Baystate Roads Program
Local Technical Assistance Program (LTAP)
Tech Notes

Tech Note #40

Correct Sign Installation Can Increase Motorist Safety on Local Roadways

According to a safety study by General Motors Corporation, 85% of all motor vehicles that run off the road recover safely within 30 feet of the roadway in a safety, or clear, zone.

While a 30-foot clear zone is not always possible, it is a good concept to try to achieve. The fewer barriers that are present in the area adjacent to the road, the safer motorists will be:

Remove
Remove fixed objects and provide traversable terrain.

Relocate
Relocate objects to outside the clear zone.

Retrofit
Improve objects which cannot be removed or relocated by making them breakaway or crash worthy.

Shield
Install guardrails, barriers, or crash cushions to shield the hazards that cannot be improved.

Delineate
If the methods above are impractical, delineate the hazard as a temporary measure.

SIGN HAZARDS

One hazard or obstacle that is often placed in the clear zone so it will be in the drivers' line of sight is the road sign. Because of this, the construction of road sign posts and foundations becomes critical. Road signs should be placed on safe sign supports so that they do not become a bigger hazard than the situation they are meant to improve.

According to the *Manual on Uniform Traffic Control Devices (MUTCD)*, "Sign posts and their foundations and sign mounting shall be so constructed as to hold signs in proper and permanent position, to resist swaying in the wind or displacement by vandalism. In areas where ground mounted sign supports cannot be sufficiently offset from the pavement edge, sign supports should be of suitable breakaway or yielding design."

Support posts must be able to hold a particular sign in the proper postion and withstand normal loads from wind and other sources, yet safely yield when struck by a vehicle instead of being a fixed object.

SIGN PLACEMENT

A sign placed close to the roadway is more likely to be struck than one that is set farther away. Whenever possible, place signs where they are not likely to be struck by out-of-control vehicles. The following are some considerations for placing road signs:

*Avoid placing signs on curves such as the outside of horizontal curves.

*Avoid placing signs next to lane drops or other places where the pavement narrows.

*Provide an unobstructed view of signs along the roadway.

*Place signs behind guardrails or other barriers whenever possible.

*Avoid placing signs in the bottom of ditches.

*Space signs along the roadway so they don't obstruct the view of each other.

Recommended spacing is 100 to 200 feet apart. Signs should not be clustered together.

Sign Installation Tips

**Bury posts in firm ground 4.0 feet deep. Loose or sandy soil may require deeper post placement.*

**Use breakaway sign supports to enhance roadside safety.*

**Use sign connections that prevent vandalism.*

SIGN HEIGHT

The *MUTCD* states, " Signs erected at the side of the road in rural districts shall be mounted at a height of at least five feet, measured from the bottom of the sign to the near edge of the pavement.

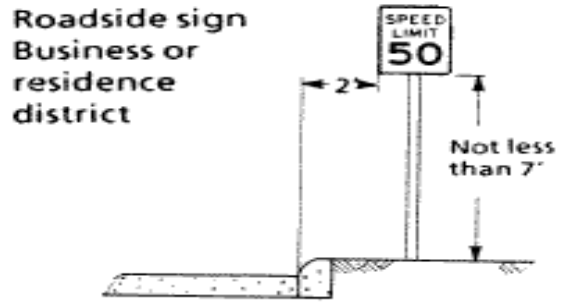
In business, commercial, and residential districts where parking and/or pedestrian movement is likely to occur or where obstructions are present, the clearance to the bottom of the sign must be at least seven feet. The height to the bottom of a secondary sign mounted below another sign may be one foot less than the appropriate height specified above.

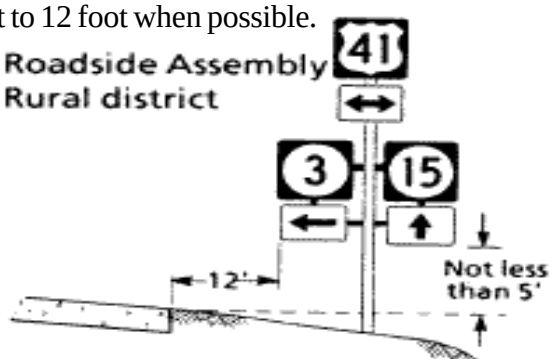
LATERAL CLEARANCE

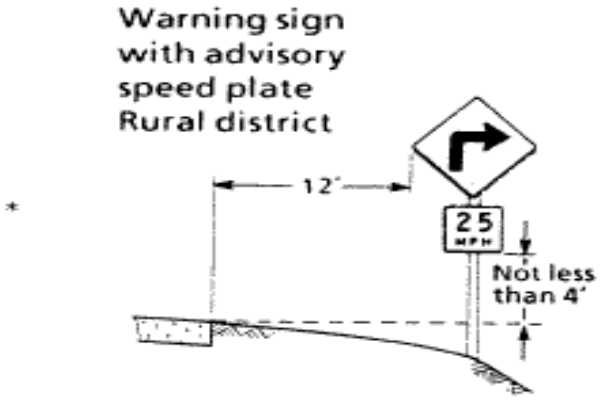
Signs should have the maximum lateral clearance that is practical from the edge of the traveled roadway for the safety of motorists who might leave the roadway and strike the sign supports. Existing guardrails, over-crossing structures, and other conditions should be used to minimize the exposure of sign supports to traffic. Otherwise, sign supports should be breakaway or yielding.

