

Traffic Signs (1 of 3)

GENERAL

DESCRIPTION AND DEFINITION

New language adopted in the MN MUTCD requires all agencies that maintain roadways open to the public to adopt a program designed to maintain traffic sign retroreflectivity at specific levels.

An informal survey of practice of local agencies was conducted as part of a Minnesota Local Technical Assistance Program (LTAP) workshop on Traffic Signing Best Practices. The survey found that most agencies attending the workshop did not have a large enough annual budget to maintain their existing inventory of traffic signs.

As agencies review their sign inventories and determine the appropriate maintenance policy, it is becoming clear that the suggested levels of investments necessary to maintain their inventory may not be possible. Proactive sign management requires agencies to follow these five steps when developing a sign maintenance program:

1. **Conduct/update sign inventory**—Review current inventory and document signs.
2. **Prepare annual budget**—Create a budget that accounts for knockdowns, vandalism, and the periodic replacement of signs as they wear out.
3. **Understand engineering study processes**—Create a written record of the engineering judgment regarding signs to remain and signs to be removed; this step supports establishing official immunity for agencies.
4. **Develop policy**—Develop a policy that implements sign placement based on MN MUTCD's effective safety requirements and that documents the planned maintenance method. The policy can also identify types of signs that the agency will not install.



5. **Initiate Projects**—Implement sign upgrade projects and consider sign removal. In the analytical process to determine an agency's annual sign maintenance budget, the only variable that the agency can control is the size of its inventory. Removal of unnecessary signs should be considered, especially ineffective or non-required signs.

SAFETY CHARACTERISTICS

A review of traffic safety literature found that, at this time, the only types of warning signs that have been proven effective are the Horizontal Alignment Series (but only in a narrow range of curve radii).

Bottom line—If an agency's decision to install a sign is based on an expectation of proven effectiveness—through either reducing crashes or changing driver behavior—supporting literature is virtually nonexistent.

PROVEN, TRIED, INEFFECTIVE, OR EXPERIMENTAL

- The use of chevrons is considered to be **PROVEN** effective at reducing road departure crashes. The Federal Highway Administrations Crash Modification Factors (CMF) Clearinghouse documents 12 studies with crash reductions ranging from 5 to 50 percent.
- There is no documented evaluation of other signs, and they are considered **TRIED**.
- Application of new technologies to create dynamic signs has shown some promise but they have not been widely deployed or evaluated and are considered **EXPERIMENTAL**.
- A number of traffic signs have been proven to be **INEFFECTIVE**, such as pedestrian crossing signs, deer crossing signs, and warning signs for infrequent occurrences (falling rocks, slippery pavement, and pedestrian signs in rural areas).

GENERAL

Traffic Signs (2 of 3)

ROADWAY OPERATIONS

- **Effectiveness of Speed Limit Signs**—Drivers select a speed they perceive as safe based on their reaction to actual conditions (presence of pedestrians, road width, parked vehicles, etc.) along a roadway. Majority of drivers only comply with speed limits (and the signs) if the posted limits are consistent with their perception and selection of a safe speed.
- **Effectiveness of STOP Signs**—Research shows that increasing the level of intersection control does NOT improve safety for lower-volume rural county and state intersections (fewer than 500 vehicles per day on approach), and that only about 20 percent of drivers actually stop. STOP signs on high volume or speed roads might be considered as a safety feature, but only if indicated by a traffic study.

Study Location	Before	After	Sign Change +/- mph	85% Before After	Change mph
T.H. 65			-10	34 34	0
T.H. 65			-10	44 45	+1
Anoka CSAH 1			-5	48 50	+2
Anoka CSAH 24			+15	49 50	+1
Anoka CR 51			+5	45 46	+1
Henn. CSAH 4			-10	52 51	-1
Nobles Ave.			+5	37 40	+3
62 nd Ave. N			-5	37 37	0
Miss. St.			+5	39 40	+1

Sample Data from Study of Effectiveness of Speed Limit Signs

DESIGN FEATURES

Out of the hundreds of signs contained in the MN MUTCD, 14 types of signs are actually required. This number suggests that if an agency decides to put up a sign, most of the time that action will be based on exercising the agency's judgement and NOT on the requirements of the MN MUTCD. The following signs are required:

- **Regulatory Sign Usage**
 - Speed limits (if in an established speed zone)
 - ONE WAY/DO NOT ENTER

