Signs 101 Manual

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Office of
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1. INTRODUCTION

1.1 Background

This is a one-day introductory Traffic Signs 101 Course that is designed to enable participants to acquire a basic understanding of how and why the determination is made to place a traffic sign at a particular site. This course serves as an introduction to for entry level traffic technicians and engineers, refresher course for experienced staff or an introduction to additional subjects related to traffic signs which may assist participants in responding to sign requests from the public.

1.2 Goals of Course

This is an introduction to traffic signs in Minnesota course. The main emphasis is to provide an overview of the lifecycle of a traffic sign from initiation, design, installation and maintenance.

At the end of each course, you will be able to:

- ✓ List the principles of traffic control devices
- ✓ Name the different functional classifications of signs
- ✓ Navigate the appropriate laws and manuals related to signing
- ✓ Note the considerations for why signs are installed
- ✓ Define the difference between advertising and traffic signs
- ✓ Describe some types of agreements used in signing
- ✓ Recognize some of the typical components used in signing
- ✓ List the typical sheets in a signing plan set
- ✓ Describe some of the maintenance responsibilities related to signs
- ✓ List some of the new technologies in traffic signing

1.3 Disclaimer

This manual is disseminated under the sponsorship of the Minnesota Department of Transportation (MnDOT), Office of Traffic, Safety and Technology. MnDOT and Albeck Gerken, Inc. assume no liability for its contents or use thereof.

MnDOT does not endorse products or manufacturers. Trademarks of manufacturer's names appear herein only because they are considered essential to the object of this manual.

1.4 Acknowledgements

The development of this Signing 101 Manual has been a result of the efforts of the MnDOT Office of Traffic, Safety and Technology (OTST) and Albeck Gerken, Inc. The contributions by Heather Lott, Rick Sunstrom, Brian Barrett and Janelle Anderson are gratefully acknowledged.

1.5 Contact Information

MnDOT's technical experts are listed below with contact information.

Exhibit 1-1 MnDOT Signing Technical Expert Contacts

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Rick Sunstrom	Rick.Sunstrom@state.mn.us	651-234-7381
Brian Barrett	brian.barrett@state.mn.us	651 234-7374

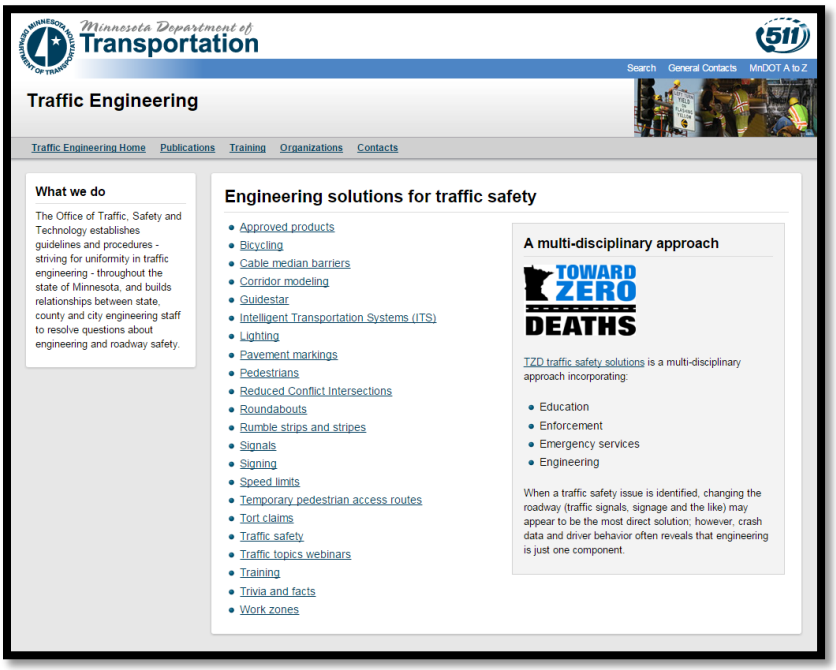
1.6 MnDOT OTST Website

The MnDOT Office of Traffic, Safety and Technology website (see **Exhibit 1-2**) includes a wide variety of traffic engineering information, including traffic signing. The website can be visited by going to:

http://www.dot.state.mn.us/trafficeng/.

Click on the links on the right side to proceed to the appropriate Traffic Engineering Site.

Exhibit 1-2 MnDOT OTST Website



1.7 Glossary of Terms

The following is a handout from Chapter 6 of the Traffic Engineering Manual (TEM) Glossary of Terms. The original document can be downloaded from the OTST website, publications link:

www.dot.state.mn.us/trafficeng/publ/index.html.

HANDOUT

6-2.00 GLOSSARY

A-Frame
The combination of vertical flanged channel sign posts with knee braces and lateral framing to form an assembly to which a sign panel is mounted.

Attrition
The process of evaluating existing traffic control devices and removing and/or replacing devices that no longer meet standards through scheduled construction or routine maintenance activities.

Breakaway Supports
Supports designed to yield when struck by an errant vehicle, thereby minimizing injury to occupants of the vehicle and damage to the vehicle itself. Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, published by the American Association of State Highway and Transportation Officials, indicates acceptable performance standards and dynamic test conditions.

Business Panel
A separately attached sign panel that shows, either individually or in combination, the brand, symbol, trademark, or logo of the business service.

Cone of Vision
A fan-shaped field of view extending in front of a vehicle operator.

Conventional Road – Single Lane
A two-lane, two-way trunk highway.

Conventional Road – Multilane
An undivided highway with more than one lane in each direction of travel and having a posted speed equal to or less than 60 mph or a divided highway with more than one lane in each direction of travel and having a posted speed equal to or less than 55 mph.

Direct Applied
Adhesive-backed pressure sensitive retroreflective sheeting.

Expressway
A high speed, multilane, divided highway which is generally an arterial road with a posted speed greater than 55 mph. Most intersections are at-grade, although grade separated interchanges may exist.

Extruded Section
An aluminum channel substrate 6 inches or 12 inches in height.

Freeway
A divided highway with full control of access.

Intersection
(a) The area embraced within the prolongation or connection of the lateral curb lines or, if none, then the lateral boundary lines of the roadways of two highways which join one another at, or approximately at, right angles or the area within which vehicles traveling upon different highways joining at any other angle may come in conflict.

(b) Where a highway includes two roadways 30 feet or more apart, then every crossing of each roadway of such divided highway by an intersecting highway shall be regarded as a separate intersection. In the event such intersecting highway also includes two roadways 30 feet or more apart, then every crossing of two roadways of such highways shall be regarded as a separate intersection. Minn. Stat. Sec. 169.011, Subd. 36.

Iso-tacs
Lines of equal wind velocity given in various mean recurrence intervals.

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Knee Brace
A flanged channel sign post attached diagonally to a riser post or a lateral brace to increase stability of the sign structure.

Local Road
Any road that is not a trunk highway.

Overlay
A thin, flat aluminum sheet with sign face material applied, which is bolted or pop riveted to a sign panel.

Primary Guide Signs (freeways and expressways)
These signs consist of advance guide signing, exit directional signs, exit gore signs, destination, and distance signs.

Screening Process
Method of sign fabricating by screen printing with colored inks (pastes) over a given retroreflective sheeting.

Shop Drawing
Detail drawings of sign structures indicating materials used, dimensions, and fabricating processes.

Sign Base Material or Sign Blank (Substrate)
Sheet aluminum joined by backup splice plates, or extruded sections bolted together to form a flat surface.

Sign Face Material
Retroreflective or non-retroreflective sheeting material applied to the sign substrate.

Specific Service
Restaurants; rural agricultural or tourist-oriented businesses; places of worship; gasoline service stations and other retail motor fuel businesses; and motels, resorts, or recreational camping areas that provide sleeping accommodations for the traveling public. Minn. Stat. Sec. 160.292, Subd. 21.

Specific Service Sign
A rectangular sign panel displaying the name or optional business panel, or both, of a rural agricultural or tourist-oriented business, place of worship, motel, restaurant, resort, recreational camping area, or gasoline service station or other retail motor fuel business and, where appropriate, the direction to and distance to the rural agricultural or tourist-oriented business, place of worship, recreational camping area, motel, restaurant, resort, or gasoline service station or other retail motor fuel business. Minn. Stat. Sec. 160.292, Subd. 22.

Tourist-Oriented Business
(a) "Tourist-oriented business" means a business, service, or activity that receives the major portion of its income or visitors during the normal business season from motorists not residing in the immediate area of the business or activity.

(b) "Tourist-oriented business" includes, but is not limited to (1) a greenhouse or nursery, (2) a bait and tackle shop, (3) a marina, and (4) a gift or antique shop. Minn. Stat. Sec. 160.292, Subd. 25.

Spliced U-Post
The combination of two flanged channel sign posts nested together and bolted to obtain the desired post length.

Square Tube
A square steel tube formed of 10 or 12 gauge steel rolled to size and welded in the corners. Tubes have holes spaced at one inch intervals on all four sides along the entire length of the tube.

Stringer
A lateral structural member forming a frame to which the sign panel is attached. They also may provide additional strength to the assembly. Type D signs generally utilize flanged channel sign posts as stringers.

HANDOUT

Supplemental Guide Signs

Guide signs which further orient the driver to geographical identification and secondary destinations. Destinations include cities, motorist services, and state parks. Exit numbers are included on freeway signs.

Trunk Highway

Any highway or segment of highway, including the interstates, under the jurisdiction of the State of Minnesota.

U-Post (Flanged Channel Sign Post)

A steel post of a channel or modified channel design, with flanges against which a sign panel will be placed. Holes are punched at a uniform spacing along the centerline of the back of the post.

Wind Loading

The pressure of the wind on the horizontal and vertical supports of a structure are given in Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, published by the American Association of State Highway and Transportation Officials.

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2. SIGNING OVERVIEW

2.1 Purpose of Signs

One cannot over emphasized the importance of good signing since national studies indicate that deficient signing is the number one complaint of 60 percent of drivers and is the third leading cause of crashes. In addition, sign improvements have one of the highest benefit-to-cost ratio of all safety improvements.

Traffic signs regulate, warn, and guide motorists, pedestrians, and other traffic on all public roads. The traffic sign is the most commonly used traffic control device, and it is the oldest device for controlling, safe guarding, and expediting traffic. Signs are not ordinarily needed to confirm the basic rules of the road, but they are essential to inform highway users of specific regulations, to warn users where hazards are not self-evident, and to furnish information and guidance.

The Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) provides legal standards, allowable limits, and alternatives for the design, use, and application of traffic signs. The purpose of this chapter is to describe typical applications and procedures related to placement of traffic signs on MnDOT streets and highways.

Since the basic principles of signing are set forth in the MN MUTCD and must be adhered to, the engineers, technicians, and maintenance personnel responsible for the design, selection, and placement of these devices should have ready access to and be familiar with the MN MUTCD. The MUTCD is discussed in more detail throughout this manual.

2.2 What is Retroreflectivity?

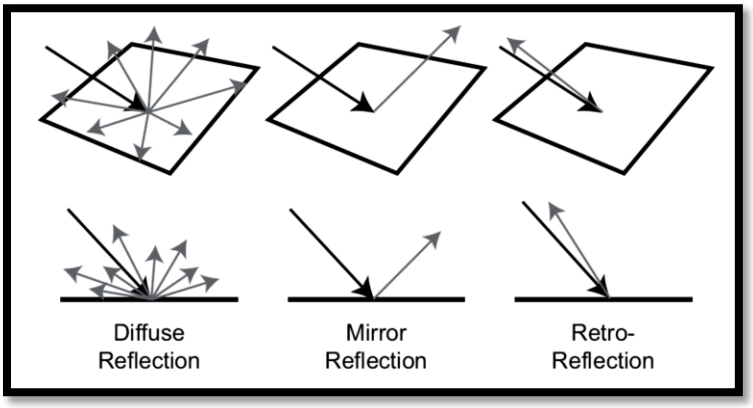
The MUTCD requires traffic signs to be either retroreflective or illuminated to show the same shape and color both day and night. Since it is more cost effective to make signs retroreflective than it is to illuminate them, retroreflective sheeting material is used on all signs.

Most objects reflect light. The most common type of reflection is “diffuse reflection” where light scatters after striking rough surfaces such as trees, clothing and carpet. Only a very small amount of the diffused light reflects back toward the light source.

Another type of reflection is “mirror reflection” that occurs when light strikes smooth or glossy surfaces, and the light reflects off the surface at an equal but opposite angle. Mirror reflection frequently occurs at night on wet roads when the headlights of approaching vehicles create extensive glare. Sign faces also produce some mirror reflection due to their glossy surfaces, and for this reason; it is a good practice to rotate signs away from the driver.

In contrast, “retroreflection” is the unique ability of a surface to reflect light back toward the light source, and “retroreflectivity” is the measurable property of a material to redirect light back to its source.

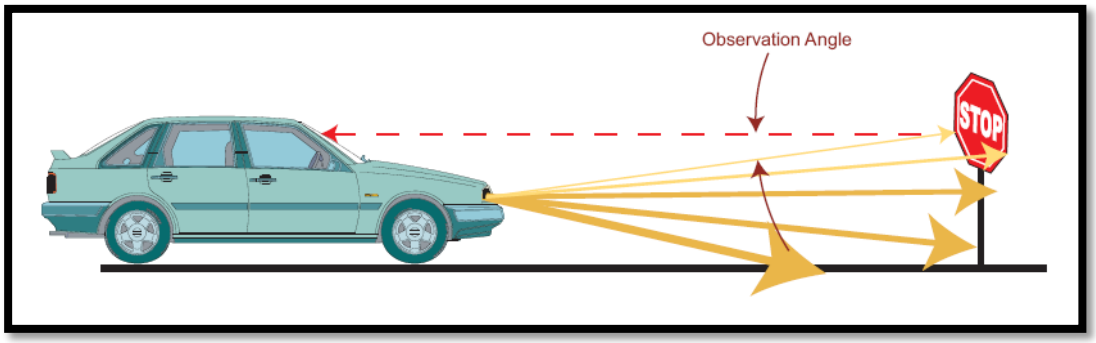
Exhibit 2-1 Types of Retroreflection



2.2.1 Retroreflective Sheeting Materials

To make signs retroreflective, sign manufacturers apply retroreflective sheeting, which contains either microscopic glass beads or cube corner reflectors, to the face of each sign. If the sheeting manufacturers could make all glass beads and cube corner reflectors perfectly shaped, all reflected light would return directly to the light source (headlights). Although retroreflective sheeting does not have perfectly shaped lenses, drivers do see more reflected light the closer their eyes are to the headlights. As illustrated in **Exhibit 2-2**, the angle formed between the headlights, the sign and the driver's eyes is the observation angle, and the smaller the angle the higher the retroreflectivity.

Exhibit 2-2 Graphic Illustration of the Observation Angle



Retroreflective materials are also more efficient when the light source is approximately perpendicular to the sign face; therefore, it is important to have signs oriented to face approaching traffic.

The ability to see traffic signs at night is a function of the following:

- ✓ Driver's night vision.
- ✓ Intensity and light distribution of the headlights.
- ✓ Distance, mounting height, and orientation of the sign in relation to the vehicle's headlights.
- ✓ Location of driver's eyes with respect to the headlights.
- ✓ Type, color and age of the retroreflective material.

2.2.2 Why is Retroreflectivity Important?

The nighttime visibility of signs and pavement markings is essential for highway safety. National studies show that 50 percent or more of all fatal crashes occur at night despite lower travel volumes. In fact, the average fatality rate (fatalities per 100 million vehicle-miles of travel) is about three times higher during the night than during the day.

Some of the factors that contribute to higher nighttime crash rates include:

- ✓ After age 20, the human eye needs about twice as much light approximately every 12 years in order to read. For example, compared to a 20-year old driver, a 32-year old driver needs twice as much light, a 44-year old driver needs four times as much light, a 56-year old driver needs eight times as much light, and a 68-year old driver needs 16 times as much light.
- ✓ The number of visual clues that delineate the roadway alignment are reduced at night.
- ✓ Glare from opposing traffic further reduces the number of visual clues.
- ✓ Rain, snow, fog, dew and frost reduce visibility distances.
- ✓ There are more intoxicated and sleepy drivers.

Some traffic signs may look almost new during the day but are completely ineffective at night. This nighttime visibility problem is usually a function of the type and age of the retroreflective material.

Exhibit 2-3 Stop Sign Retroreflectivity difference Day vs. Night

Stop Signs During the Day

Stop Sign During the Night

2.2.3 Minimum Retroreflectivity

In 1993, Congress directed the U.S. Secretary of Transportation to include minimum retroreflectivity values for traffic signs in the Federal MUTCD. Following extensive research and public input, FHWA adopted minimum retroreflectivity values for most traffic signs on December 21, 2007, and incorporated them into the MUTCD (Revision 2 of the 2003 Edition). Specifically, Section 2A-09 and Table 2A-1 of the MUTCD contain the new criteria.

2.3 Five Principles of Traffic Control Devices

As stated in the MN MUTCD Section 1A.2, in order for traffic signs to be effective, they should meet the following basic requirements:

1. Fulfill a need
2. Command attention
3. Convey a clear, simple meaning
4. Command respect from road users
5. Give adequate time for proper response

Design, placement, operation, maintenance, and uniformity are aspects that should be carefully considered in order to maximize the ability of a traffic control device to meet the five requirements listed in the previous paragraph. Vehicle speed should be carefully considered as an element that governs the design, operation, placement, and location of various traffic control devices.

Item 2, 3 and 4 in the list are mostly covered by how the sign is designed. That is, addressed by following the design rules and policies as set forth in the appropriate documents. Item 1 and 5 are the engineering behind signing. That is, the sign must fulfill a given need (be justified) and the placement should be such to give adequate time for the driver to respond.

2.4 Classification of Signs

As noted in Section 2A.5 of the MN MUTCD, there are three classifications of signs:

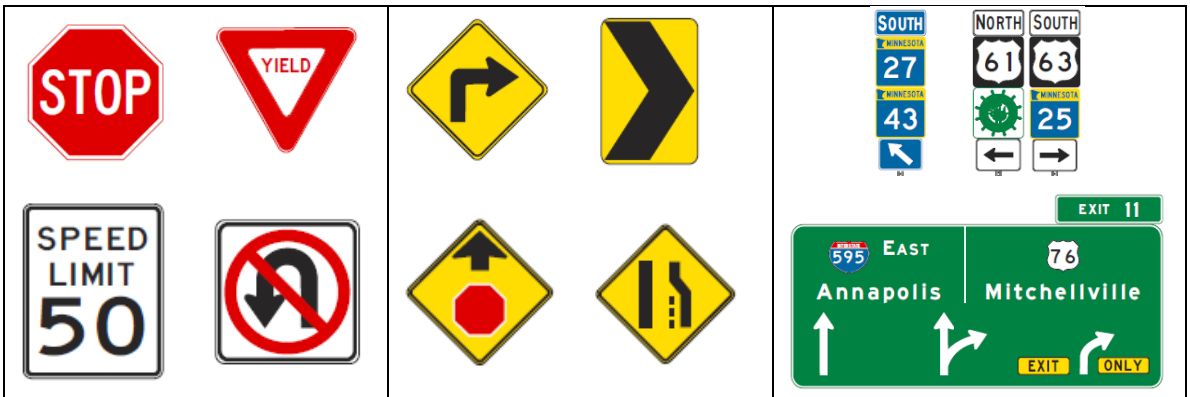
A. Regulatory signs give notice of traffic laws or restrictions (See Section **4.2**)

B. Warning signs give notice of a situation that might not be readily apparent (See Section **4.3**).

C. Guide signs show route designations, destinations, directions, distances, services, points of interest and other geographical, recreational, or cultural information (See Section **4.4**).

Exhibit 2-4 illustrates some examples of Regulatory, Warning and Guide Signs.

Exhibit 2-4 Sample Regulatory, Warning and Guide Signs



Sample Regulatory Signs	Sample Warning Signs	Sample Guide Signs

2.5 Design of Signs

The primary purpose of the MN MUTCD is to improve safety and reduce driver frustration by promoting uniformity in the design and application of traffic control devices. Uniform designs and applications of traffic signs help everyone, because as drivers we can see and understand the sign messages, and the systematic advance placement of warning signs provide sufficient notice for us to take appropriate actions.

To that end, the MN MUTCD (see Section **2.7.2**) establishes the basic framework for the design and application of signs, and the *Standard Highway Signs and Markings* manual (see Section **2.7.4**) provides detailed drawings of the standard signs and alphabets.

The MN MUTCD also states in Section 2A.06:

> "Except as provided in the option below and except for the Carpool Information (D12-2) sign (see Section 2I.11), Internet addresses and e-mail addresses, including domain names and uniform resource locators (URL),shall not be displayed on any sign, supplemental plaque, sign panel (including logo sign panels on Specific Service signs) or changeable message signs."

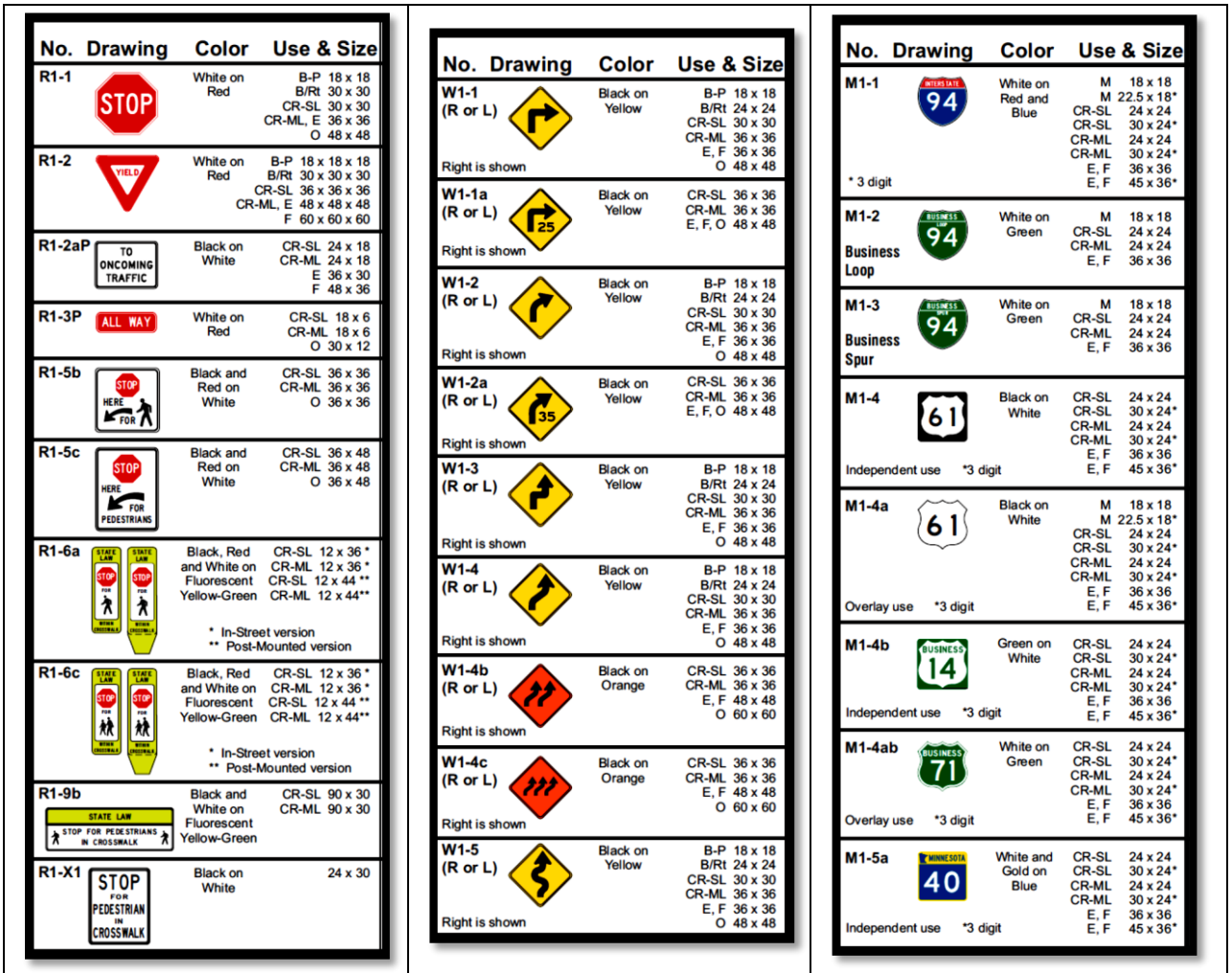
2.5.1 Sign Nomenclature

The Standard Signs Summary (see Section **2.7.5**) defines a unique nomenclature to all common types of traffic signs. The first letter in sign nomenclature conforms to the following:

- ✓ R Series: Regulatory
- ✓ W Series: Warning
- ✓ M Series: Route Markers and Auxiliaries
- ✓ G Series: Construction Information
- ✓ S Series: School Warning
- ✓ D Series: Guide Signs - Conventional Roads
- ✓ I Series: Informational
- ✓ E Series: Guide Signs - Expressway, Freeway
- ✓ X Series: Miscellaneous

Exhibit 2-5 shows examples of sign nomenclature as listed in the 2013 Standard Signs Summary (www.dot.state.mn.us/trafficeng/publ/index.html). The "No." in the left-hand column of the figure shows the sign number (nomenclature).

