway)

*Vertical mounting height may vary according to need when an object requires a lower or higher mounting. Mount at least 6 in above road surface.

**Do not use Type 3 object marker farther than 8 ft from edge of traveled way or shoulder.

Inside edge of object marker lines up with inside edge of curb or guardrail.

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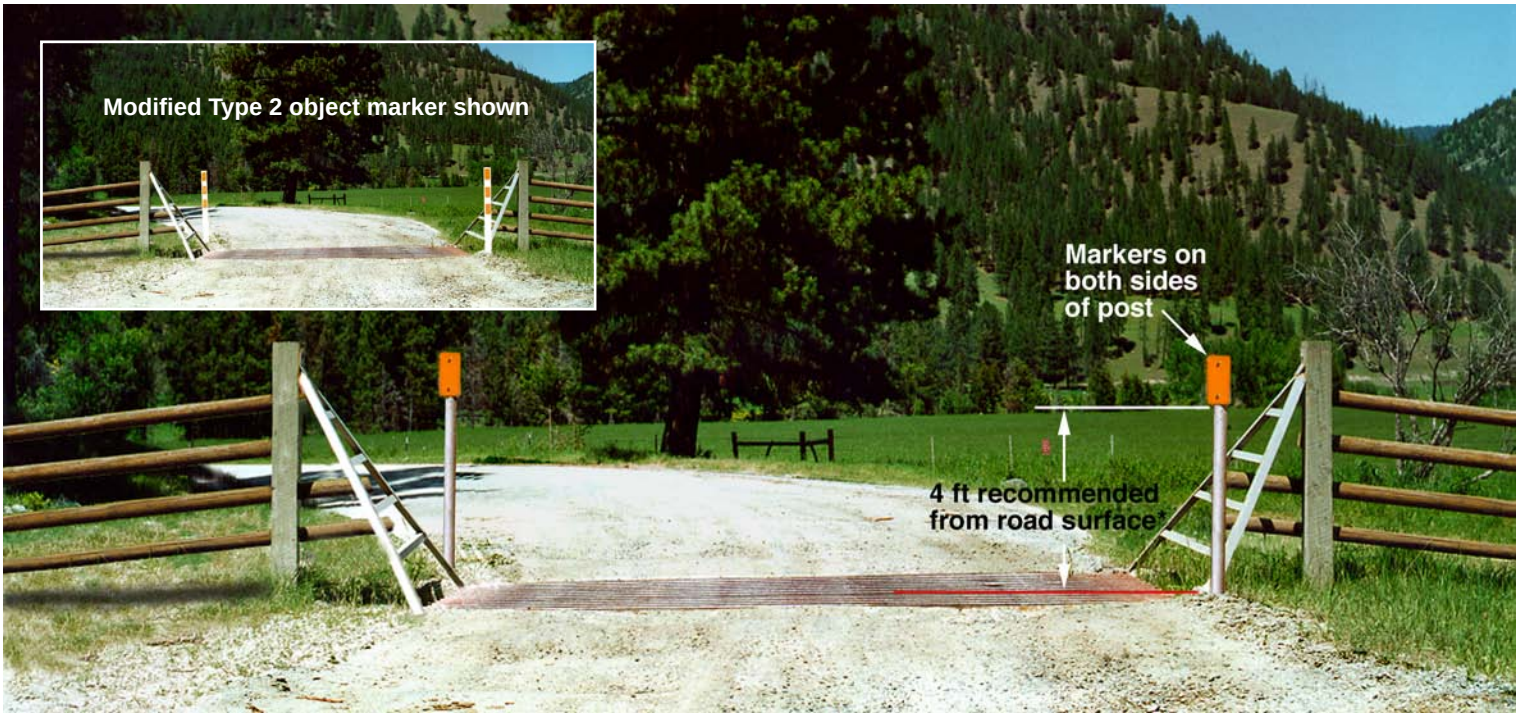

Typical Cattleguard Signing With Modified Type 2 Object Markers

(roadway is not constricted)

Vertical mounting height may vary according to need when an object requires a lower or higher mounting. Mount at least 6 in above road surface.