- Turn prohibitions
- ALL-WAY STOP supplementary plaque
- **Warning Sign Usage**
 - Railroad Crossing
 - Low Clearance
 - Advance traffic control (if sight distance to the device is limited or impaired)
 - No Train Horn
 - Horizontal alignment (for roadways with volumes greater than 1,000 vehicles per day)
- **Guide Sign Usage**
 - Route numbers (on all numbered highways)
 - Junction assembly (such as Jct US 63)
 - Advance route turn assembly
- **Low-Volume Roads**
 - Four warning signs—STOP AHEAD (if sight distance is limited), Vertical Clearance, Railroad Crossing, and minimum maintenance roads; no regulatory or guide signs are required

TYPICAL COSTS

The cost of the maintenance of signs required to meet the MN MUTCD's retroreflectivity standards depends on the following factors:

- The number of signs in the agency's inventory
- Selected replacement schedule and method
- Estimated annual cost to address vandalism and knockdowns

MnDOT's *Traffic Sign Maintenance/Management Handbook* provides an estimated cost for the next 5 years to upgrade all the signs in an agency's inventory. Using an average \$150 replacement cost per sign, costs range from \$5,400 per year for townships to over \$400,000 per year for counties for the first 5 years, depending on the number of signs in an agency's inventory.

Once all signs are up to standard, and if agencies use a 12-year blanket replacement approach (replacing 1 out of 12 signs each year, based on the 12-year warranty period), the annual costs range from \$3,600 to \$267,000 per



Traffic Signs (3 of 3)

GENERAL

year, including a 4 percent replacement rate for damage or vandalism.

The levels of investment are likely 10 to 20 times more than most agencies spend on their inventory of signs.



BEST PRACTICE

Agencies should develop and maintain an inventory of all signs on their roadway systems. Based on the inventory and policy considerations, signs that are not consistent with policy and signs that are not required or are determined by an engineering study to be unnecessary should be removed.

TORT LIABILITY

A number of agencies have expressed a concern for possible liability if they choose to take signs down. The tort law in Minnesota for highway agencies is very good, and its practice over time has identified two proven effective risk management techniques for activities associated with traffic signs: **official immunity** and **discretionary immunity**. In official immunity, agency officials should document decisions about installing (or removing) signs. For discretionary immunity, an agency's action relative to signing should be consistent with written policy. The suggested steps listed in the practice description incorporate these risk management techniques.

YOUR AGENCY IS NOW "ON THE CLOCK"

The following deadlines are based on the December 2011 MN MUTCD. However, on August 30, 2011, the Federal Highway Administration announced that it was reviewing the federal guidelines and was considering a range of actions including maintaining, extending or eliminating the current deadlines. As of the date of publication, the Federal Highway Administration has not determined a course of action and their website should be consulted for the latest information: <http://mutcd.fhwa.dot.gov/>

- **January 2012**—Document the maintenance method your agency will use to maintain retroreflectivity on its signs.
- **January 2015**—Regulatory, warning, and ground-mounted guide signs need to meet the designated minimum level of retroreflectivity.
- **January 2018**—Overhead guide and street name signs need to meet the designated minimum level of retroreflectivity.

The Federal Highway Administration included in the August announcement that "it is important to understand that elimination of a compliance date for a given Standard contained in the MUTCD does not eliminate the regulatory requirement to comply with the Standard. The Standard itself remains in the MUTCD and applies to any new installations, but the firm fixed date for replacing noncompliant devices that exist in the field is eliminated."

It is also important to understand that the possible elimination of the compliance dates has no effect on whether an agency's annual maintenance budget is sufficient to address all signs in its system. Experience has shown that there may be more risk at having signs installed that do not meet the retroreflectivity thresholds than not having signs up (or taking them down) that are not required.

SOURCES

Minnesota Manual on Uniform Traffic Control Devices. MnDOT.

Speed Limit vs. Actual Speed. MnDOT (unpublished data).

Best Practices for Traffic Sign Maintenance/Management Handbook. 2010. MnDOT.

Effectiveness of Traffic Signs on Local Roads, Minnesota Local Road Research Board, Report TRS-1002.

Putting Research into Practice: Establishing a Sign Retroreflectivity Maintenance Program, Minnesota Local Road Research Board, Report 2010-RIC02TS, 2010.