Exhibit 2-5 Sample Sign Nomenclature



No.	Drawing	Color	Use & Size
R1-1	STOP	White on Red	B-P 18 x 18 B/Rt 30 x 30 CR-SL 30 x 30 CR-ML, E 36 x 36 O 48 x 48
R1-2	YIELD	White on Red	B-P 18 x 18 x 18 B/Rt 30 x 30 x 30 CR-SL 36 x 36 x 36 CR-ML, E 48 x 48 x 48 F 60 x 60 x 60
R1-2aP	TO ONCOMING TRAFFIC	Black on White	CR-SL 24 x 18 CR-ML 24 x 18 E 36 x 30 F 48 x 36
R1-3P	ALL WAY	White on Red	CR-SL 18 x 6 CR-ML 18 x 6 O 30 x 12
R1-5b	STOP HERE FOR	Black and Red on White	CR-SL 36 x 36 CR-ML 36 x 36 O 36 x 36
R1-5c	STOP HERE FOR PEDESTRIANS	Black and Red on White	CR-SL 36 x 48 CR-ML 36 x 48 O 36 x 48
R1-6a	STATE LAW STOP FOR PEDESTRIANS WITHIN CROSSWALK	Black, Red and White on Fluorescent Yellow-Green	CR-SL 12 x 36 * CR-ML 12 x 36 * CR-SL 12 x 44 ** CR-ML 12 x 44**
			* In-Street version ** Post-Mounted version
R1-6c	STATE LAW STOP FOR PEDESTRIANS WITHIN CROSSWALK	Black, Red and White on Fluorescent Yellow-Green	CR-SL 12 x 36 * CR-ML 12 x 36 * CR-SL 12 x 44 ** CR-ML 12 x 44**
			* In-Street version ** Post-Mounted version
R1-9b	STATE LAW STOP FOR PEDESTRIANS IN CROSSWALK	Black and White on Fluorescent Yellow-Green	CR-SL 90 x 30 CR-ML 90 x 30
R1-X1	STOP FOR PEDESTRIAN IN CROSSWALK	Black on White	24 x 30

No.	Drawing	Color	Use & Size
W1-1 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W1-1a (R or L)	25 Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 x 48
W1-2 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W1-2a (R or L)	35 Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 x 48
W1-3 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W1-4 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W1-4b (R or L)	Right is shown	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48 O 60 x 60
W1-4c (R or L)	Right is shown	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48 O 60 x 60
W1-5 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48

No.	Drawing	Color	Use & Size
M1-1	INTERSTATE 94 * 3 digit	White on Red and Blue	M 18 x 18 M 22.5 x 18* CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-2 Business Loop	BUSINESS LOOP 94	White on Green	M 18 x 18 CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
M1-3 Business Spur	BUSINESS SPUR 94	White on Green	M 18 x 18 CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
M1-4	61 Independent use *3 digit	Black on White	CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-4a	61 Overlay use *3 digit	Black on White	M 18 x 18 M 22.5 x 18* CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-4b	BUSINESS 14 Independent use *3 digit	Green on White	CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-4ab	BUSINESS 71 Overlay use *3 digit	White on Green	CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-5a	MINNESOTA 40 Independent use *3 digit	White and Gold on Blue	CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*

R Series | W Series | M Series

2.5.2 Elements of Traffic Sign Design

Elements of sign design include shape, color, size, legend, border, retro-reflective properties, illumination, and uniformity. These elements are discussed in the MN MUTCD; however, some permitted alternatives are as follows.

If there is more than one sign panel on an overhead sign structure and the sheeting is being replaced on one sign panel, the sheeting shall be replaced on all of the sign panels.

2.5.3 Shape

Sign shapes should be designed as stated in the MN MUTCD, except that it is the policy in Minnesota to use the rectangular shape (rather than trapezoidal) for recreation area signs (see **Exhibit 2-6**).

Exhibit 2-6 Use of Sign Shapes (Source: MN MUTCD Table 2A-4)

Shape	Signs
Octagon	Stop *
Equilateral Triangle (1 point down)	Yield *
Circle	Grade Crossing Advance Warning *
Pennant Shape / Isosceles Triangle (longer axis horizontal)	No Passing *
Pentagon (pointed up)	School Advance Warning Sign (squared bottom corners) * County Route Sign (tapered bottom corners) *
Crossbuck (two rectangles in an "X" configuration	Grade Crossing *
Diamond	Warning Series
Rectangle (including square)	Regulatory Series Guide Series ** Warning Series
Trapezoid	Recreational and Cultural Interest Area Series National Forest Route Sign

* This sign shall be exclusively the shape shown.
** Guide series includes general service, specific service, tourist -oriented directional, general information, recreational and cultural interest area, and emergency management signs.

2.5.4 Color

General Provisions

Black: Used as legend color for signs with orange, white or yellow backgrounds. Black also is used as the background color for some regulatory signs.

Blue: Indicates services available to road users. It is used as the background color in motorist information signs, interstate, Minnesota, and county route markers, and auxiliary markers. Blue is not used as a legend color except on Adopt-a-Highway signing.

Brown: Indicates recreational and cultural facilities. It is used only as the background color in recreational and cultural interest signs. It is not used as a legend color.

Green: Indicates movement permitted or gives directional guidance. It is used as the background color in guide signs and as the legend color in permissive parking signs.

Orange: Warns of temporary traffic conditions with a higher than normal potential hazard level. It is used as the background color in temporary traffic control signs and is most commonly seen in construction zones. It is not used as a legend color.

Red: Indicates right-of-way control, prohibition or exclusion. It is used as the background color for STOP, DO NOT ENTER, WRONG WAY, and interstate route marker signs and as the legend color for YIELD, parking prohibition and prohibitory (circular with slash) signs.

White: White either indicates a law, regulation or legal requirement in effect at or near the sign or provides directional guidance. It is used as the background color for regulatory signs, route markers and route marker auxiliaries. It also is used as the legend color for signs with a black, blue, brown, green or red background.

Yellow: Warns of a potential hazard. It is used as the background color for warning signs and as the legend color for county route marker signs.

Fluorescent-Yellow Green: Designated for use as background color for warning signs and their supplemental plaques associated with pedestrians, bicyclists, playgrounds and schools. SCHOOL plaque is also included.

Fluorescent Pink: Incident Management

Purple: Electronic Toll Accounts (ETC) such as Minnesota's MnPASS lanes. More details on color usage can be found in the MN MUTCD Section 2F.3.

2.5.5 Size

In general, the following items control the size of the sign:

- ✓ Message on sign
- ✓ Font use for text
- ✓ Letter and object spacing
- ✓ Borders and margins

An accepted "rule-of-thumb" to follow for legibility for signs other than Interstate is to have 1 inch of letter height for every 30 feet of desired legibility. Whenever practicable, the overall dimensions of the sign plates should be in multiples of 6 inches.

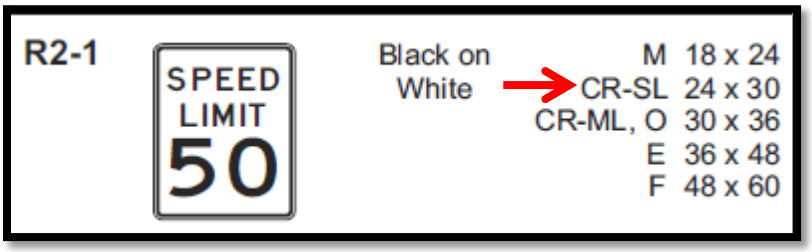
Standard Signs

Both sign and letter size have been established for standard signs (regulatory, warning, etc). The Federal Manual on Uniform Traffic Control Devices sets forth criteria establishing the series of letters to be used and the spacing between letters for these two classifications of signs. The resulting sign sizes are listed in the Minnesota Standard Signs Summary (see Section **2.7.5**). The size of the sign selected is than based on the type of roadway and speed.

Speed Limit Sign Size Example

Consider the size of a speed limit sign for a conventional road with a single lane. In the Standard Signs Summary, this would be found in the "R" series signs on page 1 (see **Exhibit 2-7**). In this case, the sign would be 24" x 30". This is roughly the size of a full size (22" x 34") plan set.

Exhibit 2-7 Speed Limit Sign, R2-1 Sizing



Now consider a speed limit sign on a freeway. In this case, the sign also includes a "Minimum" speed sign. For this instance, the size of the sign is 48" x 96" (see **Exhibit 2-8**). This is larger than a standard front door to a house (typically 36" x 80"). See **Exhibit 2-9** for a relative size comparison.

Exhibit 2-8 Speed Limit Sign, R2-4b Sizing

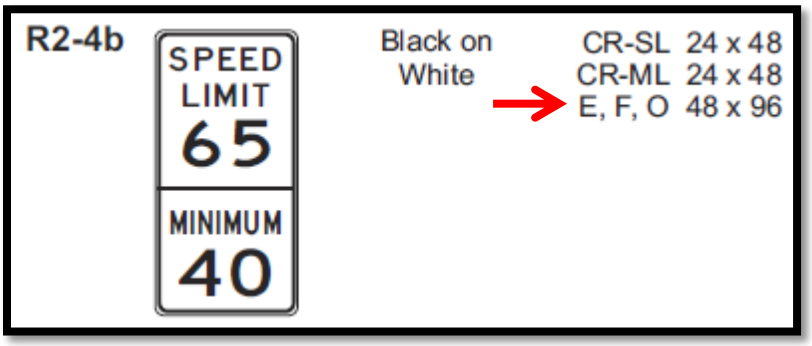
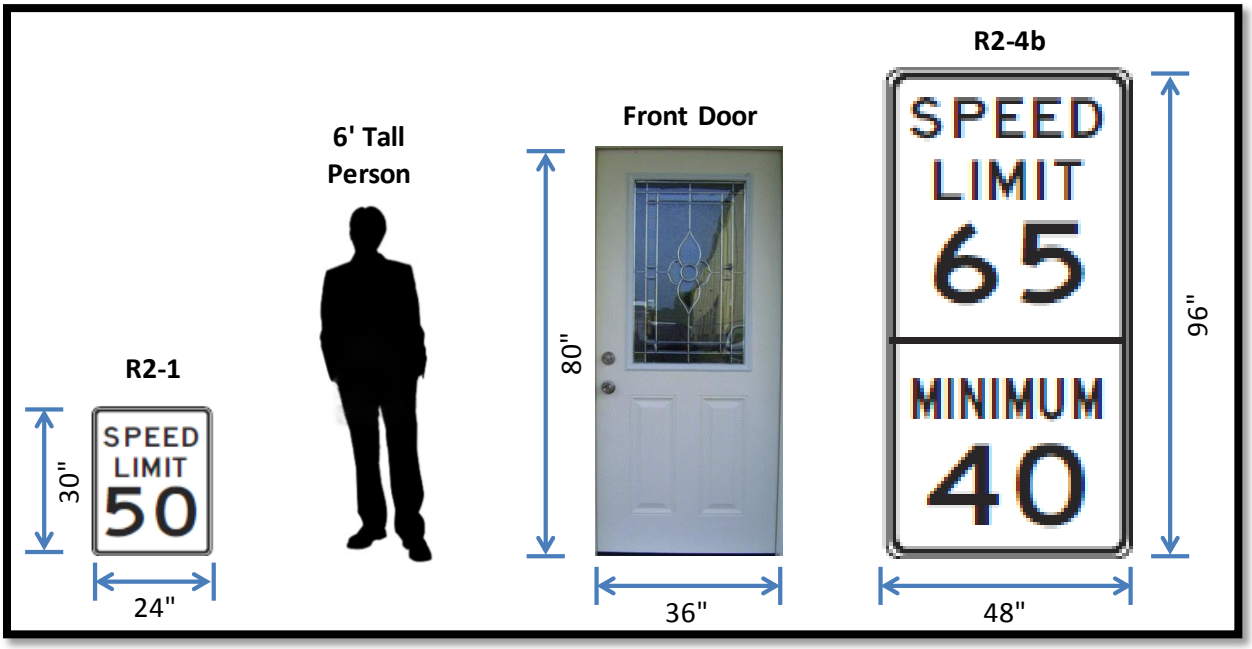


Exhibit 2-9 Relative Size Comparison of Signs



Guide Signs

For guide signs, only minimum sizes have been established. The letter size needed to give motorists ample opportunity to read a sign easily at normal approach speed will, in general, determine the size of sign needed. Sign design is dependent upon many variables:

1. The sign reading behavior of drivers is a highly adaptive process - the manner in which a driver obtains information from a sign heavily depends on the following factors:
    a. Visual loads on the driver's visual information acquisition and processing functions
    b. Driver's informational need
        i. type of informational need
        ii. urgency associated in obtaining information
        iii. driver's familiarity with the route
    c. Size of letters displaying information on the sign
    d. Amount of message displayed on the signs and its relevancy to driver's informational need
    e. Driver's visual capabilities
    f. Vehicle velocity
    g. Location of the sign with respect to the path of the driver

Drivers do not concentrate on a sign until they obtain the required information from the sign - they share their time between the sign, objects on the road and performing other driving tasks.

The SignCAD® program is currently used by MnDOT staff in designing guide signs. The software will assist in sizing the sign based on the legend and objects placed on the sign panel. On a two-way highway, the font size is typically 6”. However, on a freeway section, the font size is 16”. See **Exhibit 2-10** for a relative guide sign size comparison comparing an overhead freeway sign to a 6’ tall person.

Exhibit 2-10 Relative Size Comparison for Guide Sign

2.5.6 Legend

MnDOT's preferred practice is to use symbol messages when the MN MUTCD allows the use of word messages as alternatives to symbols.

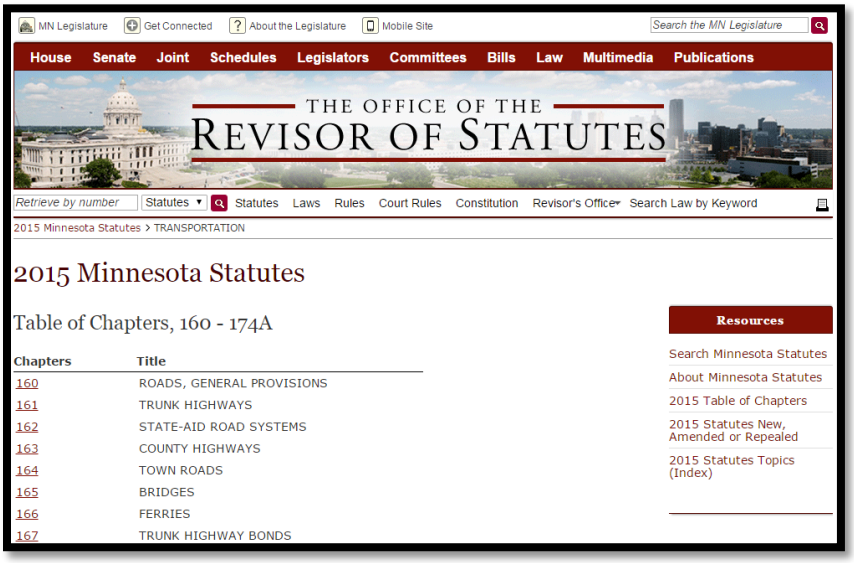
New warning or regulatory symbol signs not readily recognizable by road users should be accompanied by an educational plaque which is to remain in place for at least three years after initial installation.

It is MN MUTCD Standard to use upper/lower case lettering on all guide signs with proper name destinations. The SignCAD® program is currently used by MnDOT staff in designing guide signs. Contact OTST for technical assistance in the design of guide signs and usage of this program.

2.6 Legal Authority for Placement of Traffic Signs

Legal authority for the placement of signs is found in the Minnesota Statutes. Chapters 160 to 174A cover Transportation. The Statutes can be found at https://www.revisor.mn.gov/statutes/.

Exhibit 2-11 Minnesota Statutes Website



2.6.1 Traffic Signs Installed by MnDOT Maintenance Forces

Minnesota Statute (MS) 169.06, subd.2, provides that the Commissioner of Transportation (Commissioner) shall place and maintain traffic signs conforming to the MN MUTCD and the MnDOT Standard Specifications for Construction as deemed necessary to regulate, warn, or guide traffic on the Minnesota trunk highway system. MnDOT district traffic offices and maintenance forces act as agents of the Commissioner in this duty. Additional Statutes may also be applicable.

2.6.2 Traffic Signs Installed by Contract

Under the provisions of MS 161.32, subd.1, the Commissioner may elect to conduct sign installation work by construction contract rather than by maintenance forces. Additional statutes may also be applicable.

2.6.3 Traffic Signs Installed by Others by Maintenance Permit

Under the provision of MS 169.06 subd. 2, the Commissioner may authorize others to install approved traffic signs by maintenance permit (MnDOT Form 1723). All signs shall conform to the MN MUTCD, Minnesota Standard Specifications for Construction, this Manual, and any specific conditions outlined in the permit. District traffic engineers should approve all sign installations to ensure that all applicable standards and practices are followed. Additional statutes may also be applicable.

2.6.4 Temporary Traffic Control Signs Installed by Construction Contracts and Public Utility Companies at Work Sites

The MN MUTCD, Part 6, Temporary Traffic Control provides standards and guidelines for placing traffic control signs at work sites to protect the public, workers, and equipment. Section 6A covers the legal responsibility of authorities having jurisdiction to comply with the requirements of Part 6.

2.7 Associated Manuals

There are a variety of manuals related to highway signs in Minnesota. In this section, some of the more common manuals are presented.

2.7.1 Federal Manual on Uniform Traffic Control Devices

The Federal Highway Administration (FHWA) publishes the MUTCD, which contains all national design, application, and placement, standards, guidance, options, and support provisions for traffic control devices. At the time of publication of this manual, the 2009 edition dated December of 2009 is the current version. The national MUTCD website is located at:

http://mutcd.fhwa.dot.gov/index.htm.

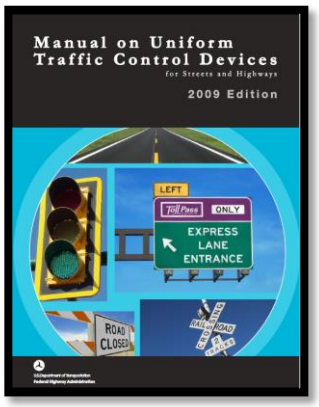
The purpose of the MUTCD is to provide uniformity of these devices, which include signs, signals, and pavement markings, to promote highway safety and efficiency on the Nation's streets and highways.

Title 23 of the Code of Federal Regulations requires all States to do one of three things within two years after a new national MUTCD edition is issued or any national MUTCD amendments are made:

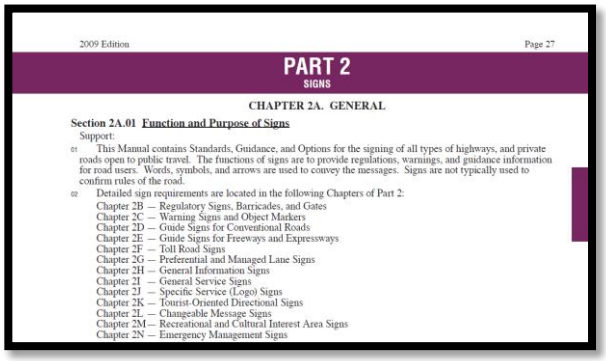
1. adopt the new or revised national MUTCD as the standard for traffic control devices in the State;
2. adopt the national MUTCD with a State Supplement that is in substantial conformance with the new or revised national MUTCD; or
3. adopt a State MUTCD that is in substantial conformance with the new or revised national MUTCD.

Minnesota develops and adopts a State MUTCD (3 above) that is in substantial conformance with the national MUTCD.

Exhibit 2-12 Federal MUTCD



Chapter 2 of the Federal MUTCD related to Traffic Signs



2009 Edition Page 27

PART 2
SIGNS

CHAPTER 2A. GENERAL

Section 2A.01 Function and Purpose of Signs

Support:

01 This Manual contains Standards, Guidance, and Options for the signing of all types of highways, and private roads open to public travel. The functions of signs are to provide regulations, warnings, and guidance information for road users. Words, symbols, and arrows are used to convey the messages. Signs are not typically used to confirm rules of the road.

02 Detailed sign requirements are located in the following Chapters of Part 2:

Chapter 2B — Regulatory Signs, Barricades, and Gates
Chapter 2C — Warning Signs and Object Markers
Chapter 2D — Guide Signs for Conventional Roads
Chapter 2E — Guide Signs for Freeways and Expressways
Chapter 2F — Toll Road Signs
Chapter 2G — Preferential and Managed Lane Signs
Chapter 2H — General Information Signs
Chapter 2I — General Service Signs
Chapter 2J — Specific Service (Logo) Signs
Chapter 2K — Tourist-Oriented Directional Signs
Chapter 2L — Changeable Message Signs
Chapter 2M — Recreational and Cultural Interest Area Signs
Chapter 2N — Emergency Management Signs

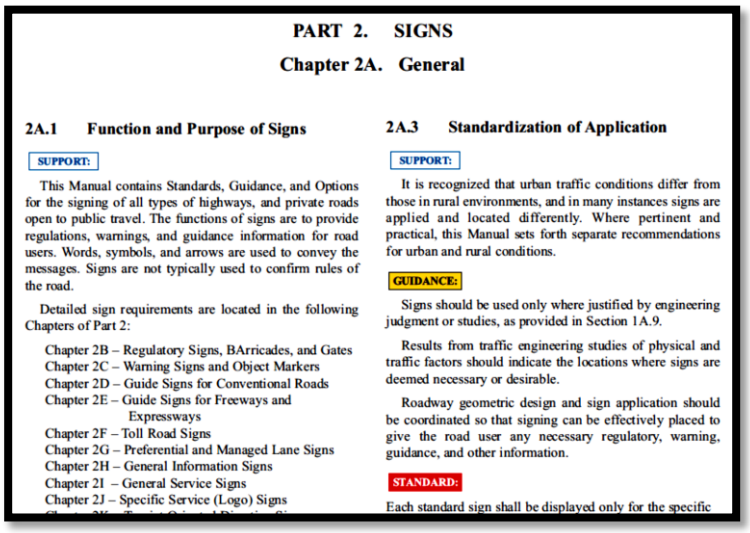
The Federal MUTCD is not just a "policy". It is not a MnDOT document. It applies to all public roads in the United States. The MUTCD is part of Federal Law and the MN MUTCD is part of State Law. The Federal government issues the MUTCD and gives states a certain amount of time to adopt it, or lose federal funding. Some states adopt it "as is", many states publish a supplement. Minnesota re-writes the document. Those that re-write can be more conservative, but not less. State Law, trumps the federal manual.

2.7.2 Minnesota Manual on Uniform Traffic Control Devices

As noted above, Minnesota develops and adopts a state MUTCD that is in substantial conformance with the Federal MUTCD. The Minnesota MUTCD (MN MUTCD) was recently updated in July 2013. Chapter 2 of the MN MUTCD is dedicated to traffic signs.

Exhibit 2-13 Minnesota MUTCD

Chapter 2 of the MN MUTCD related to Traffic Signs



PART 2. SIGNS

Chapter 2A. General

2A.1 Function and Purpose of Signs

SUPPORT:

This Manual contains Standards, Guidance, and Options for the signing of all types of highways, and private roads open to public travel. The functions of signs are to provide regulations, warnings, and guidance information for road users. Words, symbols, and arrows are used to convey the messages. Signs are not typically used to confirm rules of the road.

Detailed sign requirements are located in the following Chapters of Part 2:

Chapter 2B – Regulatory Signs, BArricades, and Gates
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Chapter 2E – Guide Signs for Freeways and Expressways
Chapter 2F – Toll Road Signs
Chapter 2G – Preferential and Managed Lane Signs
Chapter 2H – General Information Signs
Chapter 2I – General Service Signs
Chapter 2J – Specific Service (Logo) Signs

2A.3 Standardization of Application

SUPPORT:

It is recognized that urban traffic conditions differ from those in rural environments, and in many instances signs are applied and located differently. Where pertinent and practical, this Manual sets forth separate recommendations for urban and rural conditions.