Type 2 object markers are used for objects that are outside the traveled way but close enough to present a hazard.

Inside edge of object marker lines up with inside edge of obstruction.

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Typical Gate Signing With Object Markers (OM) for One-Lane Roads

If motorized or nonmotorized use (such as bicycles) occurs behind a gate, the back side may **require signing also.** Size of barricade markers depends on approach speeds. Travel management signing: if road use is restricted with an order, a travel management sign should be mounted on the gate or on a post next to the gate. For seasonal restrictions, the travel management sign should be mounted on a post next to the gate so it is visible when the gate is open.

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Work Zone Identification Sign

Work zones include construction, maintenance, and logging operations.

*** See page iii for placement exceptions.**

All temporary traffic control devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, temporary traffic control devices that are no longer appropriate shall be removed or covered.

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Work Zone Sign
(temporary support)

Do not mount on trees or other signs.

For short-term, short-duration, and mobile conditions only. Signs should be constantly maintained for cleanliness, visibility, and correct positioning because they are moved frequently.

Do not locate on sidewalks, bicycle lanes, or areas designated for pedestrian or bicycle traffic.

Signs mounted on portable supports may be placed within the roadway if necessary. Signs may be mounted on or above barricades.

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Road Closed Sign

This sign marks roads that have been closed to all motorized and nonmotorized traffic (except authorized vehicles) because of a temporary emergency, construction and maintenance activities, or spring breakup. It is not to be used on a gate or closure for seasonal or long-term road restrictions.

When no turns are intended, stripes should be positioned to slope downward toward the center of the barricade. Barricade stripes should slope downward toward direction which road users must turn.

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Guide Sign

*** See page iii for placement exceptions.**

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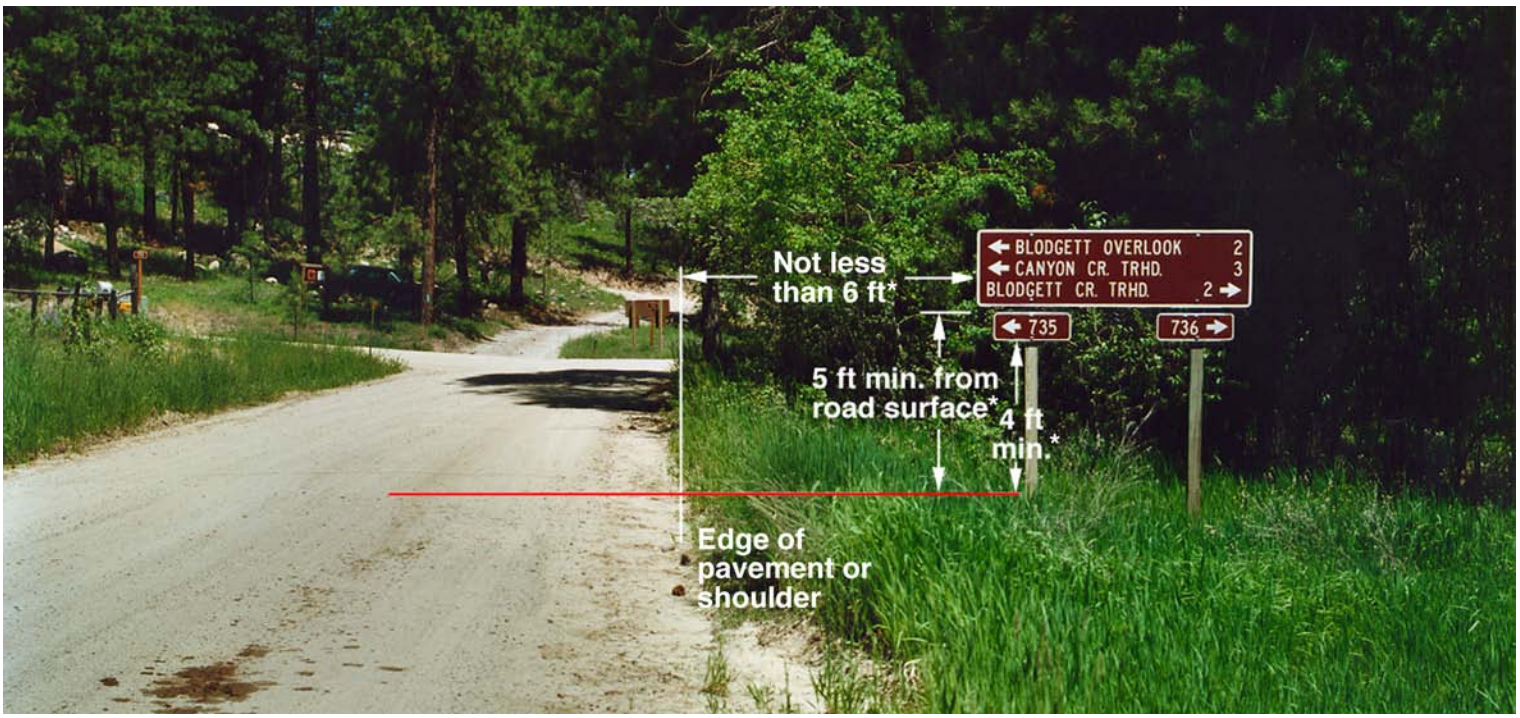