Traffic Signs Policy (1 of 2)

GENERAL

POLICY PURPOSE/INTRODUCTION

The purpose of this policy is to establish uniformity and consistency in the application, installation, and maintenance of traffic signs on *<Insert Agency>*'s roadway system.

This policy recognizes that the MN MUTCD is the standard for all traffic control devices on all public roads in Minnesota, and therefore all traffic control devices on *<Insert City>*'s highway system must conform to its standards and specifications as specified in Minnesota Statute 169.06.

This policy officially recognizes the rule in the MN MUTCD that establishes minimum retroreflectivity levels for traffic signs and describes how *<Insert Agency>* achieves compliance.

It is in the interest of *<Insert Agency>* and the public to prevent the excessive use of traffic signs on the county/city roadway system. A conservative use of traffic signs reduces maintenance costs and improves the effectiveness of the remaining signs. Limiting the excessive use of traffic signs achieves the following:

- Fulfills demonstrated needs
- Champions a command of attention
- Reduces clutter that impedes the conveyance of a clear and simple meaning
- Fosters respect by road users, and reduces conflicts that may restrict time for a proper response that cumulatively improves traffic safety for all users
- Pursues the goals of the Minnesota Toward Zero Deaths partnership in *<Insert Agency>*.

POLICY

All traffic signs on *<Insert Agency>*'s highway system must conform to the MN MUTCD. Traffic signs not explicitly required to be installed by the MN MUTCD should not be installed on *<Insert Agency>*'s highway system unless otherwise specified in this policy, or authorized by the traffic engineer or county or city engineer.



POLICY CRITERIA

Installation of Signs

The *<Insert Agency>* will develop and maintain a sign inventory of all signs on the roadway system. Based on the inventory and level of funding available for sign maintenance, *<Insert Agency>* will determine the amount of inventory that can be supported by the current funding structure.

<Insert Agency> will maintain the determined amount of traffic control devices (signs, traffic signals, and pavement markings) to ensure safe and efficient operations. Based on the inventory and policy considerations, signs that are not consistent with policy, and signs that are not required or are determined by an engineering study to be unnecessary will be removed. The following best practices will be implemented to assist in determining the need for all traffic signs:

- Signs that are required will be installed. Signs that require engineering judgment will undergo an engineering study, the results of which will be on file documenting reason for installation.
- No warning (curve, pedestrian crossing, deer signs) or regulatory (speed limit, STOP) signs on roads classified as local or residential.
- No STOP signs on low volume intersections (fewer than 200 vehicles per day).
- Traffic signs will not be used as a reactive response to traffic crashes.
- The application of warning signs will be based on system considerations; locations with similar characteristics will be proactively signed.
- Application of curve warning signs will be consistent with MN MUTCD requirements along roadways with ADT volumes greater than 1,000 vehicles per day and with the following guidelines for ADT volumes less than 1,000 vehicles per day:

Radius	Horizontal Curve Signing
Greater than 2,000 feet	No Sign
1,500 to 2,000 feet	Curve Ahead Warning Sign
1,200 to 1,500 feet	Curve Ahead Warning Sign + Speed Advisory Plaque
500 to 1,200 feet	Curve Ahead Warning Sign + Speed Advisory Plaque + Chevrons

Traffic Signs Policy (2 of 2)

GENERAL

Maintenance Method

It shall be the <Insert Agency> engineer's responsibility to decide which signs should be replaced by maintenance personnel or by contract. Compliance with MN MUTCD retroreflectivity requirements will be achieved using a management method using the expected sign life. <Insert Agency> adopts 15 years for the life of signs with ASTM Type XI sheeting material. Applicable sign life may be revisited to determine appropriate length based on the latest research.

Maintenance personnel should replace signs according to the following guidelines:

1. All signs are inspected annually for normal daytime visibility and legibility. Nighttime surveys may also be completed every few years to discover locations of vandalism or other issues. All signs not performing their function shall be repaired or scheduled for replacement.
2. Before each year's replacement program, the sign crew should review all signs. Additional signing, relocation of signing, or removal of needless signing can be incorporated into the program at this time. The available sign budget and the current inventory will be reviewed to determine feasibility of maintaining the current inventory.
3. The replacement program includes the use of the latest standards for sign design, dimensioning, mounting, and roadway location.
4. As each new sign is installed, the mounting should be checked for deterioration. Bent or excessively rusted posts should be replaced. All posts will comply with the AASHTO *Manual for Assessing Safety Hardware* for crashworthiness.