GUIDANCE:

Signs should be used only where justified by engineering judgment or studies, as provided in Section 1A.9.

Results from traffic engineering studies of physical and traffic factors should indicate the locations where signs are deemed necessary or desirable.

Roadway geometric design and sign application should be coordinated so that signing can be effectively placed to give the road user any necessary regulatory, warning, guidance, and other information.

STANDARD:

Each standard sign shall be displayed only for the specific

The MN MUTCD contains Standards, Guidance, and Options for the signing of all types of highways, and private roads open to public travel. Detailed sign requirements are located in the following Chapters of Part 2 of the MN MUTCD:

- ✓ Chapter 2B — Regulatory Signs, Barricades, and Gates
- ✓ Chapter 2C — Warning Signs and Object Markers
- ✓ Chapter 2D — Guide Signs for Conventional Roads
- ✓ Chapter 2E — Guide Signs for Freeways and Expressways
- ✓ Chapter 2F — Toll Road Signs
- ✓ Chapter 2G — Preferential and Managed Lane Signs
- ✓ Chapter 2H — General Information Signs
- ✓ Chapter 2I — General Service Signs
- ✓ Chapter 2J — Specific Service (Logo) Signs
- ✓ Chapter 2K — Tourist-Oriented Directional Signs
- ✓ Chapter 2L — Changeable Message Signs
- ✓ Chapter 2M — Recreational and Cultural Interest Area Signs
- ✓ Chapter 2N — Emergency Management Signs

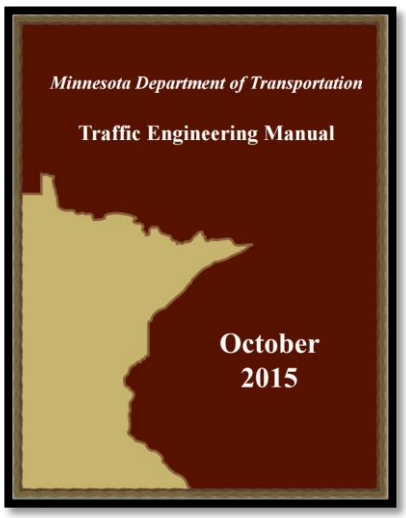
2.7.3 Traffic Engineering Manual

The Traffic Engineering Manual (TEM) is issued and updated by the MnDOT Office of Traffic, Safety, and Technology (OTST). The purpose of the TEM is to establish uniform guidelines and procedures, primarily for use by personnel at MnDOT. Counties, cities, and local units of government will also find this manual useful when striving for uniformity in traffic engineering throughout the state of Minnesota. It is the intent of this Manual to set forth accepted practices, procedures, and guidelines, chiefly for the sake of uniformity of application, but there is no legal requirement for their use.

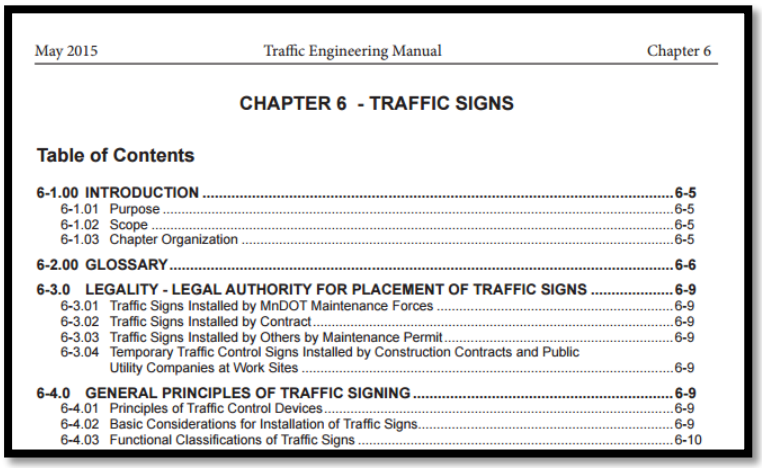
The TEM contains 14 chapters. Chapter 6 is related to Traffic Signs (see **Exhibit 2-14**). The most current version of the TEM can be found at:

http://www.dot.state.mn.us/trafficeng/publ/tem/index.html

Exhibit 2-14 MnDOT Traffic Engineering Manual (TEM)



Chapter 6 of the TEM related to Traffic Signs



May 2015 Traffic Engineering Manual Chapter 6

CHAPTER 6 - TRAFFIC SIGNS

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Chapter 6 of the TEM is broken into the following subsections:

- ✓ 6-1.0 Introduction
- ✓ 6-2.0 Glossary
- ✓ 6-3.0 Legality - Legal Authority For Placement of Traffic Signs
- ✓ 6-4.0 General Principles of Traffic Signing
- ✓ 6-5.0 Application Guidelines - Regulatory Signs
- ✓ 6-6.0 Application Guidelines - Warning Signs
- ✓ 6-7.0 Application Guidelines - Guide Signing
- ✓ 6-8.0 Application Guidelines - Miscellaneous Signing
- ✓ 6-9.0 Object Markers
- ✓ 6-10.0 Delineators
- ✓ 6-11.0 References

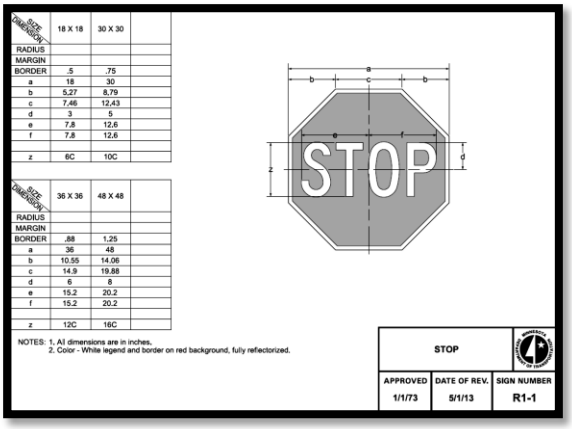
2.7.4 Minnesota Standard Signs Manual

The Standard Signs Manual contains a wide variety of standard signs that are used in the state (see **Exhibit 2-15**). It includes the common R, W, M, G, S, D, I, E and X series. Each Series is broken into groups. For instance, the R series is broken into 16 groups from Group 1 on Right of Way to Group 16 Miscellaneous.

The Standard Signs Manual includes detailed information on the layout of the sign.

Exhibit 2-15 MnDOT Standard Signs Manual

Sample Page from Standard Signs Manual (R1-1)



SIGN DIMENSIONS	18 X 18	30 X 30	
RADIUS			
MARGIN			
BORDER	.5	.75	
a	18	30	
b	5.27	8.79	
c	7.46	12.43	
d	3	5	
e	7.8	12.6	
f	7.8	12.6	
z	6C	10C	

SIGN DIMENSIONS	36 X 36	48 X 48	
RADIUS			
MARGIN			
BORDER	.88	1.25	
a	36	48	
b	10.55	14.06	
c	14.9	19.88	
d	6	8	
e	15.2	20.2	
f	15.2	20.2	
z	12C	16C	

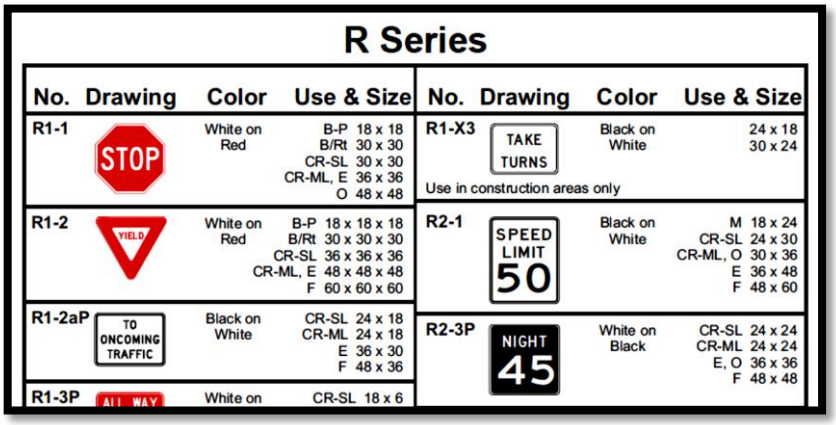
NOTES: 1. All dimensions are in inches.
2. Color - White legend and border on red background, fully reflectorized.

2.7.5 Standard Signs Summary

As the name implies, the Standard Signs Summary is a summary of the standard signs used in the state (See **Exhibit 2-16**). It includes the sign number (nomenclature), a drawing of the sign, and the color of the sign and the sizes of the sign. Unlike the Standard Signs Manual, it does not contain the detailed layout details of the sign.

Exhibit 2-16 MnDOT Standard Signs Summary

Sample R Series from Standard Signs Summary



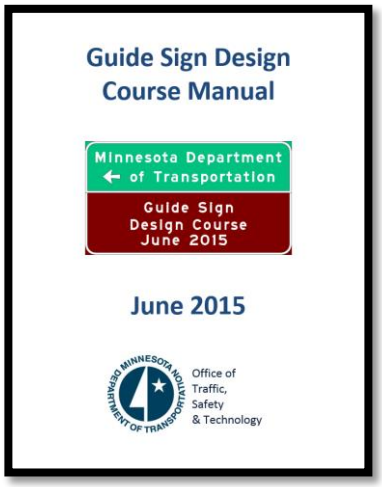
R Series

No.	Drawing	Color	Use & Size
R1-1	STOP	White on Red	B-P 18 x 18 B/Rt 30 x 30 CR-SL 30 x 30 CR-ML, E 36 x 36 O 48 x 48
R1-2	YIELD	White on Red	B-P 18 x 18 x 18 B/Rt 30 x 30 x 30 CR-SL 36 x 36 x 36 CR-ML, E 48 x 48 x 48 F 60 x 60 x 60
R1-2aP	TO ONCOMING TRAFFIC	Black on White	CR-SL 24 x 18 CR-ML 24 x 18 E 36 x 30 F 48 x 36
R1-3P	ALL WAY	White on	CR-SL 18 x 6
R1-X3	TAKE TURNS Use in construction areas only	Black on White	24 x 18 30 x 24
R2-1	SPEED LIMIT 50	Black on White	M 18 x 24 CR-SL 24 x 30 CR-ML, O 30 x 36 E 36 x 48 F 48 x 60
R2-3P	NIGHT 45	White on Black	CR-SL 24 x 24 CR-ML 24 x 24 E, O 36 x 36 F 48 x 48

2.7.6 Guide Sign Design Manual

The Guide Sign Design Manual (see **Exhibit 2-17**) is designed to enable MnDOT and consultant engineering personnel to acquire basic design skills needed to design traffic guide signs using the SignCAD® software. The manual includes a series of examples on laying out guide signs.

Exhibit 2-17 Guide Sign Design Manual

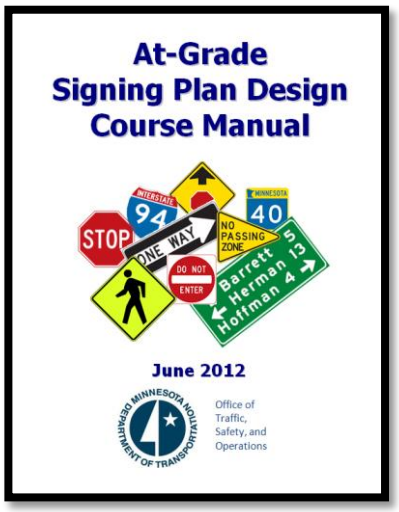


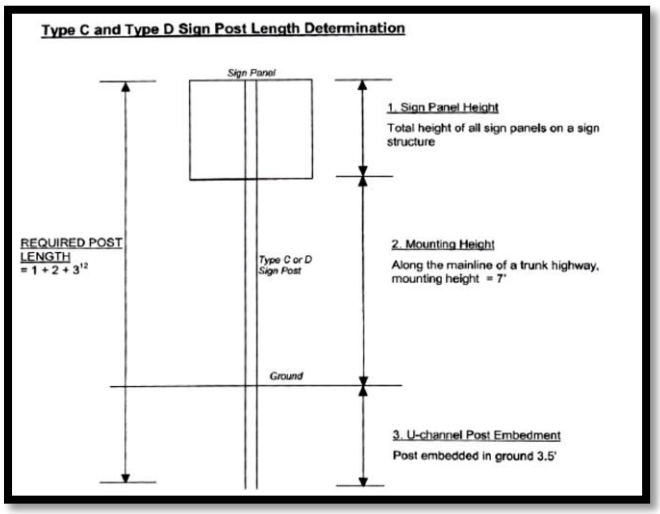
Sample Sign Panel Layout from Guide Sign Design Manual

2.7.7 At-Grade Signing Manual

This Signing Plan Design (At-Grade) Manual (see **Exhibit 2-18**) has been developed to provide training to traffic personnel to acquire basic design skills in assembling signing plans for at-grade intersections on conventional highways and expressways.

Exhibit 2-18 At-Grade Signing Plan Design Course Manual

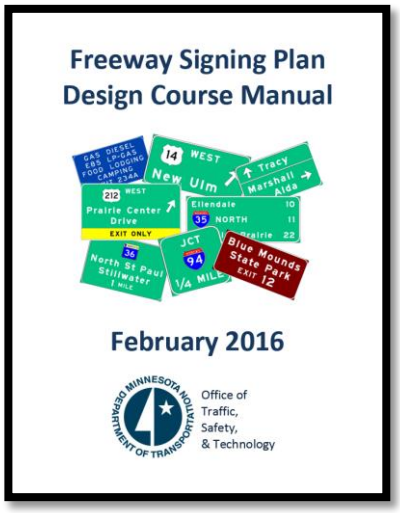


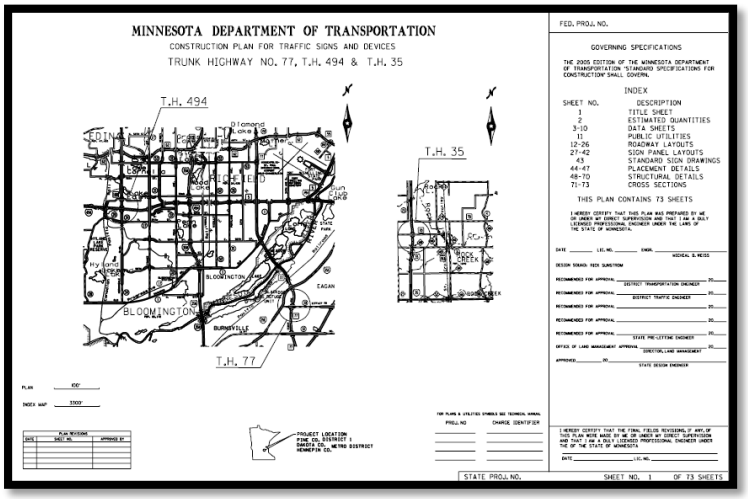


2.7.8 Freeway Signing Manual

This Freeway Signing Plan Design Manual (see **Exhibit 2-19**) has been developed to provide training to traffic personnel to acquire basic design skills in assembling freeway signing plans. This course is designed for persons who need to acquire signing plan design skills. A sample signing plan set is provided as a reference in the manual and the title sheet is illustrated in the exhibit below.

Exhibit 2-19 Freeway Signing Plan Design Manual





3. WHY SIGNS ARE INSTALLED

3.1 Introduction

A request for a traffic sign may be initiated in a variety of ways. A request for a sign may come from a developer, the city or county, a politician, the general public or the state. The following sections provide information on why a sign is installed, not simply due to a request for one.

3.2 Engineering Standards

3.2.1 MN MUTCD Text Headings

When used in the sections of the MN MUTCD, the text headings shall be defined as follows:

STANDARD: A statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. The verb "shall" is typically used. Standards are sometimes modified by Options.

GUIDANCE: A statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. The verb "should" is typically used. Guidance statements are sometimes modified by Options.

OPTION: A statement of practice that is a permissive condition and carries no requirement or recommendation. Options may contain allowable modifications to a Standard or Guidance. The verb "may" is typically used.

SUPPORT: An informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. The verbs "shall", "should", and "may" are **not** used in Support statements.

Exhibit 3-1 is an example of the text headings used for Section 2C.2 from the MN MUTCD.

Exhibit 3-1 Text Heading Example from MN MUTCD

2C.2 Application of Warning Signs

STANDARD:

The use of warning signs shall be based on an engineering study or on engineering judgment.

GUIDANCE:

The use of warning signs should be kept to a minimum as the unnecessary use of warning signs tends to breed disrespect for all signs. In situations where the condition or activity is seasonal or temporary, the warning sign should be removed or covered when the condition or activity does not exist.

OPTION:

Consistent with the provisions of Chapter 2L, changeable message signs may be used to display a warning message.

Consistent with the provisions of Chapter 4L, a Warning Beacon may be used in combination with a standard warning sign.

SUPPORT:

The categories of warning signs are shown in Table 2C-1.

Warning signs specified provided herein in this Manual cover most of the conditions that are likely to be encountered. Additional warning signs for low-volume roads (as defined in Section 5A.1), temporary traffic control zones, school areas, highway-rail grade crossings, and bicycle facilities, and highway-light rail transit grade crossings are discussed in Parts 5 through 9, respectively.

Section 1A.9 contains information regarding the assistance that is available to jurisdictions that do not have engineers on their staffs who are trained and/or experienced in traffic control devices.

3.2.2 Signing Standards

As previously presented, signs should:

1. Fulfill a need
2. Command attention
3. Convey a clear, simple meaning
4. Command respect from road users
5. Give adequate time for proper response

Engineering standards must be followed to fill these needs. Considering item number 1 and number 5, the average driver makes 400 observations, 40 decisions and 1 mistake for every 2 miles they drive.

Exhibit 3-2 Example Signing Decisions

Although conditions may exist where lesser sign spacings will be found necessary, freeway guide signs should be spaced at least 800 feet apart. A spacing of at least 400 feet should be provided between guide signs and all other types of signs on freeways.

Principle #1 of signing is to ensure the sign fulfills a need. The question to ask, what do they "need"?

3.2.3 Engineering Judgment and Documentation

In many instances, engineering judgment is required when standards cannot be fully met. For instance, in the definition of Guidance above, it states, "deviations allowed if **engineering judgment** or engineering study indicates the deviation". The definition of engineering judgment from the MN MUTCD states:

"Engineering Judgment - the evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment shall be exercised by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. Documentation of engineering judgment is not required."

While "documentation of engineering judgment is not required", it is highly recommended. For liability purposes, it is important to document engineering judgment. Often, tort claims occur many months or years later. Documentation of decisions, including minutes of meetings, notes in a diary, notes on a plan, etc. become very important during depositions and trials.

Proper documentation of decision making during design and proper review and implementation during construction results in not only a better design and safer work zone, but clearly reduces risk and liability.

3.3 Signing Priorities

According to the ITE Traffic Control Devices Handbook, when signs compete for the same physical space, there is a need to determine priorities based on the following order of precedence:

- ✓ Regulatory Signs (location specific)
- ✓ Warning Signs
- ✓ Regulatory Signs (non-location specific)
- ✓ Guide Signs
- ✓ Motorist Services
- ✓ Traffic generator signs
- ✓ General information signs

3.4 Functional Classifications of Traffic Signs

The MN MUTCD classifies signs by their functional usage as follows:

1. Regulatory signs inform road users of traffic laws or regulations and indicate the applicability of legal requirements that would not otherwise be apparent.
2. Warning signs are used to call attention to unexpected conditions on or adjacent to a highway, street or private road open to public travel and to situations that would not be readily apparent to the motorist.
3. Guide signs are used to provide directions to motorists, informing them of intersecting routes, directing them to cities and other important destinations, and guiding them to available services, points of interest, and other geographic, recreational, or cultural sites.

Further, guide signs for highways have two (2) sub-classifications:

1. Primary guide signs consist of advance junction signing, exit directional signs, exit gore signs and destination signs. On interstate freeways, exit numbers are included. Distance signs are also primary guide signs.
2. Supplemental guide signs further provide the driver geographic orientation and secondary destinations at certain interchanges. Destinations include cities, motorist services, or traffic generators.

3.5 Sign Effectiveness

The information on the following pages are handouts related to sign effectiveness. The first is "Effectiveness of Traffic Signs on Local Roads" and can be found at http://www.lrrb.org/media/reports/TRS1002.pdf. The second is Chapter F of the "Minnesota's Best Practices for Traffic Sign Maintenance / Management Handbook" and can be found at www.mnltap.umn.edu/publications/handbooks/.

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TRANSPORTATION RESEARCH SYNTHESIS

Minnesota Department of Transportation
Office of Policy Analysis, Research & Innovation
Research Services Section
(651) 366-3780
www.research.dot.state.mn.us

January 2010
TRS 1002

Effectiveness of Traffic Signs on Local Roads

Introduction

The 2009 edition of the Manual on Uniform Traffic Control Devices includes requirements for the management and maintenance of all roadway signs. Management of large numbers of signs can pose administrative and financial challenges for local road authorities. The Minnesota Department of Transportation is reviewing whether the removal of ineffective traffic signs may be part of an overall sign management strategy and has asked CH2M Hill to prepare a best practices guide for removing traffic signs. In support of this work, CTC & Associates was tasked by Mn/DOT with performing a literature search and synthesis of research demonstrating the effectiveness or lack of effectiveness of various types of traffic signs on local roads, including low-volume roads.

Summary

There does not appear to be significant credible research demonstrating the outright ineffectiveness of particular traffic warning signs. The research we identified provides support for opposing points of view: that traffic warning signs have a minimal or neutral effect on safety, or, alternatively, that warning signs are effective at reducing crash rates and severity. National guidance recommends that traffic warning signs be employed based on engineering studies and engineering judgment, and suggests that the excessive use of signs can reduce their effectiveness.

The MUTCD guidance on warning signs begins with the direction that "the use of warning signs shall be based on an engineering study or on engineering judgment." It further indicates that "the use of warning signs should be kept to a minimum as the unnecessary use of warning signs tends to breed disrespect for all signs." That directive is not followed by guidance or research indicating what types of signs are actually ineffective.

Traffic sign effectiveness appears to be more a matter of perception and opinion than of fact based on evidence. For example, *NCHRP Synthesis 186*, *Supplemental Advance Warning Devices* (1993, page 1), found that "the majority of the devices encountered in this project were not evaluated by formal effectiveness studies, but are simply perceived to be effective by the responding agency." A study of the effectiveness of static warning signs by the Institute of Transportation Engineers ("Static Warning Signs of Occasional Hazards: Do They Work?") came to a similar conclusion. In that study 18 percent of responding state transportation agencies thought the use of static warning signs for occasional hazards was effective, but 93 percent indicated that no studies had been done to investigate the actual effectiveness of the signs.

On the other hand, Fred Ranck, FHWA safety and design engineer, indicated in an interview that warning signs have proven safety benefits (see the **National Research and Guidelines** section on page 3).

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We organize our findings into the following two sections:

- National Research and Guidelines
- State Research and Guidance

The **National Research and Guidelines** section contains research from FHWA, NCHRP, TRB and the Institute of Transportation Engineers. The research includes studies that show particular signs to have minimal impact on safety, and studies that point out that the effectiveness of the signs has simply not been vigorously tested. This section also includes an article from FHWA's *Public Roads* that points to the effectiveness of increasing the number of warning signs in Mendocino County, Calif.

The **State Research and Guidance** section includes studies from Kansas, Iowa and Washington state. The Iowa publication **Guidelines for Removal of Traffic Control Devices in Rural Areas**, addresses many of the issues involved with the removal of traffic signs. The paper is focused exclusively on stop and yield signs and does not present research on the safety effectiveness of other types of signs. The other two studies cited in this section found that the use of particular types of warning signs (such as deer crossing and ice warning) are minimally effective.

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National Research and Guidelines

Interview with Fred Ranck, Safety Design Engineer, FHWA Resource Center, Matteson, Ill., fred.ranck@dot.gov, (708) 283-3534.
Mr. Ranck indicated in an interview that warning signs have proven safety benefits. He pointed to the large volume of research data regarding the effectiveness of signs as a crash reduction strategy found at http://www.cmfclearinghouse.org/resources.cfm. (Scroll to the sections titled "Resources for Countermeasure Selection" and "Publications.") The "Publications" section includes issue briefs on the effectiveness of countermeasures—including signs—on intersection crashes, pedestrian crashes and roadway departure crashes. These issue briefs contain tables listing the types of signs, their effectiveness and the research that exists to support those conclusions.