Guide Sign With Route Markers

A 1-in gap is allowable between multiple (stacked) signs to allow for expansion/contraction.

*** See page iii for placement exceptions.**

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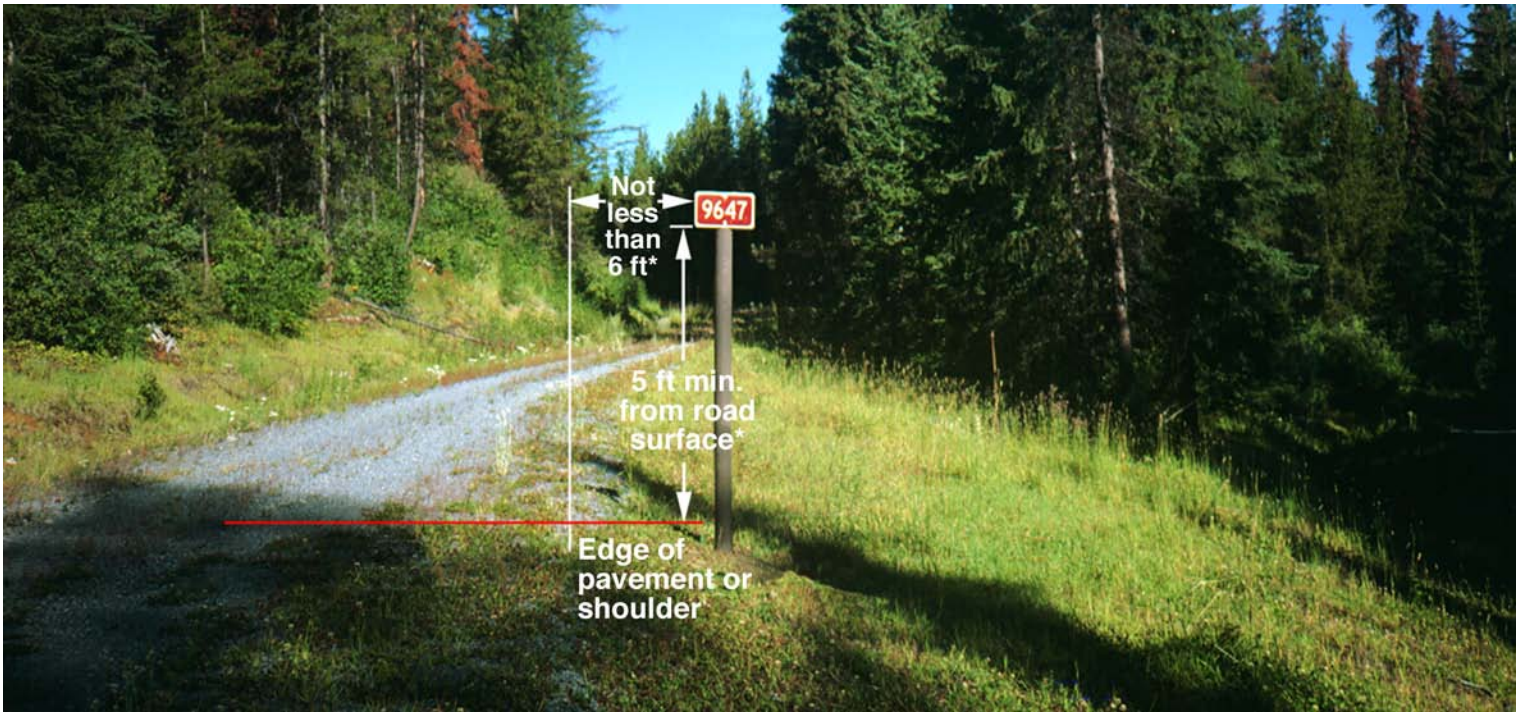