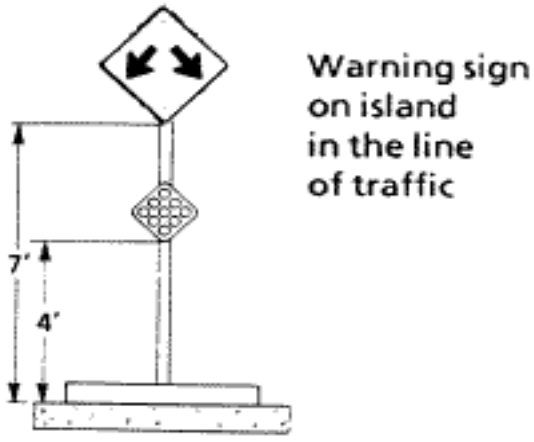
Normally, signs should not be closer than six feet from the edge of the shoulder, or 12 feet away from the edge of the traveled roadway if no shoulder is present. Although two feet are recommended as a working urban minimum, a clearance of one foot from the curb face is permissible where the sidewalk width is limited or where existing poles are close to the curb.

The diagrams below show the proper height and lateral locations of signs. Note that the lateral placement of signs in rural districts is six-foot minimum and out to 12 foot when possible.









U-Channel Steel Posts

The U-Channel rolled steel post is another common small sign support. It is considered breakaway since it will bend or breakaway at the post/base connection at the ground line when it is hit.

These posts can be purchased commercially to breakaway at ground level. They allow the post to break off on impact. These devices improve safety when the post is hit, make repairs easier, and allow the use of a U-channel post when it has to be placed in concrete.

Photos of typical U-Channel posts. The silver post has been galvanized.

MANUFACTURER CERTIFICATION

The manufacturer of U-channel steel posts must provide certification that the posts and hardware they are furnishing have essentially the same chemistry, mechanical properties, and the geometry as that used in the FHWA tests and will meet the FHWA change in velocity requirements.

The manufacturer must also provide certification that the U-channel lap splice system they are furnishing will develop the full shear and bending yield strength of the sign post section being spliced.

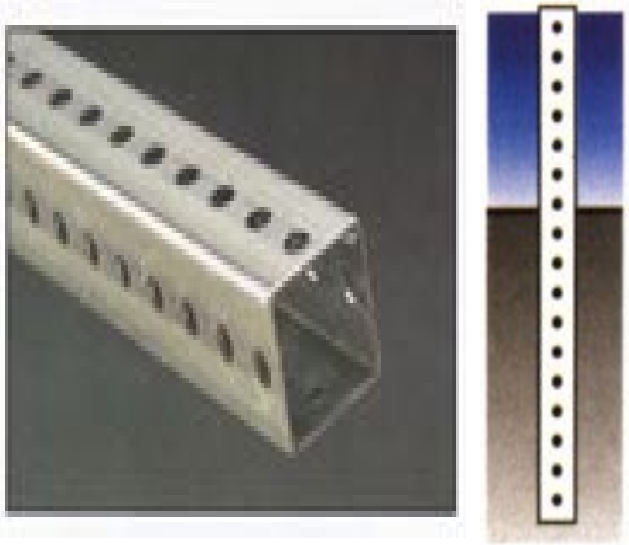
OTHER SPECIFICATIONS

The Massachusetts Highway Department does not promote the use of 'wood' posts. Either 'U-Channel' or 'square tube' posts are recommended, (and must meet NCHRP-350).

SIGN SUPPORTS

Posts should be either the square tube post or the U-channel type at the contractor's option. Signs mounted with square tube posts should be installed as follows:

Area (square feet)	Mounting with (P-5) square tube posts
Up to 7.5	single 2 1/4 X 2 1/4" post
Over 7.5 to 15	two 2 1/4 X 2 1/4" posts
Over 15 to 20	two 2 1/2 X 2 1/2" posts



Examples of typical square tube posts which are sometimes used in proper sign installation.

Single post installations should be in accordance with the Massachusetts Highway Department's Standard Drawing and Signs and Supports specifications. Signs with two posts would require a slip base and should be installed according to the manufacturer's recommendations (except that the sign post anchor

should be embedded at least 4 feet below the ground surface). Signs mounted with U-channel posts should be installed as follows:

Area (Square feet)	Mounting with (P-5) U-Channel posts
Up to 10	single post
Over 10 to 20	two posts

An example of a U-Channel post used for sign placement and installation.

Breakaway capabilities should be maintained through the use of a lap splice or a slip base system. Signs with two posts should be installed according to the manufacturer's specifications (except that the sign post anchor should be embedded at least 4 feet below the ground surface). Aside: If you accidentally damage the galvanized coating, you should repair it before erection with high zinc dust content paint (meeting appropriate material standards such as M7.04.11).

SIGN PANELS

For typical installations of small signs (up to 2.0 square meters), use hot dipped galvanized button head bolt with a slot in head and nut with a lockwasher.

There should be a minimum of 6 mm of threads beyond nuts on all signs after they are securely fastened. Signs with a width greater than or equal to 1.2 meters, or an area over 0.75 square meters up to and including 2.0 square meters, would require '2' posts. (Ref. MHD Construction and Traffic Standard Detail Signs & Support Drwg. No, TR.1.2.).

REFERENCES

Manual on Uniform Traffic Control Devices 2003
Mass. Highway Standard Specifications 1995
Mass. Highway Supplemental Specifications 2002
NCHRP Report 350 and 494,
AASHTO 2002 Interim to Highway Signs, Luminaires and Traffic Signals
Mass. Highway Construction and Traffic Standard Details 1996

A portion of information for this article was taken with permission from Special Bulletin #30-Safe Signing, published by the South Dakota Local Technical Assistance Program.