Mr. Ranck also pointed to *NCHRP Report 500, Guidance for Implementation of the AASHTO Strategic Highway Safety Plan,* as a resource for information regarding the use of traffic signs to improve safety. This report consists of 19 volumes pertaining to specific types of highway crashes or contributing factors. Volume 7 is cited on page 4 of this report.

In general, Mr. Ranck said that "signs can be very effective." He said warning signs that use black lettering on a yellow diamond are the most effective and that the use of larger signs and flashers also increases effectiveness.

While there is research pointing to the effectiveness of warning signs in reducing accidents, there is a distinct lack of research on the effectiveness of regulatory and guide signs. According to Mr. Ranck, "We don't really know that much about the credibility of regulatory or guide signs."

Manual on Uniform Traffic Control Devices, FHWA, 2009.
http://mutcd.fhwa.dot.gov/htm/2009/html_index.htm
The latest version of the MUTCD was adopted in December 2009. Section 5 of the new version is titled "Traffic Control Devices for Low-Volume Roads."

Section 5: http://mutcd.fhwa.dot.gov/htm/2009/part5/part5_toc.htm
Section 5A.02, Application, includes this guidance:

> "It is possible, in many cases, to provide essential information to road users on low-volume roads with a limited number of traffic control devices. The focus might be on devices that:
>
> A. Warn of conditions not normally encountered,
> B. Prohibit unsafe movements, or
> C. Provide minimal destination guidance."

The 2009 MUTCD also includes general guidance for the placement of traffic warning signs.

Section 2: http://mutcd.fhwa.dot.gov/htm/2009/part2/part2c.htm
Section 2C.02, Application of Warning Signs, includes this guidance:

> "The use of warning signs shall be based on an engineering study or on engineering judgment.
>
> The use of warning signs should be kept to a minimum as the unnecessary use of warning signs tends to breed disrespect for all signs. In situations where the condition or activity is seasonal or temporary, the warning sign should be removed or covered when the condition or activity does not exist."

Safety Evaluation of Advance Street Name Signs, FHWA, Frank Gross, Bhagwant Persaud, Andrea Piesse, Nancy Lefler, Kimberly Eccles, James Jenness, June 2009.
http://ntl.bts.gov/lib/31000/31000/31091/FHWA-HRT-09-029.pdf
This FHWA-funded study of 26 states evaluated low-cost safety strategies as part of its strategic highway safety effort. The goal was to assess several unproven safety strategies outlined in the *NCHRP 500* series reports. This report focuses on the effectiveness of advance street name signs on the number and severity of crashes. The report includes detailed descriptions of the objective, methodology and data collected in the study.

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The report concludes that "advance street name signs have a minimal effect on the total number of crashes at signalized intersections. Similarly, there were no significant changes in rear-end, older driver, or injury-related crashes." (page 37)

Toolbox of Countermeasures and Their Potential Effectiveness for Intersection Crashes, *FHWA Issue Brief 8*, August 2008.
http://safety.fhwa.dot.gov/tools/crf/briefs/interissuebrief.pdf
This issue brief contains data on the effectiveness of a variety of traffic control measures to reduce crashes at intersections. Table 3, beginning on page 9, evaluates the use of signs to reduce traffic accidents. The data included in the table and the literature cited in support indicate engineering research support for the use of traffic warning and regulatory signs to reduce traffic accidents and their severity.

Static Warning Signs of Occasional Hazards: Do They Work? Ahmed Al-Kaisy, Amanda Hardy, Charles P. Nemfakos, Institute of Transportation Engineers, *ITE Journal*, Vol. 78, No. 6, June 2008: 38.
Abstract: http://ntlsearch.bts.gov/tris/record/tris/01108533.html
This article discusses the effectiveness of static warning signs of nonpermanent hazards. The study included a literature search and a survey of state departments of transportation. From the abstract: "The literature review revealed that there is a lack of distinction in the literature between warning signs for permanent potential hazards (curves, winding roads, etc.) versus those for occasional hazards." The authors noted that the studies did not look at the effectiveness of the static warning signs themselves, but used the signs as a comparison to enhanced warning devices.

The survey of transportation departments revealed that "most agencies had not done any evaluations of the effectiveness of [static warning signs for occasional hazards], but that most perceived that SWSOH were only somewhat effective." (page 38)

The study concludes that "despite the extensive use of MUTCD static warning signs in the highway system, the effectiveness of these signs in improving traffic safety has hardly been investigated." (page 38)

The authors of the study argue that the extensive use of these signs despite the lack of research on effectiveness "may be attributed in part to the perceived 'legal obligation' of using these signs to minimize tort liability in the case of crashes." (page 38)

Signs Show the Way to Cost-Effective Rural Safety, Gib Peaslee, *Public Roads*, FHWA, January/February 2005.
http://www.tfhrc.gov/pubrds/05jan/08.htm
This article describes the success Mendocino County, Calif., had in reducing traffic accidents by installing more traffic signs. According to the article, the Mendocino County Transportation Board reduced crashes by 42.1 percent from 1992 to 1998 at a cost of $79,260 over the same period. The money was spent on installing traffic warning signs on county roads.

Eugene C. Calvert, P.E., former director of transportation with MCDOT and now principal project manager for the Collier County Transportation Services Division in Florida, said, "We believe that the most cost-effective method for enhancing safety on rural roads is to make the driver more aware of road conditions through consistent signing and markings."

Guidance for the Implementation of the AASHTO Strategic Highway Safety Plan, *NCHRP Report 500*, Vol. 7, 2004.
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v7.pdf
This report analyzes the effectiveness of a variety of strategies used to keep vehicles on the road and to minimize the consequences of leaving the road. A discussion of the effectiveness of traditional advance warning signs ahead of curves begins on page 7 of Section V. The report states:

> "Research suggests that the proliferation of curve warning signs, especially those supplemented with advisory speed plates, may have lessened the average motorist's respect for the messages that they convey." (page 8)

That finding is tempered by the fact that "none of the studies designed to evaluate the effectiveness of traditional advance warning treatments at horizontal curves question the importance of providing a curve warning sign in

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advance of unexpected or sharp curves, but conflicting results have been obtained on the effectiveness of advisory speed signs." (page 9)

Effectiveness of Do Not Block Intersection Signs, J.L. Gattis, Z. Igbal, *Transportation Research Record,* No. 1456, 1994: 27-33.
Abstract: http://ntlsearch.bts.gov/tris/record/tris/00677588.html
This study analyzes the effectiveness of Do Not Block Intersection signs on driver behavior. From the abstract: "The data indicated that at three of the four sites the sign had no effect on driver behavior the proportion of blockages did not decrease after the signs were installed. At the fourth site, a higher-volume shopping center driveway, a minimal impact was associated with the installation of the sign."

The authors indicate that these findings "may help officials faced with intersection blockages and citizen complaints avoid unproductive and ineffective remedial actions."

Advisory Speed Signs and Curve Signs and Their Effect on Driver Eye Scanning and Driving Performance, H.T. Zwahlen, *Transportation Research Record*, No. 1111, 1987: 110-120.
Abstract: http://ntlsearch.bts.gov/tris/record/tris/00464602.html
This paper discusses the effectiveness of advisory speed signs leading into roadway curves. From the abstract: "It may be concluded that advisory speed signs are not more effective in causing drivers to reduce their speeds through curves than curve and turn signs alone. It appears that the bent black arrow in the yellow diamond of the curve or turn warning sign represents such a strong and primary visual stimulus that an advisory speed sign adds very little additional information for the driver."

The recommendation based on the conclusion of the research is that "advisory speed sign maintenance and especially new installation be given a low priority."

State Research and Guidance

Assessing the Effectiveness of Deer Warning Signs, Eric Meyer, University of Kansas, Lawrence, April 2006.
Abstract: http://ntlsearch.bts.gov/tris/record/tris/01027350.html
This is a Kansas study that examines the effectiveness of deer warning signs by a comparison of crash rates before and after installation. From the abstract: "In Kansas, the most common countermeasure is the deer warning sign, even though its effectiveness is suspect, and accident records have traditionally been used to identify locations for installation."

Guidelines for Removal of Traffic Control Devices in Rural Areas, Reginald R. Souleyrette, Ryan Tenges, Tom McDonald, Tom Maze, Center for Transportation Research and Education, October 2005.
http://publications.iowa.gov/3629/1/signs_removal.pdf
This research focused on ultra-low-volume (less than 150 daily entering vehicles) unpaved intersections in rural areas of Iowa. The starting point was the fact that each county had as many as 300 or more stop sign pairs. From the abstract: "Four conclusions are supported by this research: (1) there is no statistical difference in the safety performance of ultra-low-volume stop-controlled and uncontrolled intersections for all drivers or for younger and older drivers (although interestingly, older drivers are underrepresented at both types of intersections); (2) compliance with stop control (as indicated by crash performance) does not appear to be affected by the use or excessive use of STOP signs, even when adjusted for volume and a sight distance proxy; (3) crash performance does not appear to be improved by the liberal use of stop control; (4) safety performance of uncontrolled intersections appears to decline relative to stop-controlled intersections above about 150 daily entering vehicles Subject to adequate sight distance, traffic professionals may wish to consider removal of control below this threshold."

The report also includes a section outlining an implementation strategy for the removal of excessive stop signs (beginning on page 52). Operational and legal issues are discussed. The legal liability concerns addressed are specific to Iowa but are emblematic of what any state would face in similar circumstances.

It is worth noting that this 2005 study contains 47 citations; 30 relate to traffic sign management or safety studies surrounding traffic signs. Of those 30 citations, 18 are dated prior to 1990.

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The Effect of Ice Warning Signs on Ice-Accident Frequencies and Severities, Jodi Carson, Fred Mannering, *Accident Analysis and Prevention*, Vol. 33, No. 1, 2001.
Abstract: http://ntlsearch.bts.gov/tris/record/tris/00805036.html
The purpose of this study was to statistically evaluate the effectiveness of ice-warning signs in Washington state and to provide guidance for effective sign placement. The research discusses the challenges of effective warning sign placement and whether the current warning signs in Washington are effective at reducing accident rates and severity.

The authors surveyed other states to determine potential sign placement strategies and found that states have "compensated for the difficulties in predicting ice as a roadway hazard by resorting to oversigning and/or standardized sign placement (placing signs on all bridges, regional boundaries or other standard roadway features)." The authors state that these policies "seem to be intended to protect state transportation agencies from liability as much as they are intended to improve highway safety."

The authors state, "Too many signs or ice-warning signs posted at potentially inappropriate locations (i.e., locations where the ice hazard is rarely present) can desensitize drivers, thereby negating any safety enhancement the signs may have." This particular statement regarding the ineffectiveness of oversigning is found in many studies and handbooks, but is not followed by a citation of any studies that support this conclusion.

This study concludes that "ice-warning signs do not have a statistically significant impact on the frequency or severity of vehicular accidents that involve ice. This suggests that current ice-warning sign placement practices are ineffective and that there is an urgent need for standardized sign-placement procedures that will reduce the frequency and severity of ice-related accidents."

Effectiveness of "Children at Play" Warning Signs, Transportation Synthesis Report, CTC & Associates LLC, WisDOT Research and Library Unit, 2007.
http://on.dot.wi.gov/wisdotresearch/database/tsrs/tsrchildrenwarningsigns.pdf
This synthesis report addresses the effectiveness of "Children at Play" warning signs. The report cites U.S. DOT, FHWA, NCHRP, the Institute of Transportation Engineers and several state DOTs to support the conclusion that "there is no evidence that special warning signs of this sort reduce driver speeds or crash rates."

What's wrong with these pictures?
(See page G-3 for answer.)

Part F – Effectiveness of Traffic Signs

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Effectiveness of Regulatory Signs – STOP signs F-4
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How to Measure Effectiveness?

Regulatory

Warning

Guide

- In order to determine the effectiveness of signs – you have to ask what is the Performance Measure?
- The most commonly cited measure is **CRASHES**, but that is a very difficult piece of information to work with because only a very few signs are related to safety and there are too few crashes at most locations to produce statistically reliable results.
- It appears that a second (and possibly better) measure of effectiveness would be **DRIVER BEHAVIOR**. Did the sign change behavior in the desired way? Was the response consistent among drivers?

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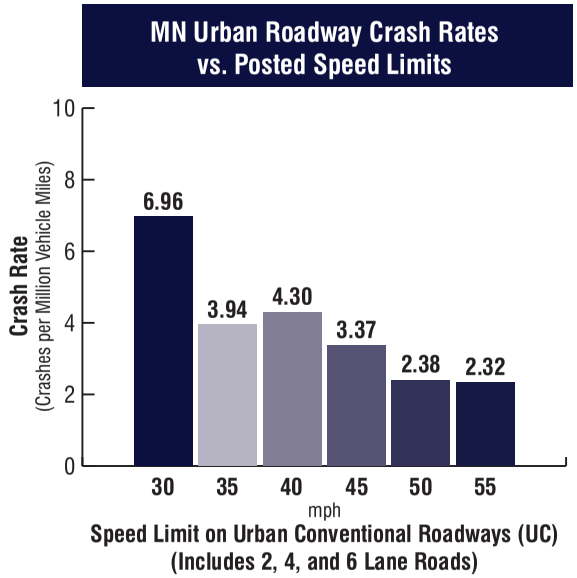
Effectiveness of Regulatory Signs – Speed Limit

Study Location	Before	After	Sign Change +/- mph	85% Before After	Change mph
T.H. 65	SPEED LIMIT 40	SPEED LIMIT 30	-10	34 34	0
T.H. 65	SPEED LIMIT 50	SPEED LIMIT 40	-10	44 45	+1
Anoka CSAH 1	SPEED LIMIT 45	SPEED LIMIT 40	-5	48 50	+2
Anoka CSAH 24	SPEED LIMIT 30	SPEED LIMIT 45	+15	49 50	+1
Anoka CR 51	SPEED LIMIT 40	SPEED LIMIT 45	+5	45 46	+1
Henn. CSAH 4	SPEED LIMIT 50	SPEED LIMIT 40	-10	52 51	-1
Nobles Ave.	SPEED LIMIT 30	SPEED LIMIT 35	+5	37 40	+3
62nd Ave. N	SPEED LIMIT 35	SPEED LIMIT 30	-5	37 37	0
Miss. St.	SPEED LIMIT 30	SPEED LIMIT 35	+5	39 40	+1

		Before	After
TH 210 Baxter	Posted	55	45
	85%	57	53
	% Compliance	68	38
TH 316 Hastings	Posted	45	35
	85%	47	45
	% Compliance	60	12

Source: Unpublished MnDOT Data

- 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.
- Speed limit signs have never proven to change driver behavior.
- Drivers only comply with speed limits (and the signs) if the posted limits are consistent with a driver's perception of the road environment and their selection of a safe speed, that is approximated by the 85th percentile speed.
- Lower speed limits are frequently requested in order to improve safety. There is one very substantial problem with this theory – it is **NOT** consistent with actual crash data. Analysis of a sample of urban, conventional roads found that crash rates decreased with increased speed limits.



Source: Preston, H., Statistical Relationship Between Vehicular Crashes and Highway Access, Minnesota Department of Transportation Report No. 1998-27, August 1998.

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Effectiveness of Regulatory Signs – STOP signs

- A comprehensive study of a sample of low volume rural intersections with STOP, YIELD and NO CONTROL found that the number of crashes was **NOT** related to the degree of control.[1]

Summary of Significant Data[1]

	Control Type			Statistical Significance
	Stop	Yields	No Control	
Number of intersections	48	48	44	—
Average Volume (vpd)				
Major Roadway	2,530	2,380	3,800	—
Minor Roadway	200	190	120	—
Average Crashes/Int	0.44	0.42	0.32	—
Intersections w/NO Crashes	69%	83%	95%	Significant
Driver Behavior				
Voluntary Stops	19%	8%	9%	Not Significant
Slow Entries (<=5mph)	65%	79%	80%	Not Significant
Fast Entries (>=5mph)	16%	13%	11%	Not Significant

- Increasing levels of control at low volume intersections did **NOT** reduce the number of crashes.
- The fraction of intersections with **NO** crashes is inversely related to the level of control – 95% of the intersections with No Control had no crashes compared to 69% for STOP controlled intersections.
- STOP signs have proven to have only a marginal effect on driver behavior at the low volume intersections, where the need to stop (based on interacting with conflicting vehicles) may not be obvious. Fewer than 20% of vehicles voluntarily stopped at STOP signs (vs. 9% at No Control intersections) and the fraction of Fast Entries at STOP controlled intersections was 45% higher than at intersections with No Control.

Summary of Previous Research on Driver Behavior at STOP Signs[1]

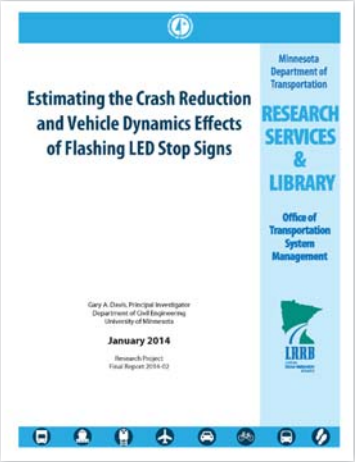
Company	Morrison (1931)	Fisher (1935)	Elliot (1935)	Hanson (1960)	Leisch (1963)	Beaubien (1976)	Dyar (1977)
Full Stops	47%	45%	38%	20%	17%	22%	12%
Partial Violation (Rolling Stop)	42%	34%	42%	69%	69%	48%	60%
Full Violation (No Stop)	11%	21%	20%	11%	14%	30%	28%

- A recent study of intersections in Iowa[2] found that at low volumes (less than 150 entering vehicles per day), there was no statistically significant difference between the safety performance of a STOP controlled versus an uncontrolled intersection.
- St. Louis County, MN recently added flags to an ALL-WAY STOP intersection and studied driver behavior. There was no statistical difference in STOP sign violations from before, during or after the flags were in place.

1 *Stockton, Brackett and Mounce "STOP, YIELD and NO CONTROL at Intersections, Report No. FHWA/RD-81/084, 1981*
2 *Souleyrette, Tenges, McDonald, Maze, "Guidelines for the Removal of Traffic Control Devices in Rural Areas", Iowa Highway Research Board Project TR-527, 2005*

Effectiveness of Regulatory Signs – LED STOP and YIELD Signs

- MnDOT LRRB Report 2014-02 researched the impact of flashing LEDs on crash reduction and driver behavior at STOP signs.
  - 15 Minnesota locations with LED STOP signs in place for 3-years were chosen and compared to a group of 240 STOP signs without LEDs.
  - The study yielded mixed results.
    - There was a 42% decrease in right-angle crashes when LEDs were installed.
    - Drivers were much more likely to stop at LED STOP signs when there was opposing traffic present.
    - When no opposing traffic was present, no change in behavior at LED STOP signs was noted.
    - **Too few crashes made the results statistically uncertain.**
- From this research, MnDOT created a policy for when to install LED STOP or YIELD signs. Because the results of the study are inconclusive, this option is in the toolbox, but will be used in limited locations that meet at least 2 of the following criteria:
  - Limited visibility on approach to the intersection, as determined by the sight distance criteria for Warrant 1 in Section 9-4.00.0 of the Traffic Engineering Manual.
  - A history of crashes documented to be caused by a failure to stop and deemed preventable by implementation of conspicuity improvements.
  - At a rural junction of two or more high speed trunk highways to warn drivers of an unexpected crossing of another highway.
  - At a rural junction of a trunk highway and a local road which has no STOP controlled intersection within five miles.
- Local agencies could also take this criteria into account when deciding whether or not to use LED STOP or YIELD signs.



Effectiveness of Warning Signs – Children at Play

- A research synthesis prepared for the Wisconsin Department of Transportation found that there is no evidence that special Warning signs of this sort either change driver behavior or improve safety.
- MnDOT and the LRRB published research[2] that found no evidence that Playground Warning signs reduced vehicle travel speeds. Instead, at these locations, vehicle speeds appeared to be related to the number of cars parked along the street.
- Traffic control devices are intended to change driver behavior and improve safety – these special Warning signs have not been found to do either.

1 Wisconsin Department of Transportation, "Effectiveness of Children at Play" Warning Signs, Transportation Synthesis Report, 20(
2 CTC & Associates, Impacts of Playground Warning Signs on Vehicle Speeds, Minnesota Department of Transportation Report No.

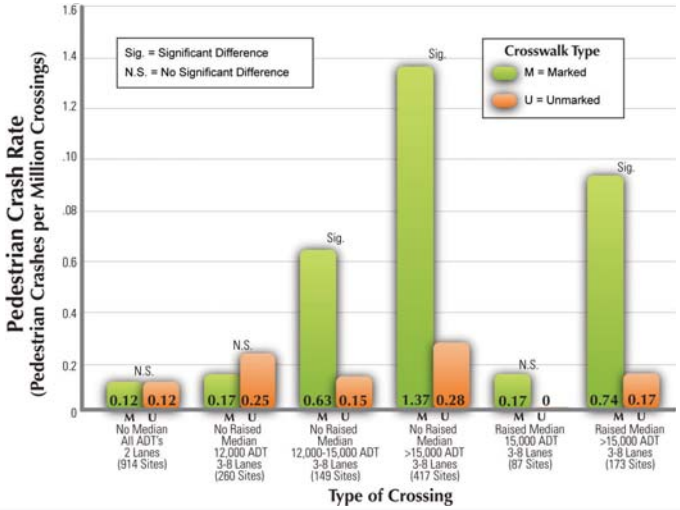
Effectiveness of Warning Signs – Horizontal Alignment

- The most frequently used Horizontal Alignment Warning signs include the Advanced Curve Warning and the Speed Advisory.
- FHWA's Desktop Reference for Crash Reduction[1] indicates that the standard Advance Curve Warning signs have been found to reduce road departure crashes by about 20 to 30% and the use of enhanced delineation (Chevrons) reduced crashes by 20 to 50%.
- A study of a sample of approximately 200 curves in Minnesota[2] found the crash reduction associated in the Advanced Curve Warning was limited to curves with radii between 1,000 and 1,800 feet.
- The analysis of approximately 19,000 curves along highways in Minnesota Counties (part of the MnDOT sponsored project to prepare safety plans for all counties) found that 70% of severe crashes occurred in curves with radii between 500 and 1,200 feet. This same analysis also found that longer radius curves present a much lower total crash risk and very short radius curves a much lower severe crash risk. This kind of information can be used to prioritize curves across a system and aid in the development of a system wide approach to deploy horizontal alignment signs.
- A recent study[3] of the effect of enhanced delineation – Chevrons – in Connecticut and Washington found crash reductions in the range of 20-30% and a benefit/cost ratio of 8:1.

NEW STANDARD: In advance of horizontal curves on freeways, on expressways, and on roads with more than 1,000 AADT that are functionally classified as arterials or collectors, Horizontal Alignment Warning signs shall be used in accordance with Table 2C-5 based on the speed differential between the roadway's posted or statutory speed limit or 85th-percentile speed, whichever is higher, or the prevailing speed on the approach to the curve, and the horizontal curve's advisory speed.

1 *Desktop Reference for Crash Reduction Factors, Report No. FHWA-SA-07-015, September 2007*
2 *Pitale, Shankewitz, Preston and Barry; Benefit Cost Analysis of In-Vehicle Technologies and Infrastructure Modifications to Prevent Crashes along Curves and Shoulders, Mn DOT Research Report 2008-XX, June, 2009*
3 *Techbrief: Safety Evaluation of Improved Curve Delineation, FHWA Report – HRT-09-046, November, 2009*

Effectiveness of Signs (Pedestrians)



- One of the most commonly requested strategies to address pedestrian safety is the installation of a marked crosswalk accompanied by Pedestrian Crossing Warning signs.
- However, the results of two recent studies indicate that marked crosswalks (with pedestrian crossing warning signs) are NOT safety devices when used at uncontrolled intersections.
- A cross-sectional study of 2,000 intersections in 30 cities across the U.S. found that marked crosswalks at uncontrolled intersections resulted in higher pedestrian crash rates[1] (than at unmarked/ signalized crosswalks) and this effect is greatest for multi-lane arterials with traffic volumes over 15,000 vehicles per day.[2]
- A Before vs. After study at over 500 intersections in San Diego and Los Angeles found a 70% reduction in pedestrian crashes following the removal of marked crosswalks at uncontrolled intersections.[3]

1 Crash rate is the frequency of crashes divided by the number of pedestrians crossing at a particular location.
2 Charles V. Zegger, et al., Safety Effects of Marked vs Unmarked Cross-Walks At Uncontrolled Locations: Executive Summary and Recommended Guidelines, 1996-2001
3 ITE (Institute of Transportation Engineers) Journal, September 2000

Effectiveness of Warning Signs

- A search of the safety research literature found **NO** documentation of crash reductions associated with **any** other Warning signs.
- It appears the use of Warning signs is more out of fear of litigation as opposed to the strategic application of a traffic control device to solve a specific problem at a specific location.
- The most comprehensive study[1] of a Deer Crossing Warning signs found these signs did NOT either change driver behavior (reduce vehicle speeds) or reduce deer-vehicle crashes and concluded that in order to increase effectiveness, research should focus on developing a dynamic system that would provide accurate real time information.
- There appears to be a consensus among traffic engineers that static signs that warn of infrequent conditions or general possibilities – deer crossings, pavements that are slippery only when wet, rocks that may have fallen, low volume intersections and driveways with limited sight distances – are routinely ignored by drivers. This suggests that these signs would fail the effectiveness test because drivers do not choose to change their behavior based on information they determine to be either regularly wrong or of no value.
- Research[2,3] has shown that the use of flourescent yellow sheeting appears to improve driver recognition of Warning signs and increased legibility distances. As a result, MnDOT has adopted a practice to convert all Warning signs and yellow delineators to use flourescent sheeting.