Horizontal or Distinctive Route Marker

On steep slope installations, minimum 2-ft distance is preferred to minimize pole height. Install 50 ft to 100 ft from road junction.

*** See page iii for placement exceptions.**

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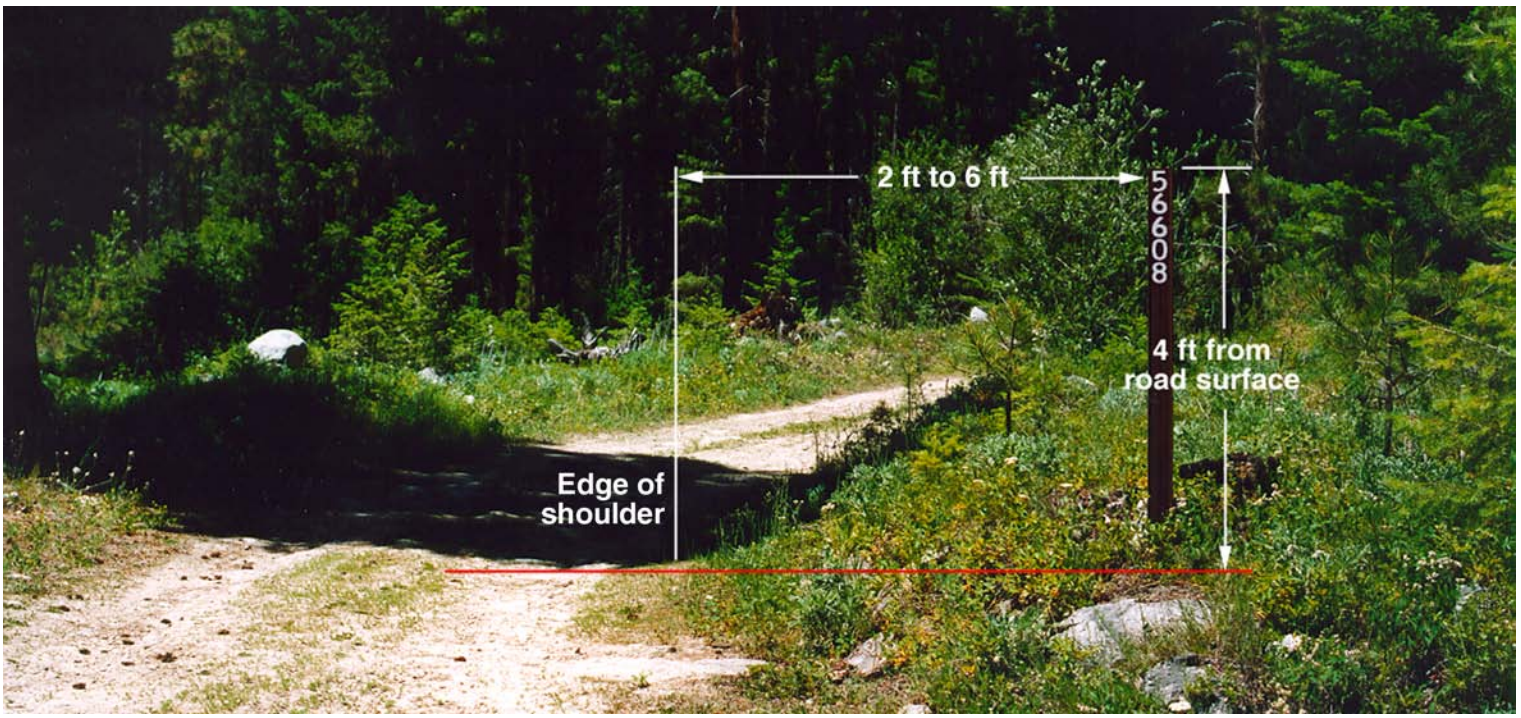