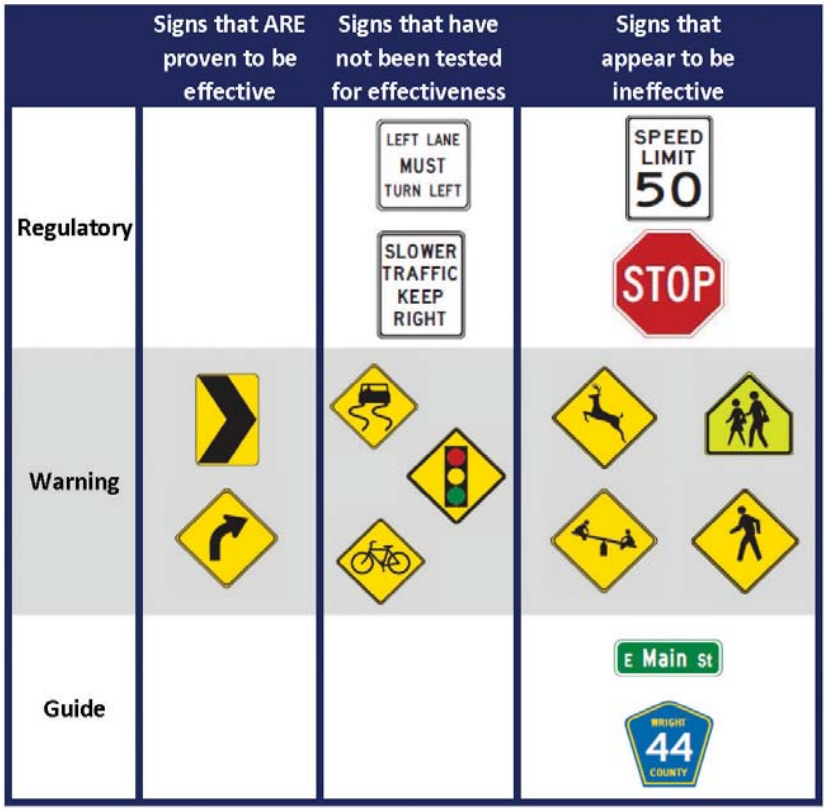
1 Knapp, K., Deer–Vehicle Crash Counter Measure Toolbox: A Decision and Choice Resource, University of Wisconsin. Report No. DVCIC-02, June 2004
2 Zwahlen, Schnell, Visual Detection and Recognition of Flourescent Color Targets" Tranportation Research Record No. 1605, 1997
3 Schnell, Bentley, Hayes, Rick, Legibility Distances of Fluorescent Traffic Signs, Transportation Research Record No. 1754, 2001

Effectiveness of Guide Signs

- The MN MUTCD suggests the use of Guide Signs – Junction, Advance Junction and Street Name to support navigation and way-finding.
- A recent study of the safety effectiveness of advanced street name signs at signalized intersections found a minimal and statistically insignificant effect on crashes.[1]
- A preliminary evaluation of one rural expressway corridor in Minnesota found that upgrading the Advance Junction and street name signs from conventional to a freeway style sign resulted in a 30% reduction of right angle crashes. (Note: this is an interesting conclusion, moves the crash data in a desired direction, but is not statistically significant. The sample size is too small.)[2]
- Many Minnesota counties have decided to participate in the program to provide a complete set of street name signs to improve way-finding for emergency response. There is a general consensus that these signs are a high priority and an important component of an overall effort to reduce emergency response time.

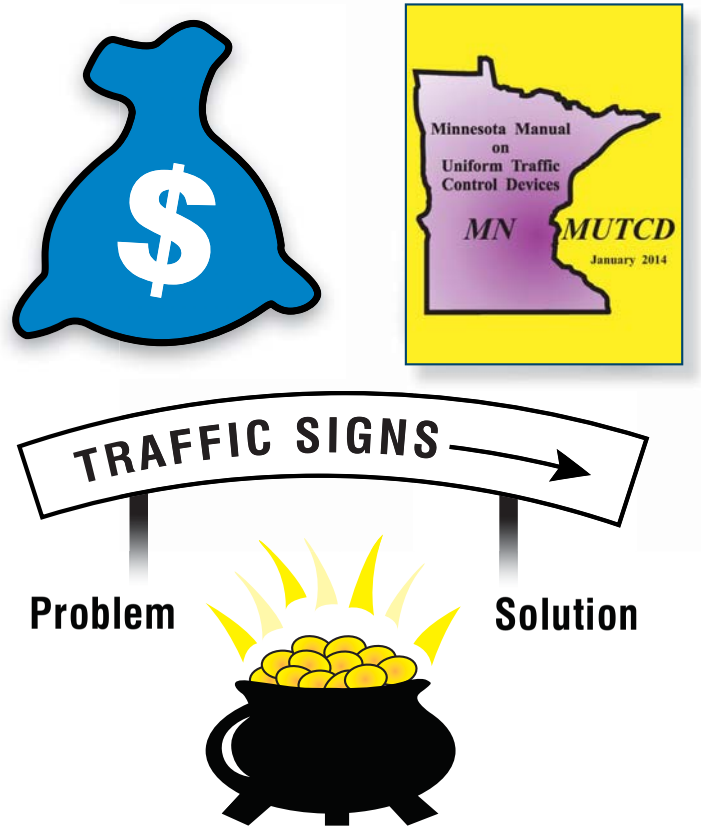
1 *Safety Evaluation of Advance Street Name Signs. Federal Highway Administration. FHWA-HRT-09-030.*
2 *NCHRP 15-30, Median Intersection Design for Rural High-Speed Divided Highways. Maze, T. April, 2010.*

Sign Effectiveness Summary



- OK, which signs have been proven effective at either reducing crashes or changing driver behavior?
  - A search of the traffic safety literature found that the only types of signs that have been proven effective are the Horizontal Alignment Series (but only in a fairly narrow range of curve radii).
  - Research published by NCHRP found that pedestrian warning signs in combination with marked crosswalks at uncontrolled intersections in fact resulted in greater numbers of pedestrian crashes.
  - Guide Signs have been found to only have a minimal effect on intersection crashes but are assumed to improve way finding and navigation.
  - Bottom line – if your decision to install a sign is based on an expectation of effectiveness – either reducing crashes or changing driver behavior – the literature in support is virtually non-existent.
  - It appears that most signs fall into a category of hope - hope they do some good and an expectation that at least they don't do any harm.

Making the Case For Considering Sign Removal



- When evaluating your inventory of signs and deciding which signs should be retained versus which would be candidates for removal, consider the following issues:
  - What is the problem you are attempting to resolve and has the particular sign ever been effective at either changing driver behavior or reducing crashes?
  - What is the cost of maintaining your inventory? Can you afford this?
  - Is the use of a particular sign consistent with the guidance in the MN MUTCD? For example, the MN MUTCD discourages the use of stop signs for speed control because they aren't effective.
  - Think systematically – is the usage of a type of sign consistent along all of your roads?
- If the answer to these questions are negative – not effective, can't afford to maintain the system and inconsistent – then you should give very careful consideration to removing some signs in your inventory.

Sign Removal – Which Signs Are Candidates? (1/2)

- Speed Limit signs are only effective if the limit is near the 85th percentile speed. Speed Limit signs that merely state the statutory limit are not necessary.

- STOP and YIELD signs at low volume intersections are not safety devices, uncontrolled intersections have a lower expected crash frequency.

- Turn prohibitions relying solely on signage have only proven to be effective in the presence of law enforcement – you need to ask, how often will officers be present?

- The use of Turn Lane signs are linked to helping law enforcement get convictions and snow plow drivers clearing turn lanes. Ask law enforcement how much time they devote to going after passing on the shoulder? Would a delineator be sufficient to assist the plow drivers?

- Statements of the obvious are a waste of money if there is little or no enforcement of the law.

- Research suggests that typical drivers do NOT understand the concept of "CROSS TRAFFIC". To traffic engineers "Cross Traffic" means traffic approaching from the right and left but some drivers thought that this referred to vehicles coming towards them (Crossing the highway) from the opposing minor leg approach to the intersection.

Sign Removal – Which Signs Are Candidates? (2/2)

- Static signs that warn drivers of hazardous conditions they rarely encounter quickly lose credibility and become part of the background noise that drivers tune out.

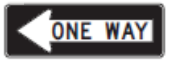
- MnDOT is removing DEER CROSSING Warning signs because they have not proven to be effective at reducing deer/vehicle collisions. (They also determined that the signs had proven ineffective at training the deer where to cross the highways.)

- Advance Curve Warning signs were found to be effective in only a fairly narrow range of curve radii – curves with radii between 1,000 feet and 1,800 feet. There was no safety effect in larger radius curves and in shorter radius curves it was found that a combination of Advance Curve Warning **PLUS** Chevrons was required to produce a crash reduction. Try to achieve consistency across your system. If you have curve warning signs in advance of long radius curves, those could be candidates for removal based on system wide considerations.

NOTE: On roads with 1,000 ADT or greater, the Horizontal Alignment sign series is required based on speed differentials.

- A number of studies have found that marked pedestrian crosswalks and their Advance Warning signs are **NOT** safety devices when used at uncontrolled locations. Pedestrian crash rates are actually higher at marked locations.

- There is no evidence that special Warning signs of this type either change driver behavior (reduce travel speed) or improve safety.



- ONE WAY signs are not required in medians that are less than 30 feet wide if KEEP RIGHT signs are installed.

3.6 Excessive Use of Signs

The MN MUTCD section 2A.4 states:

> "Regulatory and warning signs should be used conservatively because these signs, if used to excess, tend to lose their effectiveness. If used, route signs and directional guide signs should be used frequently because their use promotes efficient operations by keeping road users informed of their location."

3.6.1 Sign Clutter

Existing signs should be regularly reviewed to ensure that all of the signs are official and are necessary for regulatory, warning or guidance purposes. Unnecessary signs increase sign clutter and should be considered for removal as discussed in the handouts in Section **3.5**. See **Exhibit 3-3** for examples of sign clutter.

Exhibit 3-3 Example of Sign Clutter

3.6.2 Sign Grouping

Traffic signs of different functional classification should not be mixed in a given sign installation.

It is not always feasible to erect signs separately in urban areas where mounting space is limited and visibility problems occur. In such cases, a sign of major importance may be placed above a relatively small sign of routine or secondary significance. However, if the design of the individual panels could mislead or confuse the motorist, this practice should be avoided.

3.7 Sign Justification

A traffic sign is not installed simply because of a request for it. As noted in Section **2.3**, a traffic sign needs to fulfill a need, command attention, convey a clear, simple meaning, command respect from road users and give adequate time for proper response. If these principles cannot be met, the sign should not be installed. In addition, section 1A.9 of the MN MUTCD states:

> "The decision to use a particular device at a particular location should be made on the basis of either an engineering study or the application of engineering judgment."

3.7.1 Politically Motivated Signs

In some cases, signs may be installed contrary to the engineering principles previously discussed. This may be due to political pressure or even state laws that contradict these principles.

For example, consider memorial highway signs. MN state law was passed to include these signs on an Interstate. In the MUTCD, section 2.M.10 Guidance states "Freeways and expressways should not be signed as memorial or dedicated highways.". The state law contradicts this.

The following is an additional example of a state law that was passed in 2013 requiring MnDOT to install a specific service sign:

SF 1270 3rd Engrossment 88th Legislature (2013-2014) posted on 06/10/2013

Sec. 68. SPECIFIC SERVICE SIGN.
40.13 Notwithstanding any other law or administrative rule or order, the commissioner of
40.14 transportation, after being assured of adequate funding from nonstate sources, shall erect a
40.15 specific service sign on the east side of marked Trunk Highway 52, near its intersection
40.16 with 37th Street NW in Olmsted County. The sign must display the name or business
40.17 panel, or both, of a retail establishment on the east side of marked Trunk Highway 52 that
40.18 began operation before construction of the noise wall on the east side of marked Trunk
40.19 Highway 52, and the premises of which is blocked from view by the noise wall.

This bill was passed for a retail business that claimed that due to the noise wall construction along the freeway, the visibility of their business was blocked. The law does not meet MN MUTCD or Federal MUTCD requirements, along with violating existing state statutes. It violates the existing laws and standards due to:

1. It is a retail business not qualifying under gas, food, camping, lodging, rural agriculture or tourist oriented activities, and
2. this section of US Trunk Highway 52 is freeway.

This violates MN MUTCD Section 2K.1:

STANDARD:

When used, Specific Service Signs shall be used only on rural non-freeway trunk highways or conventional roads and shall not be used on conventional roads in urban areas or at interchanges on expressways or freeways except on highway bypasses of outstate municipalities.

MN Statutes also indicates:

MN Statutes 160.293 Subd 1. "Purpose. Specific service signs are to be used to create and implement a system of signing for the purpose of displaying specific service information to the traveling public on nonfreeway trunk highways in rural areas."

MN State Statute 160.292 Subd.21 which defines Specific Service as "Specific service" means restaurants; rural agricultural or tourist-oriented businesses; places of worship; gasoline service stations and other retail motor fuel businesses; and motels, resorts, or recreational camping areas that provide sleeping accommodations for the traveling public."

3.8 Advertising Signs vs. Traffic Control Signs

Exhibit 3-4 illustrates a logo sign and an advertising billboard. Logo Signs are located on Interstate highways and a few other freeways and are motorist service signs. Motorist services are defined by the Federal Highway Administration and include gas, food, lodging and camping (see Section **3.8.1** below). Billboards and other advertising are found off of the public right of way (ROW).

Exhibit 3-4 Advertising vs. Highway Signs

You will notice that both signs have business and exit information and are visible from the highway. However, the billboard is an advertising device and the logo is a traffic control device.

Both types of signs are governed by federal and state law and policies and businesses pay for the signs.

Logo signs are NOT advertisements. They are motorist service signs.

3.8.1 Logo Signs

About

Logo signs (**Exhibit 1-1**) are guide signs that provide road users with business identification and directional information for services and eligible attractions. Eligible service categories are defined by the Federal Highway Administration as being limited to gas, food, lodging, camping, attractions and 24-hour pharmacies. Mainline logo signs are allowed on interstate and freeway highways within the State of Minnesota. Trailblazing signs are smaller signs located on freeway exit ramps and local roads to direct motorists from the freeway to the business.

Exhibit 3-5 Logo Signing

Program

The Minnesota Sign Franchise Program, which allows for the installation and maintenance of logo signs, was established by Minnesota Statute 160.80 in 1984. This program is in general conformance with the specific service signing guidelines in the Federal Manual on Uniform Traffic Control Devices (MUTCD). Eligibility criteria is contained in Minnesota Statute 160.80 and MnDOT's Sign Franchise Contract.

MnDOT's Logo Sign Franchise Contract is currently managed and operated by Minnesota Logos (http://www.minnesota.interstatelogos.com/state/home.aspx). Information on business eligibility and participation fees can also be found on this website.

3.8.2 Bonus Law (1958)

In 1958, Congress passed the first outdoor advertising control legislation which is commonly known as the "Bonus Law", PL 85-381, formerly codified as 23 U.S.C., Section 231. However, since it has been replaced by the Beautification Act (see below), it can no longer be found in the United States Code. Its provisions still exist by reason of agreements.

The Bonus Act basically provided an incentive to states to control outdoor advertising within 660' of the Interstate system. States which complied with the Act would receive a bonus of one-half of one percent of the Federal Highway funds, which participated in the right-of-way acquisition and construction of the segment of Interstate on which outdoor advertising was controlled. Initially the bill that was introduced would have provided for a complete prohibition of standardized outdoor advertising on the Interstate system. Some signs were permitted, which will be explained later.

3.8.3 Highway Beautification Act (1965)

The Highway Beautification Act of 1965 called for control of outdoor advertising, including removal of certain types of signs, along the nation's growing Interstate Highway System and the existing federal-aid primary highway system. It also required certain junkyards along Interstate or primary highways to be removed or screened and encouraged scenic enhancement and roadside development.

Some highlights on the laws and:

- ✓ Signs allowed: directional or other official signs required or authorized by law
- ✓ 87% of motorists prefer logo signs to billboards or high-rise signs. These provide information without creating an eyesore.
- ✓ Billboards detract from scenery and contribute to visual pollution.
- ✓ Traffic control devices shall not bear any advertising message or any other message that is not related to traffic control.
- ✓ Tourist-oriented directional signs and Specific Service signs are not considered advertising; rather they are classified as motorist service signs.

The following information are from the Billboard Permits site (www.dot.state.mn.us/roadsides/billboards/) and are related to Minnesota Outdoor Advertising Control Act and Fee Schedule for Advertising Devices.

HANDOUT

THE MINNESOTA OUTDOOR ADVERTISING CONTROL ACT BECAME EFFECTIVE JUNE 7, 1971. THE ACT REQUIRES THAT YOUR ADVERTISING DEVICE HAVE A STATE PERMIT AND BE RENEWED EACH YEAR.

1. **NO ADVERTISING DEVICE ALLOWED WITHIN THE LIMITS OF ANY HIGHWAY.** Devices must be located entirely on private property.
2. Church and Service Club Signs are exempt provided they are under eight square feet and are directional or contain information related to meeting.

ADVERTISING DEVICES ERECTED AFTER JUNE 7, 1971 ARE ALLOWED ONLY IN THE FOLLOWING LOCATIONS:

1. On land zoned for business, industrial or commercial activities.
2. On unzoned land within 800 feet of a business area. (Business area defined as an unzoned area on which there is one or more permanent structures devoted to commercial or industrial activity, or on which a commercial or industrial activity, or on which a commercial or industrial activity, or on which a commercial or industrial activity is actually conducted whether or not a permanent structure is located thereon.

PROHITED AREAS

1. Within 100 feet of a church or school property.

SPACING

Interstate and fully controlled freeways:

1. 500 feet between signs.
2. Unincorporated area: Signs must be 500 feet from the entrance or exit ramp widening.

Primary Highways:

1. Incorporated areas: 100 feet between signs.
2. Unicorporated zoned areas: 300 feet between signs; no signs within 300 feet of an intersection with another highway, public road or railroad.
3. Unicorporated unzoned areas: 400 feet between signs; no sign within 300 feet of an intersection with another highway, public road or railroad.

ADVERTISING PERMIT APPLICATION

1. Read instruction on back of application.
2. Items 1 through 18 must be completed.
3. Landowner must sign item 16 or submit letter granting use of the property. A copy of the lease is also acceptable.
4. Advertising device erection must comply with Local Ordinances.
5. Fee must accompany application. Make check payable to the Commissioner of Transportation and return application to the address below.
6. Please call for correct fee.

HANDOUT
HANDOUT
HANDOUT

HANDOUT

Minnesota Department of Transportation

FEE SCHEDULE FOR ADVERTISING DEVICES

Fee required when applying for a permit will be prorated from the date of erection or the date we received your application, whichever is the earliest.

1. Application received or erection date on the 1st of the month through the 14th day, the fee shall be for that month.

2. Application received or erection date after the 14th day of the month, the fee shall be for the following month.

SQUARE FEET	0 TO 50	50 TO 300	OVER 300
July	$30.00	$60.00	$120.00
August	27.50	55.00	110.00
September	25.00	50.00	100.00
October	22.50	45.00	90.00
November	20.00	40.00	80.00
December	17.50	35.00	70.00
January	15.00	30.00	60.00
February	12.50	25.00	50.00
March	10.00	20.00	40.00
April	7.50	15.00	30.00
May	5.00	10.00	20.00
June	2.50	5.00 10.00	

An Equal Opportunity Employer

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HANDOUT

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4. TYPES OF SIGNS

4.1 Functional Classifications of Traffic Signs

The MN MUTCD classifies signs by their functional usage as follows:

1. Regulatory signs inform road users of traffic laws or regulations and indicate the applicability of legal requirements that would not otherwise be apparent.
2. Warning signs are used to call attention to unexpected conditions on or adjacent to a highway, street or private road open to public travel and to situations that would not be readily apparent to the motorist.
3. Guide signs are used to provide directions to motorists, informing them of intersecting routes, directing them to cities and other important destinations, and guiding them to available services, points of interest, and other geographic, recreational, or cultural sites.

Further, guide signs for expressways and freeways have two (2) sub-classifications:

1. Primary guide signs consist of advance junction signing, exit directional signs, exit gore signs and destination signs. On interstate freeways, exit numbers are included. Distance signs are also primary guide signs.
2. Supplemental guide signs further provide the driver geographic orientation and secondary destinations at certain interchanges. Destinations include cities, motorist services, or traffic generators.

4.1.1 Department Classification by Sign Design Type

While the previous sign classifications describe general functions, MnDOT has further classified signs by "design" type.

Type A Sign
(with EA panel)

Type A signs are large breakaway guide, directional, or informational signs normally installed on mainline freeways, expressways, and occasionally on conventional roads. They are supported on wide-flange steel posts.

Around the year 1960, MnDOT did have a Type B sign. These signs were on one small wide flange post (W4X13 or W5X16) in concrete and Type C signs were installed on wood posts or U posts. Around 1962 MnDOT dropped the Type B signs and installed only Type C signs on U posts or X posts (two U posts back to back).

Type C Sign

Type C signs are primarily regulatory, warning, route marker assemblies, and auxiliaries, as found in the Standard Signs Manual. They are the most common sign type and typically installed on driven U posts or square tube posts.

Type D signs are the smaller guide, destination, or informational signs. They are supported on driven U posts or mounted on overhead structures with punching and stringer spacing as indicated in the Standard Signs Manual.

Type D – Ground Mounted

Type D – Bridge Mounted

Type D – Mast Arm Mounted

Type OH signs are large overhead guide, directional, or informational signs, either spanning a roadway, cantilevered over the roadway/shoulder, or bridge-mounted. The requirements of the structural support system generally require installation or maintenance by contract. There are three kinds of Type OH signs: sign supports which include no walkway or sign lighting, trusses which may or may not include walkway and sign lighting, and bridge-mounted structures which may or may not include walkway and sign lighting.

Type OH Sign – Cantilever (Design A)

Type OH Sign – Cantilever (Design B)

Type OH Sign – Sign Bridge (Design C)

Type OH signs are necessary where ground-mounted signs are not deemed effective. Applications include, but are not limited to the following:

1. Freeway signing where space is not available for ground mounted signs or where there are three or more lanes of travel.
2. Guide and/or lane use control signing approaching intersections in urban areas.
3. Approach warning sign/flasher for mid-block pedestrian crosswalks.
4. Locations with restricted sight distance (may be coupled with other factors cited).

Type OH – Sign Support

Type OH Sign – Bridge Mounted

Type EA signs are exit number panels attached with U-posts to Type A sign panels.

Type EO signs are exit number panels attached with U-posts to Type OH sign panels.

4.2 Regulatory Signs

4.2.1 Application of Regulatory Signs

Regulatory signs shall be used to inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements. Regulatory signs shall be installed at or near where the regulations apply. The signs shall clearly indicate the requirements imposed by the regulations and shall be designed and installed to provide adequate visibility and legibility in order to obtain compliance.

Regulatory signs shall be retroreflective (see Section Error! Reference source not found.) or illuminated to show the same shape and similar color by both day and night, unless specifically stated otherwise in the text discussion in the MN MUTCD for a particular sign or group of signs.

The requirements for sign illumination shall not be considered to be satisfied by street, highway, or strobe lighting.