Vertical Route Marker
(for maintenance level 1 and 2 roads)

Option: Use delineator post and mount wood or aluminum sign panel.

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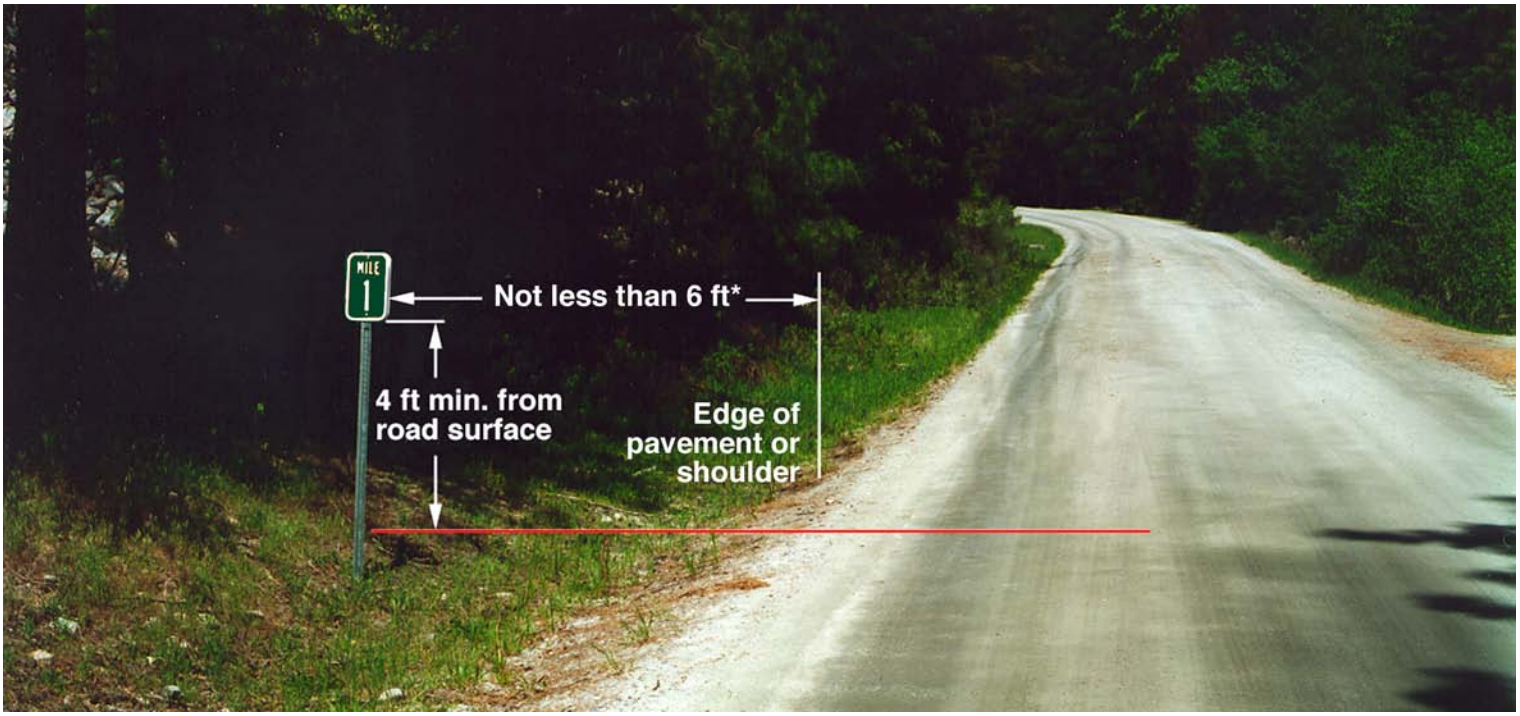

Milepost Marker

*** See page iii for placement exceptions.**

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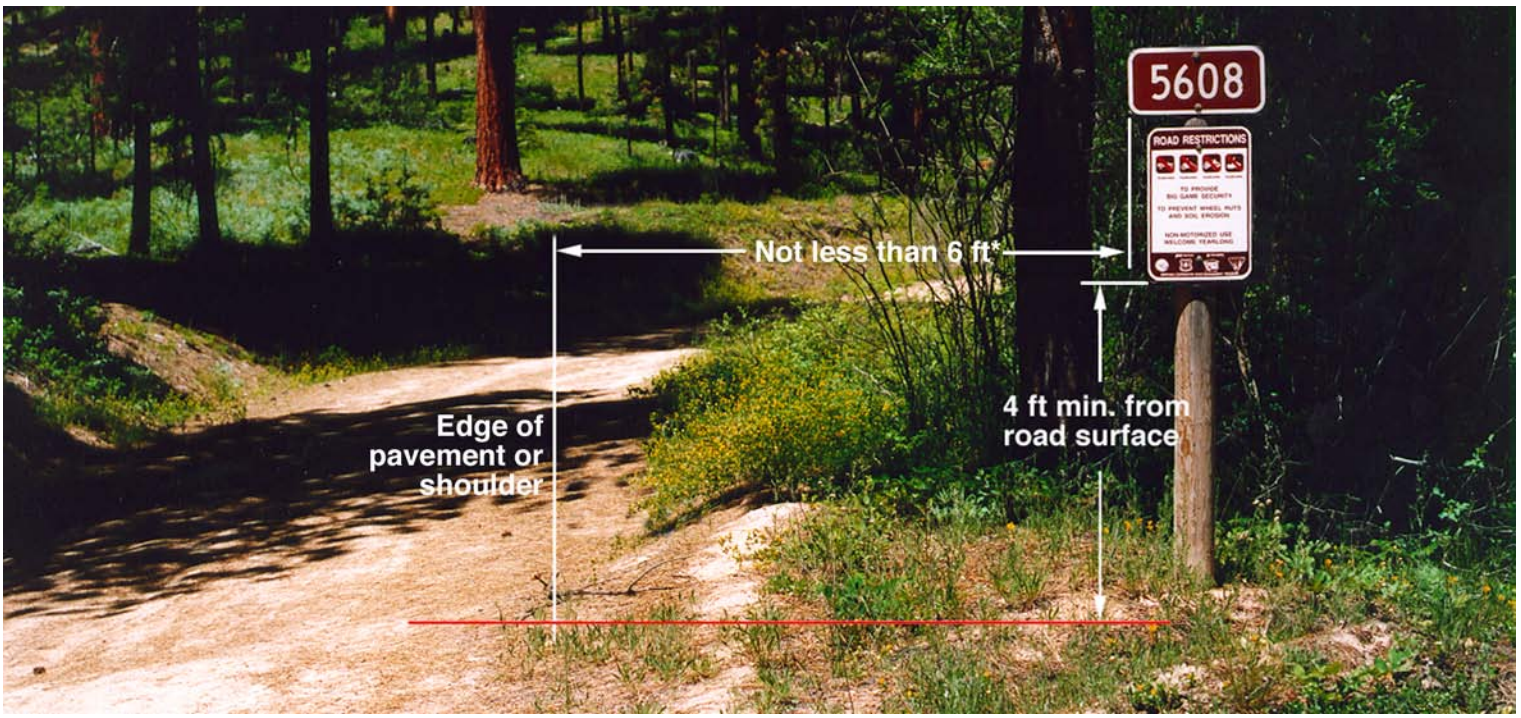

Travel Management Sign With Route Marker

If restrictions are noted on a travel management sign, an order must be written under 36 CFR 261.