4.2.2 Establishment of Priorities

Signs should be used only where warranted by facts and field studies. Signs are essential where special regulations apply at specific places or at specific times only, or where hazards are not self-evident.

Regulatory signs are not necessary to confirm rules of the road.

4.2.3 MUTCD Chapter 2B Handout

The information on the following pages are a handout from the MN MUTCD, Chapter 2B on Regulatory Signs. The entire section is not included, but only pages of interest for this manual. For full details on the MUTCD, refer to the OTST publications website found at, www.dot.state.mn.us/trafficeng/publ/index.html.

In addition, the entire 2013 Standard Signs Summary is included at the end of this chapter.

HANDOUT

Chapter 2B. REGULATORY SIGNS

2B.1 Application of Regulatory Signs

STANDARD:

Regulatory signs shall be used to inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements.

Regulatory signs shall be installed at or near where the regulations apply. The signs shall clearly indicate the requirements imposed by the regulations and shall be designed and installed to provide adequate visibility and legibility in order to obtain compliance.

Regulatory signs shall be retroreflective or illuminated (see Section 2A.7) to show the same shape and similar color by both day and night, unless specifically stated otherwise in the text discussion in this Manual for a particular sign or group of signs.

The requirements for sign illumination shall not be considered to be satisfied by street, highway, or strobe lighting.

SUPPORT:

Section 1A.9 contains information regarding the assistance that is available to jurisdictions that do not have engineers on their staffs who are trained and/or experienced in traffic control devices.

2B.2 Design of Regulatory Signs

STANDARD:

Regulatory signs shall be rectangular unless specifically designated otherwise. Regulatory signs shall be designed in accordance with the sizes, shapes, colors, and legends contained in the "Standard Highway Signs and Markings" book (see Section 1A.11).

OPTION:

Regulatory word message signs other than those classified and specified in this Manual and the "Standard Highways Signs and Markings" book (see Section 1A.11) may be developed to aid the enforcement of other laws or regulations.

Except for symbols on regulatory signs, minor modifications may be made to the design provided that the essential appearance characteristics are met.

SUPPORT:

The use of educational plaques to supplement symbol signs is described in Section 2A.12.

Most regulatory signs are rectangular, with the longer dimension vertical. The shapes and colors of regulatory signs are listed in Tables 2A-4 and 2A-5, respectively. Exceptions are specifically noted in the following Sections.

The use of educational plaques to supplement symbol signs is described in Section 2A.13.

GUIDANCE:

Changeable message signs displaying a regulatory message incorporating a prohibitory message that includes a red circle and slash on a static sign should display a red symbol that approximates the same red circle and slash as closely as possible.

2B.3 Size of Regulatory Signs

STANDARD:

Except as provided in Section 2A.11, the sizes for regulatory signs shall be as shown in Table 2B-1 and in Appendix C at the back of this Manual.

SUPPORT:

Section 2A.11 contains information regarding the applicability of the various columns in Table 2B-1.

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Section 1A.13 contains information regarding the definitions of multi-lane street or highway and multi-lane approach with respect to inclusion of turning lanes.

STANDARD:

Except as provided in the following Option, the minimum sizes for regulatory signs facing traffic on multi-lane conventional roads shall be as shown in the Multi-lane column of Table 2B-1.

OPTION:

Where the posted speed limit is 35 mph or less on a multi-lane highway or street, other than for a STOP sign, the minimum size shown in the Single Lane column in Table 2B-1 may be used.

HANDOUT

Where a regulatory sign, other than a STOP sign, is placed on the left-hand side of a multi-lane roadway in addition to the installation of the same regulatory sign on the right-hand side or the roadway, the size shown in the Single Lane column in Table 2B-1 may be used for both the sign on the right-hand side and the sign on the left-hand side of the roadway.

STANDARD:

A minimum size of 36 x 36 inches shall be used for STOP signs that face multi-lane approaches.

Where side roads intersect a multi-lane street or highway that has a speed limit of 45 mph or higher, the minimum size of the STOP signs facing the side road approaches, even if the side road only has one approach lane, shall be 36 x 36 inches.

Where side roads intersect a multi-lane street or highway that has a speed limit of 40 MPH or lower, the minimum size of the STOP signs facing the side road approaches shall be as shown in the Single Lane or Multi-lane columns of Table 2B-1 based on the number of approach lanes on the side street approach.

GUIDANCE:

The minimum sizes for regulatory signs facing traffic on exit and entrance ramps should be as shown in the column of Table 2B-1 that corresponds to the mainline roadway classification (Expressway or Freeway). If a minimum size is not provided in the Freeway column, the minimum size in the Expressway column should be used. If a minimum size is not provided in the Freeway or Expressway Column, the size in the Oversized column should be used.

2B.4 Right-of-Way at Intersections

SUPPORT:

State or local laws written in accordance with the "Uniform Vehicle Code" (see Section 1A.11) establish the right-of-way rule at intersections with four approaches having no regulatory traffic control signs such that the driver of a vehicle approaching an intersection must yield the right-of-way to any vehicle or pedestrian already in the intersection. When two vehicles approach an intersection with four approaches from different streets or highways at approximately the same time, the right-of-way rule requires the driver of the vehicle on the left to yield the right-of-way to the vehicle on the right. The right-of-way can be modified at through streets or highways by placing YIELD (R1-2) signs (see Sections 2B.8 and 2B.9) or STOP (R1-1) signs (see Sections 2B.5 through 2B.7) on one or more approaches.

GUIDANCE:

Engineering judgment should be used to establish intersection control. The following factors should be considered:

A. Vehicular, bicycle, and pedestrian traffic volumes on all approaches;
B. Number and angle of approaches;
C. Approach speeds;
D. Sight distance available on each approach; and
E. Reported crash experience.

YIELD or STOP signs should be used at an intersection if one or more of the following conditions exist:

A. An intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law;
B. A street entering a designated through highway or street; and/or
C. An unsignalized intersection in a signalized area.

In addition, the use of YIELD or STOP signs should be considered at the intersection of two minor streets or local roads where the intersection has more than three approaches and where one or more of the following conditions exist:

A. The combined vehicular, bicycle, and pedestrian volume entering the intersection from all approaches averages more than 2,000 units per day;
B. The ability to see conflicting traffic on an approach is not sufficient to allow a road user to stop or yield in compliance with the normal right-of-way rule if such stopping or yielding is necessary; and/or
C. Crash records indicate that five or more crashes that involve the failure to yield the right-of-way at the intersection under the normal right-of-way rule have been reported within a 3-year period, or that three or more such crashes have been reported within a 2-year period.

YIELD or STOP signs should not be used for speed control.

SUPPORT:

Section 2B.7 contains provisions regarding the application of multi-way STOP control at an intersection.

GUIDANCE:

Once the decision has been made to control an intersection, the decision regarding the appropriate roadway to control should be based on engineering judgment. In most cases, the roadway carrying the lowest volume of traffic should be controlled.

A YIELD or STOP sign should not be installed on the higher volume roadway unless justified by an engineering study.

HANDOUT

SUPPORT:

The following are considerations that might influence the decision regarding the appropriate roadway upon which to install a YIELD or STOP sign where two roadways with relatively equal volumes and/or characteristics intersect:

A. Controlling the direction that conflicts the most with established pedestrian crossing activity or school walking routes;
B. Controlling the direction that has obscured vision, dips, or bumps that already require drivers to use lower operating speeds; and
C. Controlling the direction that has the best sight distance from a controlled position to observe conflicting traffic.

STANDARD:

Because the potential for conflicting commands could create driver confusion, YIELD or STOP signs shall not be used in conjunction with any traffic control signal operation, except in the following cases:

A. A STOP sign, if the signal indication for an approach is a flashing red at all times;

B. If a minor street or driveway is located within or adjacent to the area controlled by the traffic control signal, but does not require separate traffic signal control because an extremely low potential for conflict exists; or

C. If a channelized turn lane is separated from the adjacent travel lanes by an island and the channelized turn lane is not controlled by a traffic control signal.

Except as provided in Section 2B.9, STOP signs and YIELD signs shall not be installed on different approaches to the same unsignalized intersection if those approaches conflict with or oppose each other.

Portable or part-time STOP or YIELD signs shall not be used except for emergency and temporary traffic control zone purposes.

A portable or part-time (folding) STOP sign that is manually placed into view and manually removed from view shall not be used during a power outage to control a signalized approach unless the maintaining agency establishes that the signal indication that will first be displayed to that approach upon restoration of power is a flashing red signal indication and that the portable STOP sign will be manually removed from view prior to stop-and-go operation of the traffic control signal.

OPTION:

A portable or part-time (folding) STOP sign that is electrically or mechanically operated such that it only displays the STOP message during a power outage and ceases to display the STOP message upon restoration of power may be used during a power outage to control a signalized approach.

SUPPORT:

Section 9B.3 contains provisions regarding the assignment of priority at a shared-use path/roadway intersection.

2B.5 STOP Sign (R1-1) and ALL WAY Plaque (R1-3P)

R1-1 R1-3P

STANDARD:

When it is determined that a full stop is always required on an approach to an intersection, a STOP (R1-1) sign shall be used.

The STOP sign shall be an octagon with a white legend and border on a red background.

At intersections where all approaches are controlled by STOP signs (see Section 2B.7), an ALL WAY supplemental plaque (R1-3P) shall be mounted below each STOP sign. The ALL WAY plaque shall have a white legend and border on a red background.

The ALL WAY plaque shall only be used if all intersection approaches are controlled by STOP signs.

Supplemental plaques with legends such as 2-WAY, 3-WAY, 4-WAY, or other numbers of ways shall not be used with STOP signs.

SUPPORT:

The use of the CROSS TRAFFIC DOES NOT STOP (W4-4P) plaque (and other plaques with variations of this word message) is described in Section 2C.59.

GUIDANCE:

Plaques with the appropriate alternative messages of TRAFFIC FROM LEFT (RIGHT) DOES NOT STOP (W4-4aP) or ONCOMING TRAFFIC DOES NOT STOP (W4-4bP) should be used at intersections where STOP signs control all but one approach to the intersection, unless the only non-stopped approach is from a one-way street.

HANDOUT

R1-10P

OPTION:

An EXCEPT RIGHT TURN (R1-10P) plaque may be mounted below the STOP sign if an engineering study determines that a special combination of geometry and traffic volumes is present that makes it possible for right-turning traffic on the approach to be permitted to enter the intersection without stopping.

SUPPORT:

The design and application of Stop Beacons are described in Section 4L.5.

2B.6 STOP Sign Applications

GUIDANCE:

At intersections where a full stop is not necessary at all times, consideration should first be given to using less restrictive measures such as YIELD signs (see Sections 2B.8 and 2B.9).

The use of STOP signs on the minor-street approaches should be considered if engineering judgment indicates that a stop is always required because of one or more of the following conditions:

A. The vehicular traffic volumes on the through street or highway exceed 6,000 vehicles per day;
B. A restricted view exists that requires road users to stop in order to adequately observe conflicting traffic on the through street or highway; and/or
C. Crash records indicate that three or more crashes that are susceptible to correction by the installation of a STOP sign have been reported within a 12-month period, or that five or more such crashes have been reported within a 2-year period. Such crashes include right-angle collisions involving road users on the minor-street approach failing to yield the right-of-way to traffic on the through street or highway.

SUPPORT:

In many low volume situations with no unusual history of intersection crashes, no control at the intersections is a cost effective strategy. Research suggests that at most locations, increasing the level of intersection control will not improve safety (see FHWA-RD-81-084 Stop, Yield and No Control at Intersections).

The use of STOP signs at grade crossings is described in Sections 8B.4 and 8B.5.

2B.7 Multi-Way Stop Applications

SUPPORT:

Multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multi-way stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multi-way stop control is used where the volume of traffic on the intersecting roads is approximately equal.

The restrictions on the use of STOP signs described in Section 2B.4 also apply to multi-way stop applications.

GUIDANCE:

The decision to install multi-way stop control should be based on an engineering study.

The following criteria should be considered in the engineering study for a multi-way STOP sign installation:

A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.
B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.
C. Minimum volumes:
   1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and
   2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but
   3. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.
D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

HANDOUT

OPTION:

Other criteria that may be considered in an engineering study include:

A. The need to control left-turn conflicts;
B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;
C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and
D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

2B.8 YIELD Sign (R1-2)

R1-2

STANDARD:

The YIELD (R1-2) sign shall be a downward-pointing equilateral triangle with a wide red border and the legend YIELD in red on a white background.

SUPPORT:

The YIELD sign assigns right-of-way to traffic on certain approaches to an intersection. Vehicles controlled by a YIELD sign need to slow down to a speed that is reasonable for the existing conditions or stop when necessary to avoid interfering with conflicting traffic.

2B.9 YIELD Sign Applications

OPTION:

YIELD signs may be installed:

A. On the approaches to a through street or highway where conditions are such that a full stop is not always required.
B. At the second crossroad of a divided highway, where the median width at the intersection is 30 feet or greater. In this case, a STOP or YIELD sign may be installed at the entrance to the first roadway of a divided highway, and a YIELD sign may be installed at the entrance to the second roadway.
C. For a channelized turn lane that is separated from the adjacent travel lanes by an island, even if the adjacent lanes at the intersection are controlled by a highway traffic control signal or by a STOP sign.
D. At an intersection where a special problem exists and where engineering judgment indicates the problem to be susceptible to correction by the use of the YIELD sign.
E. Facing an entrance ramp onto a roadway, if engineering judgment indicates that control is needed because acceleration geometry and/or sight distance is not adequate for merging traffic operation.

STANDARD:

A YIELD (R1-2) sign shall be used to assign right-of-way at the entrance to a roundabout. YIELD signs at roundabouts shall be used to control the approach roadways and shall not be used to control the circulatory roadway.

Other than for all of the approaches to a roundabout, YIELD signs shall not be placed on all of the approaches to an intersection. When a YIELD sign is used at an intersection other than a roundabout, at least one other approach to an intersection shall remain uncontrolled.

2B.10 STOP Sign or YIELD Sign Placement

STANDARD:

The STOP or YIELD sign shall be installed on the near side of the intersection on the right-hand side of the approach to which it applies. When the STOP or YIELD sign is installed at this required location and the sign visibility is restricted, a Stop Ahead sign (see Section 2C.36) shall be installed in advance of the STOP sign or a Yield Ahead sign (see Section 2C.36) shall be installed in advance of the YIELD sign.

The STOP or YIELD sign shall be located as close as practical to the intersection it regulates, while optimizing its visibility to the road user it is intended to regulate.

STOP signs and YIELD signs shall not be mounted on the same post.

No items other than inventory stickers, sign installation dates, and bar codes shall be affixed to the fronts of STOP or YIELD signs, and the placement of these items shall be in the border of the sign.

No items other than official traffic control signs, inventory stickers, sign installation dates, anti-vandalism stickers, and bar codes shall be mounted on the backs of STOP or YIELD signs.

No items other than retroreflective strips (see Section 2A.21) or official traffic control signs shall be mounted on the fronts or backs of STOP or YIELD signs supports.

HANDOUT

HANDOUT

GUIDANCE:

STOP or YIELD signs should not be placed farther than 50 feet from the edge of the pavement of the intersected roadway (see Drawing F in Figure 2A-3).

A sign that is mounted back-to-back with a STOP or YIELD sign should stay within the edges of the STOP or YIELD sign. If necessary, the size of the STOP or YIELD sign should be increased so that any other sign installed back-to-back with a STOP or YIELD sign remains within the edges of the STOP or YIELD sign.

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R1-2aP

OPTION:

Where drivers proceeding straight ahead must yield to traffic approaching from the opposite direction, such as at a one-lane bridge, a TO ONCOMING TRAFFIC (R1-2aP) plaque may be mounted below the YIELD sign.

SUPPORT:

Figure 2A-3 shows examples of some typical placements of STOP signs and YIELD signs.

Section 2A.16 contains additional information about separate and combined mounting of other signs with STOP or YIELD signs.

GUIDANCE:

Stop lines that are used to supplement a STOP sign should be located as described in Section 3B.16. Yield lines that are used to supplement a YIELD sign should be located as described in Section 3B.16.

Where there is a marked crosswalk at the intersection, the STOP sign should be installed in advance of the crosswalk line nearest to the approaching traffic.

Except at roundabouts, where there is a marked crosswalk at the intersection, the YIELD sign should be installed in advance of the crosswalk line nearest to the approaching traffic.

Where two roads intersect at an acute angle, the STOP or YIELD sign should be positioned at an angle, or shielded, so that the legend is out of view of traffic to which it does not apply.

If a raised splitter island is available on the left-hand side of a multi-lane roundabout approach, an additional YIELD sign should be placed on the left-hand side of the approach.

OPTION:

If a raised splitter island is available on the left-hand side of a single lane roundabout approach, an additional YIELD sign may be placed on the left-hand side of the approach.

At wide-throat intersections or where two or more approach lanes of traffic exist on the signed approach, observance of the right-of-way control may be improved by the installation of an additional STOP or YIELD sign on the left-hand side of the road and/or the use of a stop or yield line. At channelized intersections or at divided roadways separated by a median, the additional STOP or YIELD sign may be placed on a channelizing island or in the median. An additional STOP or YIELD sign may also be placed overhead facing the approach at the intersection to improve observance of the right-of-way control.

STANDARD:

More than one STOP sign or more than one YIELD sign shall not be placed on the same support facing in the same direction.

OPTION:

For a yield-controlled channelized right-turn movement onto a roadway without an acceleration lane and for an entrance ramp onto a freeway or expressway without an acceleration lane, a NO MERGE AREA (W4-5P) supplemental plaque (see Section 2C.40) may be mounted below a Yield Ahead (W3-2) sign and/or below a YIELD (R1-2) sign when engineering judgment indicates that road users would expect an acceleration lane to be present.

2B.11 Stop Here For Pedestrians Signs (R1-5 Series)

R1-5b

R1-5c

STANDARD:

Stop Here For Pedestrians (R1-5b or R1-5c) signs shall be used if stop lines are used in advance of a marked crosswalk that crosses an uncontrolled multi-lane approach. The Stop Here for Pedestrians signs shall only be used where the law specifically requires that a driver must stop for a pedestrian in a crosswalk.

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users about the State law prior to reaching the crosswalk, nor shall it be installed as an educational display that is not near any crosswalk.

The In-Street Pedestrian Crossing sign shall have either the same sign message on the back side or a strip of retroreflective sheeting not less than 2 inches in width. The color of this strip shall be the same as that of the lane line the on which the sign is placed.

There shall be only one In-Street Pedestrian Crossing sign installed for each approach to marked crosswalks.

GUIDANCE:

If an island (see Chapter 3I) is available, the In-Street Pedestrian Crossing sign, if used, should be placed on the island.

The In-Street Pedestrian Crossing sign should only be installed on roadways with posted speed limits of 35 mph or less and should not impede normal through or turning traffic movements.

OPTION:

If a Pedestrian Crossing (W11-2) warning sign is used in combination with an In-Street or an Overhead Pedestrian Crossing sign, the W11-2 sign with a diagonal downward pointing arrow (W16-7P) plaque may be post-mounted on the right-hand side of the roadway at the crosswalk location.

STANDARD:

The In-Street Pedestrian Crossing sign and the Overhead Pedestrian Crossing sign shall not be used at signalized locations.

The STOP FOR legend shall only be used in States where the State law specifically requires that a driver must stop for a pedestrian in a crosswalk.

The In-Street Pedestrian Crossing sign shall have a black legend (except for the red STOP sign symbols) and border on a white background, surrounded by an outer yellow or fluorescent yellow-green background area. The Overhead Pedestrian Crossing sign shall have a black legend and border on a yellow or fluorescent yellow-green background at the top of the sign and a black legend and border on a white background at the bottom of the sign.

Unless the In-Street Pedestrian Crossing sign is placed on a physical island, the sign support shall be designed to bend over and then bounce back to its normal vertical position when struck by a vehicle.

SUPPORT:

The Provisions of Section 2A.18 concerning mounting height are not applicable for the In-Street Pedestrian Crossing sign.

STANDARD:

The top of an In-Street Pedestrian Crossing sign shall be a maximum of 4 feet above the pavement surface. The top of an In-Street Pedestrian Crossing sign placed in an island shall be a maximum of 4 feet above the island surface.

OPTION:

The In-Street Pedestrian Crossing sign may be used seasonally to prevent damage in winter because of plowing operations, and may be removed at night if the pedestrian activity at night is minimal.

In-Street Pedestrian Crossing signs, Overhead Pedestrian Crossing signs, and Stop Here For Pedestrians signs may be used together at the same crosswalk.

2B.13 Speed Limit Sign (R2-1)

R2-1

STANDARD:

Speed zones (other than statutory speed limits) shall only be established on the basis of an engineering study that has been performed in accordance with traffic engineering practices. The engineering study shall include an analysis of the current speed distribution of free-flowing vehicles.

The Speed Limit (R2-1) sign shall display the limit established by law, ordinance, regulation, or as adopted by the authorized agency based on the engineering study. The speed limits displayed shall be in multiples of 5 mph.

Speed Limit (R2-1) signs, indicating speed limits for which posting is required by law, shall be located at the points of change from one speed limit to another.

At the downstream end of the section to which a speed limit applies, a Speed Limit sign showing the next speed limit shall be installed. Additional Speed Limit signs shall be installed beyond major intersections and at other locations where it is necessary to remind road users of the speed limit that is applicable.

Speed Limit signs indicating the statutory speed limits shall be installed at entrances to the State and, where appropriate, at jurisdictional boundaries in urban areas.

HANDOUT

SUPPORT:

Minnesota Statute 169.14 sets forth speed limits to govern all roadways and alleys in the state. Any posted speed limit greater or less than the statutory speed limits must be authorized by the Commissioner of Transportation. Any alteration of statutory speed limits on any public road or street shall be based upon the results of an engineering and traffic investigation.

Minnesota Statute, section 169.14, subd. 5, states that:

> When local authorities believe that the existing speed limit upon any street or highway, or part thereof, within their respective jurisdictions and not a part of the trunk highway system is greater or less than is reasonable or safe under existing condition, they may request the commissioner (of transportation) to authorize, upon the basis of an engineering and traffic investigation, the erection of appropriate signs designating a reasonable and safe speed limit thereat, which speed limit shall be effective when such signs are erected.

GUIDANCE:

A Reduced Speed Limit Ahead (W3-5 or W3-5a) sign (see Section 2C.38) should be used to inform road users of a reduced speed zone where the speed limit is being reduced by more than 10 mph, or where engineering judgment indicates the need for advance notice to comply with the posted speed limit ahead.

States and local agencies should conduct engineering studies to reevaluate non-statutory speed limits on segments of their roadways that have undergone significant changes since the last review, such as the addition or elimination of parking or driveways, changes in the number of travel lanes, or changes in the configuration of bicycle lanes.

No more than three speed limits should be displayed on any one Speed Limit sign or assembly.

When a speed limit within a speed zone is posted, it should be within 5 mph of the 85th-percentile speed of free-flowing traffic.

Speed studies for signalized intersection approaches should be taken outside the influence area of the traffic control signal, which is generally considered to be approximately 1/2 mile, to avoid obtaining skewed results for the 85th-percentile speed.

STANDARD:

A Speed Limit sign shall not be used to warn road users of an advisory speed for certain roadway conditions. See Section 2C.8 for use of advisory speed plaques.

OPTION:

Other factors that may be considered when establishing speed limits are the following:

A. Road characteristics, shoulder condition, grade, alignment, and sight distance;
B. The pace speed;
C. Roadside development and environment;
D. Parking practices and pedestrian activity; and
E. Reported crash experience for at least a 12-month period.

Two types of Speed Limit signs may be used: one to designate passenger car speeds, including any nighttime information or minimum speed limit that might apply; and the other to show any special speed limits for trucks and other vehicles.

A changeable message sign that changes the speed limit for traffic and ambient conditions may be installed provided that the appropriate speed limit is displayed at the proper times.

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.

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.

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Reduced Speed Ahead Signs (R2-5 series)

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STANDARD:

The Reduced Speed Ahead signs shall be removed and replaced with Speed Reduction signs (W3-5, W3-5a), see Section 2C.38.

R2-5a

R2-5b

R2-5c

R2-X1

HANDOUT

HANDOUT

GUIDANCE:

If used, the BEGIN HIGHER FINES ZONE sign or FINES HIGHER plaque should be located at the beginning of the temporary traffic control zone, school zone, or other applicable designated zone and just beyond any interchanges, major intersections, or other major traffic generators.

STANDARD:

The Higher Fines signs and plaque shall have a black legend and border on a white rectangular background. All supplemental plaques mounted below the Higher Fines signs and plaque shall have a black legend and border on a white rectangular background.

GUIDANCE:

Agencies should limit the use of the Higher Fines signs and plaque to locations where work is actually underway, or to locations where the roadway, shoulder, or other conditions, including the presence of a school zone and/or a reduced school speed limit zone, require a speed reduction or extra caution on the part of the road user.

OPTION:

Alternate legends such as BEGIN (or END) DOUBLE FINES ZONE may also be used for the R2-10 and R2-11 signs.

The legend FINES HIGHER on the R2-6P plaque may be replaced by FINES DOUBLE (R2-6aP), $XX FINE (R2-6bP), or another legend appropriate to the specific regulation.

The following may be mounted below an R2-10 sign or R2-6P plaque:

A. A supplemental plaque specifying the times that the higher fines are in effect (similar to the S4-1P plaque), or
B. A supplemental plaque WHEN CHILDREN (WORKERS) ARE PRESENT, or
C. A supplemental plaque WHEN FLASHING (similar to the S4-4P plaque) if used in conjunction with a yellow flashing beacon.

SUPPORT:

Section 6F.12 contains information regarding other signs and plaques associated with increased fines for traffic violations in temporary traffic control zones. Section 7B.10 contains information regarding other signs and plaques associated with increased fines for traffic violations in designated school zones.

2B.18 Movement Prohibition Signs (R3-1 through R3-4, R3-18 and R3-27)

R3-1

R3-2

R3-3

R3-4

R3-18

R3-27

STANDARD:

Except as provided in the following second Option, where specific movements are prohibited, Movement Prohibition signs shall be installed.

GUIDANCE:

Movement Prohibition signs should be placed where they will be most easily seen by road users who might be intending to turn. MN Rev. 2

If No Right Turn (R3-1) signs are used, at least one should be placed either over the roadway or at a right-hand corner of the intersection.

If No Left Turn (R3-2) signs are used, at least one should be placed over the roadway, at the far left-hand corner of the intersection, on a median, or in conjunction with the STOP sign or YIELD sign located on the near right-hand corner. MN Rev. 2

Except as provided in Item C In the Guidance below, for signalized locations, if NO TURNS (R3-3) signs are used, two signs should be used, one at a location specified for a No Right Turn sign and one at a location specified for a No Left Turn sign. MN Rev. 2

If No U-Turn (R3-4) signs or combination No U-Turn/No Left Turn (R3-18) signs are used, at least one should be used at a location specified for No Left Turn signs. MN Rev. 2

OPTION:

If both left turns and U-turns are prohibited, the combination No U-Turn/No Left Turn (R3-18) sign may be used instead of separate R3-2 and R3-4 signs.

HANDOUT

GUIDANCE:

If No Straight Through (R3-27) signs are used, at least one should be placed either over the roadway or at a location where it can be seen by road users who might be intending to travel straight through the intersection.

If turn prohibition signs are installed in conjunction with traffic control signals:

A. The No Right Turn sign should be installed adjacent to a signal face viewed by road users in the right-hand lane.
B. The No Left Turn (or No U-Turn or combination No U-Turn/No Left Turn) sign should be installed adjacent to a signal face viewed by road users in the left-hand lane.
C. A NO TURNS sign should be placed adjacent to a signal face viewed by all road users on that approach, or two signs should be used.

OPTION:

If turn prohibition signs are installed in conjunction with traffic control signals, an additional Movement Prohibition sign may be post-mounted to supplement the sign mounted overhead.

Where ONE WAY signs are used (see Section 2B.40), Turn Prohibition signs may be omitted.

When the movement restriction applies during certain time periods only, the following Movement Prohibition signing alternatives may be used and are listed in order of preference:

A. Changeable message signs, especially at signalized intersections.
B. Permanently mounted signs incorporating a supplementary legend showing the hours and days during which the prohibition is applicable.
C. Portable signs, installed by proper authority, located off the roadway at each corner of the intersection. The portable signs are only to be used during the time that the movement prohibition is applicable.

Movement Prohibition signs may be omitted at a ramp entrance to an expressway or a channelized intersection where the design is such as to indicate clearly the one-way traffic movement on the ramp or turning lane.

STANDARD:

The No Left Turn (R3-2) sign, the No U-Turn (R3-4) sign, and the combination No U-Turn/No Left Turn (R3-18) sign shall not be used at approaches to roundabouts to prohibit drivers from turning left onto the circulatory roadway of a roundabout.

SUPPORT:

At roundabouts, the use of R3-2, R3-4, or R3-18 signs to prohibit left turns onto the circulatory roadway might confuse drivers about the possible legal turning movements around the roundabout. Roundabout Directional Arrow (R6-4 series) signs (see Section 2B.43) and/or ONE WAY (R6-1R or R6-2R) signs are the appropriate signs to indicate the travel direction within a roundabout.

2B.19 Intersection Lane Control Signs (R3-5 through R3-8)

STANDARD:

Intersection Lane Control signs, if used, shall require road users in certain lanes to turn, shall permit turns from a lane where such turns would otherwise not be permitted, shall require a road user to stay in the same lane and proceed straight through an intersection, or shall indicate permitted movements from a lane.

Intersection Lane Control signs shall have three applications:

A. Mandatory Movement Lane Control (R3-5, R3-5a, and R3-7) signs;
B. Optional Movement Lane Control (R3-6) sign; and
C. Advance Intersection Lane Control (R3-8 series) signs.

GUIDANCE:

When Intersection Lane Control signs are mounted overhead, each sign should be placed over the lane or a projection of the lane to which it applies.

On signalized approaches where through lanes that become mandatory turn lanes, multiple-lane turns that include shared lanes for through and turning movements, or other lane-use regulations are present that would be unexpected by unfamiliar road users, overhead lane control signs should be installed at the signalized location over the appropriate lanes or projections thereof and in advance of the intersection over the appropriate lanes.

Where overhead mounting on the approach is impractical for the advance and/or intersection lane-use signs, one of the following alternatives should be employed:

A. At locations where through lanes become mandatory turn lanes, a mandatory movement lane control (R3-7) sign should be post-mounted on the left-hand side of the roadway where a through lane is becoming a mandatory left-turn lane on a one-way street or where a median of sufficient width for the signs is available, or on the right-hand side of the roadway where a through lane is becoming a mandatory right-turn lane.

HANDOUT

B. At locations where a through lane is becoming a mandatory left-turn lane on a two-way street where a median of sufficient width for the signs is not available, and at locations where multiple-lane turns that include shared lanes for through and turning movements are present, an Advance Intersection Lane Control (R3-8 series) sign should be post-mounted in a prominent location in advance of the intersection, and consideration should be given to the use of an oversized version in accordance with Table 2B-1.

STANDARD:

Use of an overhead sign for one approach lane shall not require installation of overhead signs for the other lanes of that approach.

OPTION:

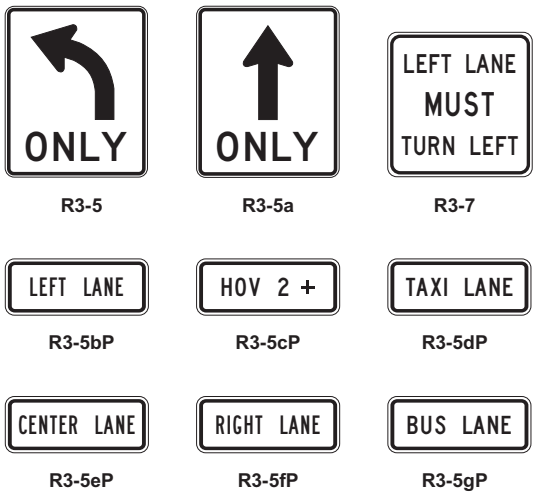
Where the number of through lanes on an approach is two or less, the Intersection Lane Control signs (R3-5, R3-6, or R3-8) may be overhead or post-mounted.

Intersection Lane Control signs may be omitted where:

A. A turn bay has been provided by physical construction or pavement markings, and
B. Only the road users using such turn bays are permitted to make a turn in that direction.

At roundabouts, Intersection Lane Control (R3-5, R3-6, and R3-8 series) signs may display any of the arrow symbol options shown in Figure 2B-5.

2B.20 Mandatory Movement Lane Control Signs (R3-5, R3-5a, and R3-7)



STANDARD:

If used, Mandatory Movement Lane Control (R3-5, R3-5a, and R3-7) sign shall indicate only the single vehicle movement that is required from the lane. If used, the Mandatory Movement Lane Control sign shall be located in advance of the intersection, such as near the upstream end of the mandatory movement lane, and/or at the intersection where the regulation applies. When the mandatory movement applies to lanes exclusively designated for HOV traffic, the R3-5cP supplemental plaque shall be used. When the mandatory movement applies to lanes that are not HOV

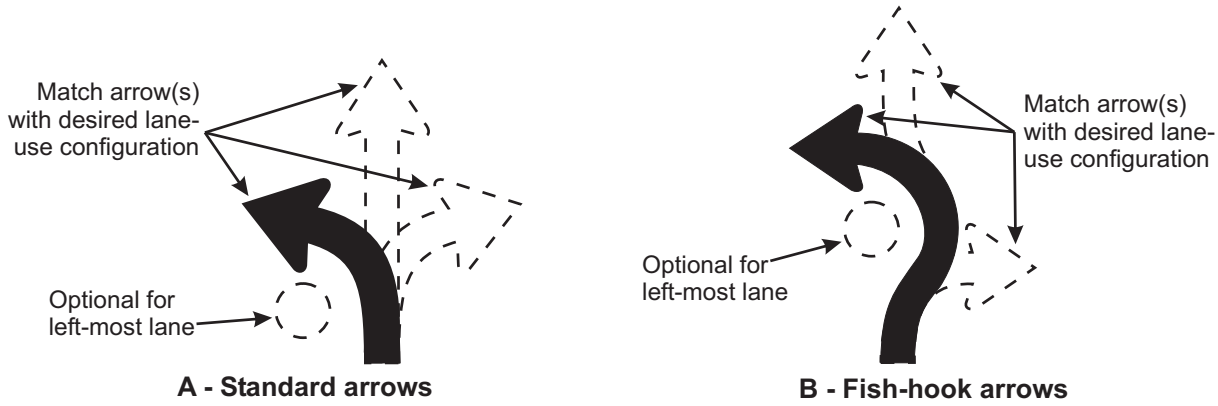


Figure 2B-5. Intersection Lane Control Sign Arrow Options for Roundabouts

HANDOUT

facilities, but are lanes exclusively designated for buses and/or taxis, the word message R3-5dP and/or R3-5gP supplemental plaques shall be used.

The Mandatory Movement Lane Control (R3-7) sign shall include the legend RIGHT (LEFT) LANE MUST TURN RIGHT (LEFT). The Mandatory Movement Lane Control symbol signs (R3-5 and R3-5a) shall include the legend ONLY.

The R3-7 word message sign shall be for post-mounting only.

Where the number of lanes available to through traffic on an approach is three or more, Mandatory Movement Lane Control (R3-5 and R3-5a) symbol signs, if used, shall be mounted overhead over the specific lanes to which they apply (see Section 2B.19).

GUIDANCE:

If the R3-5 or R3-5a sign is post-mounted on an approach with two or fewer through lanes, a supplemental plaque, such as LEFT LANE (R3-5bP), HOV 2+ (R3-5cP), TAXI LANE (R3-5dP), CENTER LANE (R3-5eP), RIGHT LANE (R3-5fP), BUS LANE (R3-5gP), or BOTH LANES, should be added above the sign to indicate the specific lane to which the mandatory movement applies. If Mandatory Lane Movement Control (R3-5) symbol signs with supplemental R3-5bP or R3-5fP plaques are used, they should be mounted adjacent to and along only the full width portion of the turn lane.

The use of the Mandatory Movement Lane Control (R3-7) word message sign should be limited to only locations that are adjacent to the full-width portion of a mandatory turn lane. The R3-7 sign should not be installed adjacent to a through lane in advance of a turn bay taper or adjacent to a turn bay taper.

Mandatory Movement Lane Control signs should be accompanied by lane-use arrow markings, especially where traffic volumes are high, where there is a high percentage of commercial vehicles, or where other distractions exist.

OPTION:

The Straight Through Only (R3-5a) sign may be used to require a road user in a particular lane to proceed straight through an intersection.

When the Mandatory Movement Lane Control sign for a left-turn lane is installed back-to-back with a Keep Right (R4-7) sign, the dimensions of the Mandatory Movement Lane Control (R3-5) sign may be the same as the Keep Right sign.

The diamond symbol may be used instead of the word message HOV on the R3-5cP supplemental plaque.

R16-X7

OPTION:

The RIGHT LANE MUST EXIT (R16-x7) sign may be used in advance of an exit ramp, in a lane drop situation, where there is no escape lane provided. This sign may be needed in addition to the black and yellow EXIT ONLY signs (E-11 series).

2B.21 Optional Movement Lane Control Sign (R3-6)

MN Rev. 2

R3-6

STANDARD:

If used, the Optional Movement Lane Control (R3-6) sign shall be used for two or more movements from a specific lane or to emphasize permitted movements. If used, the Optional Movement Lane Control sign shall be located in advance of the intersection, such as near the upstream end of an adjacent mandatory movement lane, and/or at the intersection where the regulation applies.

If used, the Optional Movement Lane Control sign shall indicate all permissible movements from specific lanes.

Optional Movement Lane Control signs shall be used for two or more movements from a specific lane where a movement, not normally allowed, is permitted.

The Optional Movement Lane Control sign shall not be used alone to effect a turn prohibition.

Where the number of lanes available to through traffic on an approach is three or more, an Optional Movement Lane Control (R3-6) sign, if used, shall be mounted overhead over the specific lane to which it applies (see Section 2B.19).

GUIDANCE:

If the Optional Movement Lane Control sign is post-mounted on an approach with two or fewer through lanes, a supplemental plaque, such as LEFT LANE (R3-5bP), HOV 2+ (R3-5cP), TAXI LANE (R3-5dP), CENTER LANE (R3-5eP), RIGHT LANE (R3-5fP), or BUS LANE (R3-5gP), should be added above the R3-6 sign to indicate the specific lane from which the optional movements can be made.

HANDOUT

OPTION:

The word message OK may be used within the border in combination with the arrow symbols of the R3-6 sign.

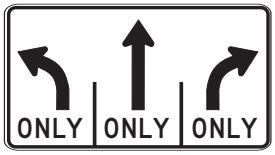
STANDARD:

Because more than one movement is permitted from the lane, the word message ONLY shall not be used on an Optional Movement Lane Control sign.

2B.22 Advance Intersection Lane Control Signs (R3-30 Series)

R3-30AE

R3-30AELA



R3-30ACA

OPTION:

Advance Intersection Lane Control (R3-30AE, R3-30AELA, and R3-30ACA) signs may be used to indicate the configuration of all lanes ahead.

MN Rev. 2 The word messages ONLY, OK, THRU, ALL, or HOV 2+ may be used within the border in combination with the arrow symbols of the R3-30 sign series. The HOV 2+ (R3-5cP) supplemental plaque may be installed at the top outside border of the R3-30 sign over the applicable lane designation on the sign. The diamond symbol may be used instead of the word message HOV. The minimum allowable vehicle occupancy requirement may vary based on the level established for a particular facility.

GUIDANCE:

If used, an Advance Intersection Lane Control sign should be placed at an adequate distance in advance of the intersection so that road users can select the appropriate lane. If used, the Advance Intersection Lane Control sign should be installed either in advance of the tapers or at the beginning of the turn lane.

OPTION:

An Advance Intersection Lane Control sign may be repeated closer to the intersection for additional emphasis.

STANDARD:

MN Rev. 2 Where three or more approach lanes are available to traffic, Advance Intersection Lane Control (R3-30 series) signs, if used, shall be post-mounted in advance of the intersection and shall not be mounted overhead (see Section 2B.19).

2B.23 RIGHT (LEFT) LANE MUST EXIT Sign (R3-33)

R3-33

OPTION:

A RIGHT (LEFT) LANE MUST EXIT (R3-33) sign may be used to supplement an overhead EXIT ONLY guide sign to inform road users that traffic in the right-hand (left-hand) lane of a roadway that is approaching a grade-separated interchange is required to depart the roadway on the exit ramp at the next interchange.

SUPPORT:

Section 2C.43 contains information regarding a warning sign that can be used in advance of lane drops at grade-separated interchanges.

2B.24 Two-Way Left Turn Only Signs (R3-9a, R3-9b)

R3-9a

R3-9b

GUIDANCE:

Two-Way Left Turn Only (R3-9a or R3-9b) signs should be used in conjunction with the required pavement markings where a non-reversible lane is reserved for the exclusive use of left-turning vehicles in either direction and is not used for passing, overtaking, or through travel.

OPTION:

The post-mounted R3-9b sign may be used as an alternate to or a supplement to the overhead R3-9a sign. The legend BEGIN or END may be used within the border of the main sign itself, or on an R3-9cP or R3-9dP plaque mounted immediately above it.

SUPPORT:

Signing is especially helpful to drivers in areas where the two-way left turn only maneuver is new, in areas subject to environmental conditions that frequently obscure the pavement markings, and on streets with two-way left turn only lanes leading to an extensive system of routes with two-way left turn only lanes.

HANDOUT

OPTION:

Appropriate combinations or groupings of these legends into a single sign, such as NO PEDESTRIANS BICYCLES MOTOR-DRIVEN CYCLES (R5-10a), or NO PEDESTRIANS OR BICYCLES (R5-10b) may be used.

STANDARD:

Minnesota has adopted the PEDESTRIANS BICYCLES MOTORIZED BICYCLES NON-MOTORIZED TRAFFIC PROHIBITED (R5-10d) sign which shall be used on all exit ramps from freeways and controlled access expressways. It shall be installed between the DO NOT ENTER (R5-1) sign and the WRONG WAY (R5-1a) sign.

GUIDANCE:

If an exclusion is governed by vehicle weight, a Weight Limit sign (see Section 2B.59) should be used instead of a Selective Exclusion sign.

If used on a freeway or expressway ramp, the NO PEDESTRIANS OR BICYCLES (R5-10b) sign should be installed in a location where it is clearly visible to any pedestrian or bicyclist attempting to enter the limited access facility from a street intersecting the exit ramp.

The Selective Exclusion sign should be placed on the right-hand side of the roadway at an appropriate distance from the intersection so as to be clearly visible to all road users turning into the roadway that has the exclusion. The NO PEDESTRIANS (R5-10c) or No Pedestrian Crossing (R9-3) sign (see Section 2B.51) should be installed so as to be clearly visible to pedestrians who are at a location where an alternative route is available.

OPTION:

The NO PEDESTRIANS (R5-10c) or No Pedestrian Crossing (R9-3) sign may also be used at underpasses or elsewhere where pedestrian facilities are not provided.

The NO TRUCKS (R5-2a) word message sign may be used as an alternate to the No Trucks (R5-2) symbol sign.

The AUTHORIZED VEHICLES ONLY (R5-11) sign may be used at median openings and other locations to prohibit vehicles from using the median opening or facility unless they have special permission (such as law enforcement vehicles or emergency vehicles) or are performing official business (such as highway agency vehicles).

2B.39.1 Other Selective Exclusion Signs (R5-X1)

R5-X1

GUIDANCE:

The No Snowmobile (R5-X1) symbol sign should be used to restrict access to highways and certain geographic areas.

GUIDANCE:

They should be erected at suitable locations as required to convey the appropriate message.

2B.40 ONE WAY Signs (R6-1, R6-2)

R6-1

R6-2

STANDARD:

Except as provided in the following Option, the ONE WAY (R6-1 or R6-2) sign shall be used to indicate streets or roadways upon which vehicular traffic is allowed to travel in one direction only. MN Rev. 1

ONE WAY signs shall be placed parallel to the one-way street at all alleys and roadways that intersect one-way roadways as shown in Figure 2B-14.

At an intersection with a divided highway that has a median width at the intersection itself of 30 feet or more, ONE WAY signs shall be placed, visible to each crossroad approach, on the near right and far left corners of each intersection with the directional roadways (see Figure 2B-15). MN Rev. 1

At an intersection with a divided highway that has a median width at the intersection itself of less than 30 feet, Keep Right (R4-7) signs and/or ONE WAY signs shall be installed (see Figures 2B-16 and 2B-17). If Keep Right signs are installed, they shall be placed as close as practical to the approach ends of the medians and shall be visible to traffic on the divided highway and each crossroad approach. If ONE WAY signs are installed, they shall be placed on the near right and far left corners of the intersection and shall be visible to each crossroad approach. MN Rev. 1

Compliance Date: December 31, 2019

HANDOUT

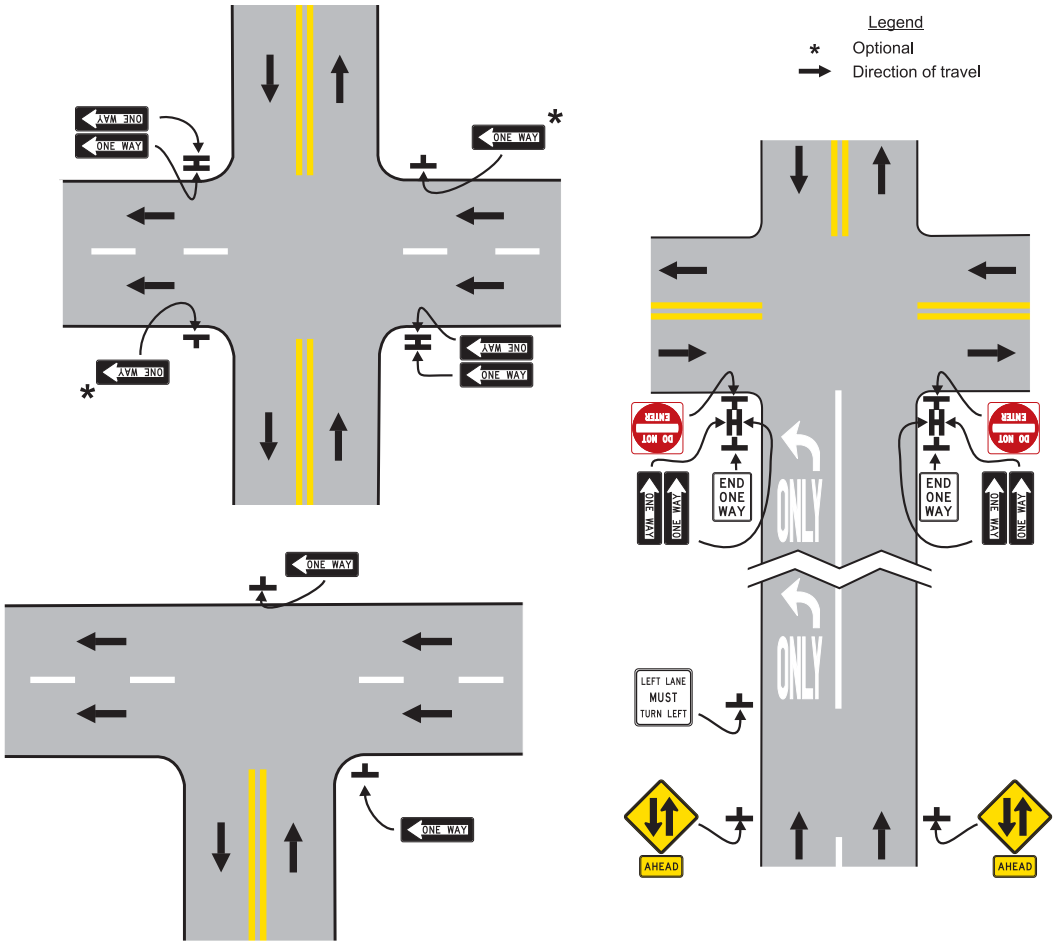


Figure 2B-14. Locations of ONE WAY Signs

OPTION:

At an intersection with a divided highway that has a median width at the intersection itself of less than 30 feet, ONE WAY signs may also be placed on the far right corner of the intersection as shown in Figures 2B-16 and 2B-17.

ONE WAY signs may be omitted on the one-way roadways of divided highways, where the design of interchanges indicates the direction of traffic on the separate roadways.

ONE WAY signs may be omitted from the medians at intersections with divided highways that have median widths of greater than 30 feet when an engineering study has demonstrated that the signs may confuse motorists.

STANDARD:

If used at unsignalized intersections with one-way streets, ONE WAY signs shall be placed on the near right and the far left corners of the intersection facing traffic entering or crossing the one-way street (see Figure 2B-14).