*** See page iii for placement exceptions.**

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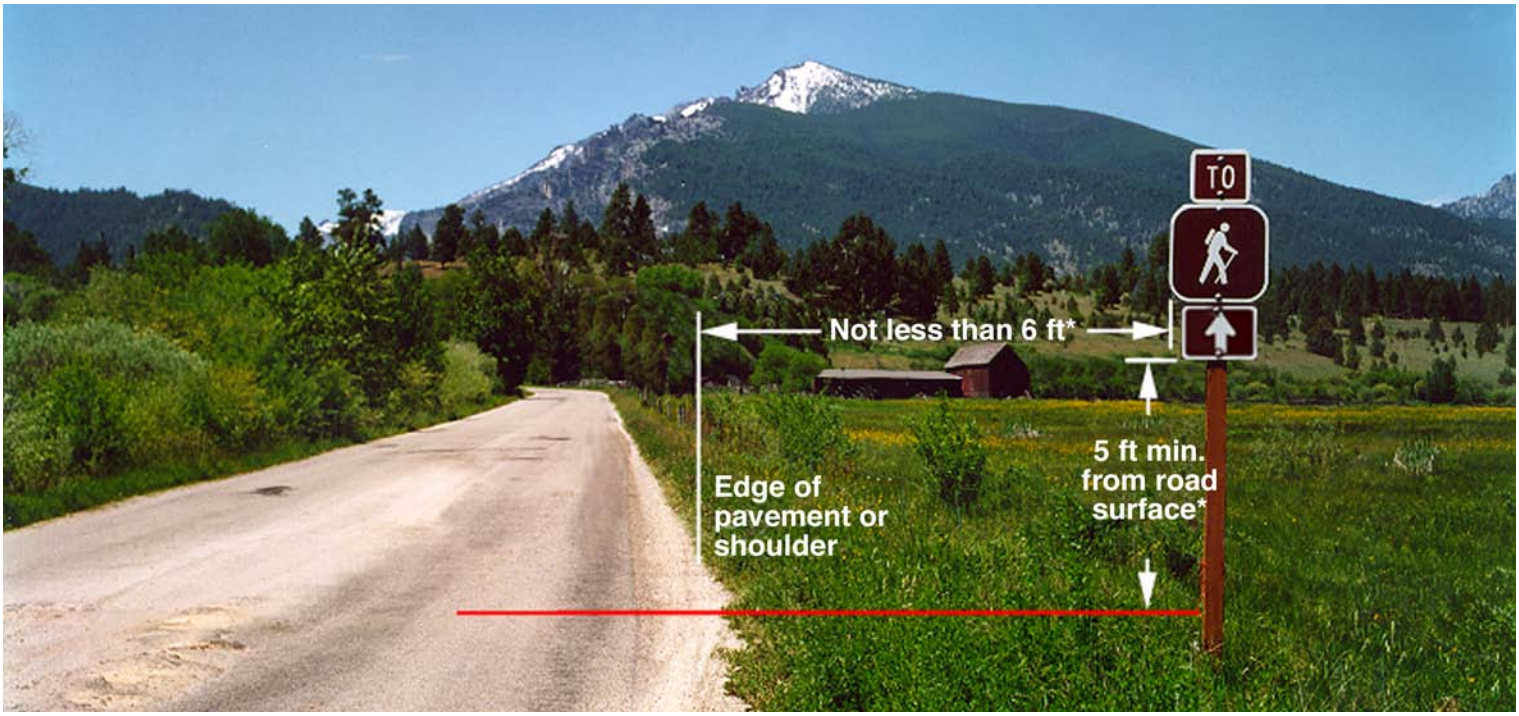

Trailblazer Assembly

A 1-in gap is allowable between multiple (stacked) signs to allow for expansion/contraction. Background colors on each assembly should be the same.

*** See page iii for placement exceptions.**

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Federal Recreation Symbol Assembly

A 1-in gap is allowable between multiple (stacked) signs to allow for expansion/contraction. Generally, no more than four symbols should be mounted on a single sign assembly.

*** See page iii for placement exceptions.**

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Page 19
Blank
Rear Cover

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