If used at signalized intersections with one-way streets, ONE WAY signs shall be placed near the appropriate signal faces, on the poles holding the traffic signals, on the mast arm or span wire holding the signals, or at the locations specified for unsignalized intersections.

HANDOUT

The No Pedestrian Crossing (R9-3) sign may be used to prohibit pedestrians from crossing a roadway at an undesirable location or in front of a school or other public building where a crossing is not designated.

The No Pedestrian Crossing (R9-3a) word message sign may be used as an alternate to the R9-3 symbol sign. The USE CROSSWALK (R9-3bP) supplemental plaque, along with an arrow, may be installed below either sign to designate the direction of the crossing.

SUPPORT:

One of the most frequent uses of the Pedestrian Crossing signs is at signalized intersections that have three crossings that can be used and one leg that cannot be crossed.

GUIDANCE:

The R9-3bP sign should not be installed in combination with educational plaques.

2B.52 Traffic Signal Pedestrian and Bicycle Actuation Signs (R10-1 through R10-4, and R10-24 through R10-26)

STANDARD:

Traffic signal signs applicable to pedestrian actuation shall be mounted immediately above or incorporated in pedestrian pushbutton units (see Section 4E.8).

SUPPORT:

Traffic Signal signs applicable to pedestrians include:

A. CROSS ONLY ON GREEN (symbolic circular green) (R10-1);
B. CROSS ONLY ON (symbolic walk indication) SIGNAL (R10-2);
C. Push Button for Walk Signal (R10-3 series); and
D. Push Button for Green Signal (R10-4 series).

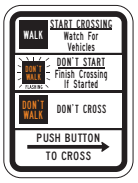
R10-1

R10-2

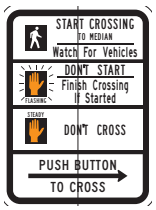
R10-3

R10-3a

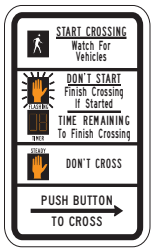
R10-3b



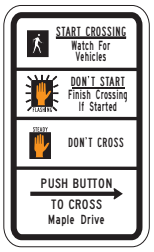
R10-3c



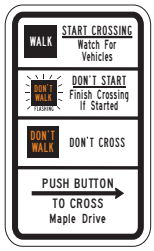
R10-3d



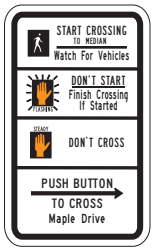
R10-3e



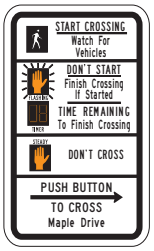
R10-3f



R10-3g



R10-3h



R10-3i

R10-4

R10-4a

R10-25

R10-32P

HANDOUT

OPTION:

The following signs may be used as an alternate for the R10-3 and R10-4 signs:

A. Push Button to Cross Street Wait for Walk Signal (R10-3a); or
B. Push Button to Cross Street Wait for Green Signal (R10-4a).

The name of the street to be crossed may be substituted for the word STREET in the legends on the R10-3a and R10-4a signs.

GUIDANCE:

The finger in the pushbutton symbol on the R10-3, R10-3a, R10-4, and R10-4a signs should point in the same direction as the arrow on the sign.

OPTION:

Where symbol-type pedestrian signal indications are used, an educational sign (R10-3b) may be used instead of the R10-3 sign to improve pedestrian understanding of pedestrian indications at signalized intersections. Where word-type pedestrian signal indications are being retained for the remainder of their useful service life, the legends WALK/DONT WALK may be substituted for the symbols on the educational sign R10-3b, thus creating educational sign R10-3c. The R10-3d educational sign may be used to inform pedestrians that the pedestrian clearance time is sufficient only for the pedestrian to cross to the median at locations where pedestrians cross in two stages using a median refuge island. The R10-3e educational sign may be used where countdown pedestrian signals have been provided. In order to assist the pedestrian in understanding which pushbutton to push, the R10-3f to R10-3i educational signs that provide the name of the street to be crossed may be used instead of the R10-3b to R10-3e educational signs.

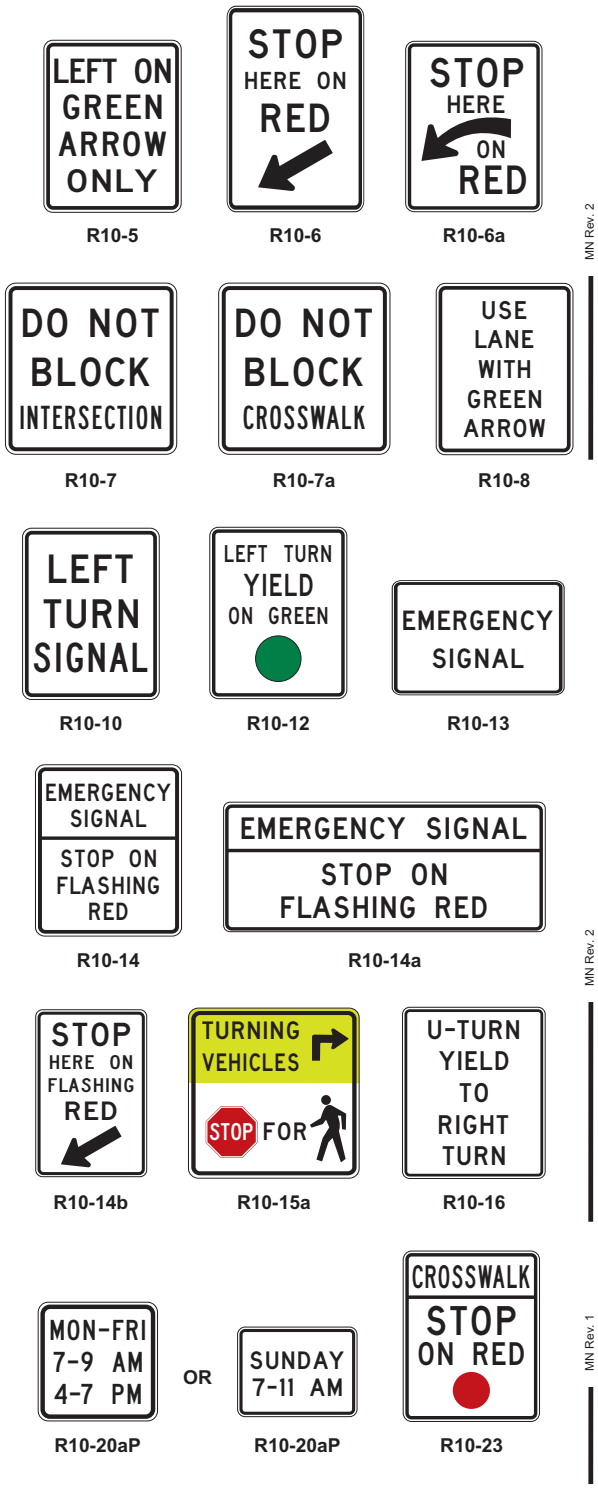
The R10-24 or R10-26 sign (see Section 9B.11) may be used where a pushbutton detector has been installed exclusively to actuate a green phase for bicyclists.

The R10-25 sign may be used where a pushbutton detector has been installed for pedestrians to activate In-Roadway Warning Lights (see Chapter 4N) or flashing beacons that have been added to the pedestrian warning signs.

SUPPORT:

Section 4E.8 contains information regarding the application of the R10-32P plaque.

2B.53 Traffic Signal Signs (R10-5 through R10-30)



4.3 Warning Signs

Warning signs call attention to unexpected conditions on or adjacent to a highway, street, or private roads open to public travel and to situations that might not be readily apparent to road users. Warning signs alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations.

Since the primary purpose of warning signs is to gain attention of the unfamiliar motorist, the placement of warning signs is important. The placement must allow these drivers sufficient time to see the warning sign, understand the intent, identify the potential hazard, decide what action must be taken, and then to perform any necessary maneuver.

4.3.1 MUTCD Chapter 2C Handout

The information on the following pages are a handout from the MN MUTCD, Chapter 2C on Warning Signs. The entire section is not included, but only pages of interest for this manual. For full details on the MUTCD, refer to the OTST publications website found at, www.dot.state.mn.us/trafficeng/publ/index.html.

In addition, the entire 2013 Standard Signs Summary is included at the end of this chapter.

HANDOUT

PART 2. SIGNS

Chapter 2C. Warning Signs and Object Markers

2C.1 Function of Warning Signs

SUPPORT:

Warning signs call attention to unexpected conditions on or adjacent to a highway, street, or private roads open to public travel and to situations that might not be readily apparent to road users. Warning signs alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations.

2C.2 Application of Warning Signs

STANDARD:

The use of warning signs shall be based on an engineering study or on engineering judgment.

GUIDANCE:

The use of warning signs should be kept to a minimum as the unnecessary use of warning signs tends to breed disrespect for all signs. In situations where the condition or activity is seasonal or temporary, the warning sign should be removed or covered when the condition or activity does not exist.

OPTION:

Consistent with the provisions of Chapter 2L, changeable message signs may be used to display a warning message.

Consistent with the provisions of Chapter 4L, a Warning Beacon may be used in combination with a standard warning sign.

SUPPORT:

The categories of warning signs are shown in Table 2C-1.

Warning signs specified provided herein in this Manual cover most of the conditions that are likely to be encountered. Additional warning signs for low-volume roads (as defined in Section 5A.1), temporary traffic control zones, school areas, highway-rail grade crossings, and bicycle facilities, and highway-light rail transit grade crossings are discussed in Parts 5 through 9, respectively.

Section 1A.9 contains information regarding the assistance that is available to jurisdictions that do not have engineers on their staffs who are trained and/or experienced in traffic control devices.

2C.3 Design of Warning Signs

STANDARD:

Except as provided in the following Option 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. Warning signs shall be designed in accordance with sizes, shapes, colors, and legends contained in the MnDOT "Standard Signs Manual" (see Map & Manual Sales Unit, page ii), and the FHWA "Standard Highway Signs and Markings" book (see Section 1A.11).

OPTION:

A warning sign that is larger than the size shown in the Oversized column in Table 2C-2 for that particular sign may be diamond-shaped or may be rectangular or square in shape.

Except for symbols on warning signs, minor modifications may be made to the design provided that the essential appearance characteristics are met. Modifications may be made to the symbols shown on combined horizontal alignment/intersection signs (see Section 2C.11) and intersection warning signs (see Section 2C.46) in order to approximate the geometric configuration of the intersecting roadway(s).

Word message warning signs other than those provided in this Manual may be developed and installed by State and local highway agencies

Warning signs regarding conditions associated with pedestrians, bicyclists, and playgrounds may have a black legend and border on a yellow or fluorescent yellow-green background.

STANDARD:

Warning signs regarding conditions associated with school buses and schools and their related supplemental plaques shall have a black legend and border on a fluorescent yellow-green background (see Section 7B.7).

HANDOUT

2C.4 Size of Warning Signs

STANDARD:

Except as provided in Section 2A.11, the sizes for warning signs shall be as shown in Table 2C-2 and in Appendix C at the back of this Manual.

SUPPORT:

Section 2A.11 contains information regarding the applicability of the various columns in Table 2C-2.

STANDARD:

Except as provided in the Option below, the minimum size for all diamond-shaped warning signs facing traffic on a multi-lane conventional road where the posted speed limit is higher than 35 mph shall be 36 x 36 inches.

The minimum size for supplemental warning plaques that are not included in Table 2C-2 shall be as shown in Table 2C-3.

OPTION:

If a diamond-shaped warning sign is placed on the left-hand side of a multi-lane roadway to supplement the installation of the same warning sign on the right-hand side of the roadway, the minimum size identified in the Single Lane column in Table 2C-2 may be used.

Signs and plaques larger than those shown in Appendix C and Tables 2C-2 and 2C-3 may be used (see Section 2A.11).

Size of Warning Sign	Size of Supplemental Plaque			
	Rectangular			Square
	1 Line	2 Lines	Arrow	
24 x 24 30 x 30	24 x 12	24 x 18	24 x 12	18 x 18
36 x 36 48 x 48	30 x 18	30 x 24	30 x 18	24 x 24

Notes: 1. Larger supplemental plaques may be used when appropriate.
2. Dimensions are in inches and are shown as width x height.

Table 2C-3. Minimum Size of Supplemental Warning Plaques

GUIDANCE:

The minimum size for all diamond-shaped warning signs facing traffic on exit and entrance ramps should be the size identified in Table 2C-2 for the mainline roadway classification (Expressway or Freeway). If a minimum size is not provided in the Freeway Column, the Expressway size should be used. If a minimum size is not provided in the Freeway or the Expressway Column, the Oversized size should be used.

2C.5 Placement of Warning Signs

SUPPORT:

For information on placement of warning signs, see Sections 2A.16 to 2A.21.

The time needed for detection, recognition, decision, and reaction is called the Perception-Response Time (PRT). Table 2C-4 is provided as an aid for determining warning sign location. The distances shown in Table 2C-4 can be adjusted for roadway features, other signing, and to improve visibility.

GUIDANCE:

Warning signs should be placed so that they provide adequate PRT. The distances contained in Table 2C-4 are for guidance purposes and should be applied with engineering judgment. Warning signs should not be placed too far in advance of the condition, such that drivers might tend to forget the warning because of other driving distractions, especially in urban areas.

Minimum spacing between warning signs with different messages should be based on the estimated PRT for driver comprehension of and reaction to the second sign.

The effectiveness of the placement of warning signs should be periodically evaluated under both day and night conditions.

OPTION:

Warning signs that advise road users about conditions that are not related to a specific location, such as Deer Crossing or SOFT SHOULDER, may be installed in an appropriate location, based on engineering judgment, since they are not covered in Table 2C-4.

Placement of Warning Signs is covered in the At-Grade Signing Course.

HANDOUT

Posted or 85th Percentile Speed	Advance Placement Distance[1]								
	Condition A: Speed reduction and lane changing in heavy traffic[2]	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0[3]	10[4]	20[4]	30[4]	40[4]	50[4]	60[4]	70[4]
(mph)	feet	feet	feet	feet	feet	feet	feet	feet	feet
20	225	100[6]	see Note[5]	---	---	---	---	---	---
25	325	100[6]	see Note[5]	see Note[5]	---	---	---	---	---
30	460	100[6]	see Note[5]	see Note[5]	---	---	---	---	---
35	565	100[6]	see Note[5]	see Note[5]	see Note[5]	---	---	---	---
40	670	125	100[6]	100[6]	see Note[5]	---	---	---	---
45	775	175	125	100[6]	100[6]	see Note[5]	---	---	---
50	885	250	200	175	125	100[6]	---	---	---
55	990	325	275	225	200	125	see Note[5]	---	---
60	1100	400	350	325	275	200	100[6]	---	---
65	1200	475	450	400	350	275	200	100[6]	---
70	1250	550	525	500	450	375	275	150	---
75	1350	650	625	600	550	475	375	250	100[6]

NOTES:

[1] The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is the appropriate for an alignment warning symbol sign. For Condition A and B, warning signs with less than 6-inch legend or more than 4 words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.

[2] Typical conditions are locations where the road user might use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2004 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.

[3] Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2004 AASHTO Policy, Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second^2, minus the sign legibility distance of 180 feet.

[4] Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second^2, minus the sign legibility distance of 250 ft.

[5] No suggested distances are provided for these speeds, as placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other sign.

[6] The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

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HANDOUT

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Table 2C-4. Guidelines for Advance Placement of Warning Signs

HANDOUT

2C.6 Horizontal Alignment Warning Signs

SUPPORT:

A variety of horizontal alignment warning signs, pavement markings (see Chapter 3B), and delineation (see Chapter 3F) can be used to advise motorists of a change in the roadway alignment. Uniform application of these traffic control devices with respect to the amount of change in the roadway alignment conveys a consistent message establishing driver expectancy and promoting effective roadway operations. The design and application of horizontal alignment warning signs to meet those requirements are addressed in Sections 2C.6 through 2C.15.

STANDARD:

In advance of horizontal curves on freeways, on expressways, and on roadways with more than 1,000 AADT that are functionally classified as arterials or collectors, horizontal alignment warning signs shall be used in accordance with Table 2C-5 based on the speed differential between the roadway's posted or statutory speed limit or 85th-percentile speed, whichever is higher, or the prevailing speed on the approach to the curve, and the horizontal curve's advisory speed.

OPTION:

Horizontal Alignment Warning signs may also be used on other roadways or on arterial and collector roadways with less than 1,000 AADT based on engineering judgment.

2C.7 Horizontal Alignment Signs (W1-1 through W1-5, W1-11, W1-15)

W1-1

W1-2

W1-3

W1-4

W1-5

W1-11

W1-15

STANDARD:

If Table 2C-5 indicates that a horizontal alignment sign is required, recommended, or allowed, the sign installed in advance of the curve shall be a Curve (W1-2) sign unless a different sign is recommended or allowed by the provisions of this Section.

A Turn (W1-1) sign shall be used instead of a Curve sign in advance of curves that have advisory speeds of 30 mph or less (see Figure 2C-2).

GUIDANCE:

Where there are two changes in roadway alignment in opposite directions that are separated by a tangent distance of less than 600 feet, the Reverse Turn (W1-3) sign should be used instead of multiple Turn (W1-1) signs and the Reverse Curve (W1-4) sign should be used instead of multiple Curve (W1-2) signs.

OPTION:

A Winding Road (W1-5) sign may be used instead of multiple Turn (W1-1) or Curve (W1-2) signs where there are three or more changes in roadway alignment each separated by a tangent distance of less than 600 feet.

A NEXT XX MILES (W7-3aP) supplemental distance plaque (see Section 2C.55) may be installed below the Winding Road sign where continuous roadway curves exist for a specific distance

If the curve has a change in horizontal alignment of 135 degrees or more, the Hairpin Curve (W1-11) sign may be used instead of a Curve or Turn sign.

If the curve has a change of direction of approximately 270 degrees, such as on a cloverleaf interchange ramp, the 270-degree Loop (W1-15) sign may be used instead of a Curve or Turn sign.

GUIDANCE:

When the Hairpin Curve sign or the 270-degree Loop sign is installed, either a One-Direction Large Arrow (W1-6) sign or Chevron Alignment (W1-8) signs should be installed on the outside of the turn or curve.

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Type of Horizontal Alignment Sign	Difference Between Speed Limit and Advisory Speed				
	5 mph	10 mph	15 mph	20 mph	25 mph or more
Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W1-10 Series)) (see Section 2C.7 to determine which sign to use)	Recommended	Required	Required	Required	Required
Advisory Speed Plaque (W13-1P)	Recommended	Required	Required	Required	Required
Chevrons (W1-8) and/or One Direction Large Arrow (W1-6)	Optional	Recommended	Required	Required	Required
Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp	Optional	Optional	Recommended	Required	Required

Note: Required means that the sign and/or plaque shall be used, recommended means that the sign and/or plaque should be used, and optional means that the sign and/or plaque may be used.

See Section 2C.6 for roadways with less than 1,000 ADT.

Table 2C-5. Horizontal Alignment Sign Selection

2C.8 Advisory Speed Plaque (W13-1P)

W13-1P

OPTION:

The Advisory Speed (W13-1P) plaque may be used to supplement any warning sign to indicate the advisory speed for a condition.

STANDARD:

The use of the Advisory Speed plaque for horizontal curves shall be in accordance with the information shown in Table 2C-5. The Advisory Speed plaque shall also be used where an engineering study indicates a need to advise road users of the advisory speed for other roadway conditions.

If used, the Advisory Speed plaque shall carry the message XX MPH. The speed displayed shall be a multiple of 5 mph.

Except in emergencies or when the condition is temporary, an Advisory Speed plaque shall not be installed until the advisory speed has been determined by an engineering study.

The Advisory Speed plaque shall only be used to supplement a warning sign and shall not be installed as a separate sign installation.

The advisory speed shall be determined by an engineering study that follows established engineering practices.

SUPPORT:

Among the established engineering practices that are appropriate for the determination of the recommended advisory speed for a horizontal curve are the following:

A. An accelerometer that provides a direct determination of side friction factors
B. A design speed equation
C. A traditional ball-bank indicator using the following criteria:
   1. 16 degrees of ball-bank for speeds of 20 mph or less
   2. 14 degrees of ball-bank for speeds of 25 to 30 mph
   3. 12 degrees of ball-bank for speeds of 35 mph and higher

The 16, 14, and 12 degrees of ball-bank criteria are comparable to the current AASHTO horizontal curve design guidance. Research has shown that drivers often exceed existing posted advisory curve speeds by 7 to 10 mph.

HANDOUT

HANDOUT

GUIDANCE:

The advisory speed should be determined based on free-flowing traffic conditions.

Because changes in conditions, such as roadway geometrics, surface characteristics, or sight distance, might affect the advisory speed, each location should be evaluated periodically or when conditions change.

2C.9 Chevron Alignment Sign (W1-8)

W1-8

STANDARD:

The use of the Chevron Alignment (W1-8) sign (see Figure 2C-2) to provide additional emphasis and guidance for a change in horizontal alignment shall be in accordance with the information shown in Table 2C-5.

OPTION:

When used, Chevron Alignment signs may be used instead of or in addition to standard delineators.

STANDARD:

The Chevron Alignment sign shall be a vertical rectangle. No border shall be used on the Chevron Alignment sign.

If used, Chevron Alignment signs shall be installed on the outside of a turn or curve, in line with and at approximately a right angle to approaching traffic. Chevron Alignment signs shall be installed at a minimum height of 4 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way.

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GUIDANCE:

The approximate spacing of Chevron Alignment signs on the turn or curve measured from the point of curvature (PC) should be as shown in Table 2C-6.

If used, Chevron Alignment signs should be visible for a sufficient distance to provide the road user with adequate time to react to the change in alignment.

STANDARD:

Chevron Alignment signs shall not be placed on the far side of a T-intersection facing traffic on the stem approach to warn drivers that a through movement is not physically possible, as this is the function of a Two-Direction (or One-Direction) Large Arrow sign.

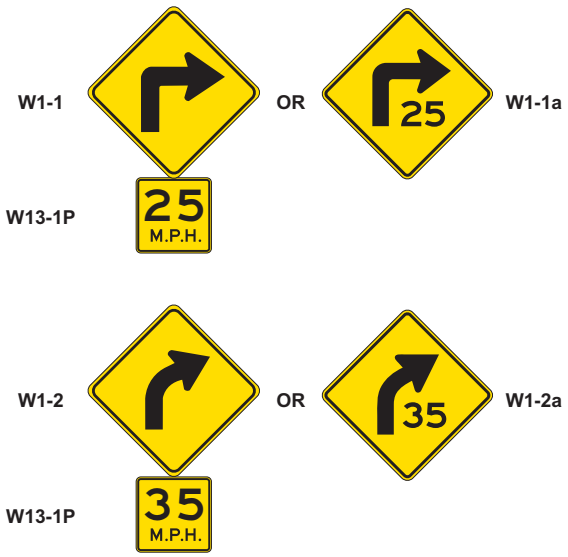
Advisory Speed	Curve Radius	Sign Spacing
15 mph or less	Less than 200 feet	40 feet
20 to 30 mph	200 to 400 feet	80 feet
35 to 45 mph	401 to 700 feet	120 feet
50 to 60 mph	701 to 1250 feet	160 feet
More than 60 mph	More than 1250 feet	200 feet

Note: The relationship between the curve radius and the advisory speed shown in this table should not be used to determine the advisory speed.

Table 2C-6. Typical Spacing of Chevron Alignment Signs on Horizontal Curves

Chevron Alignment signs shall not be used to mark obstructions within or adjacent to the roadway, including the beginning of guardrails or barriers, as this is the function of an object marker (see Section 2C.63).

2C.10 Combination Horizontal Alignment/Advisory Speed Signs (W1-1a, W1-2a)



OPTION:

The Turn (W1-1) sign or the Curve (W1-2) sign may be combined with the Advisory Speed (W13-1P) plaque (see Section 2C.8) to create a combination Turn/Advisory Speed (W1-1a) sign or combination Curve/Advisory Speed (W1-2a) sign.

HANDOUT

The combination Horizontal Alignment/Advisory Speed sign (W1-6 and W1-2a) may be used to supplement the advance Horizontal Alignment warning sign and Advisory Speed plaque based upon an engineering study.

STANDARD:

If used, the combination Horizontal Alignment/Advisory Speed sign shall not be used alone and shall not be used as a substitute for a Horizontal Alignment warning sign and Advisory Speed plaque at the advance warning location. The combination Horizontal Alignment/Advisory Speed sign shall only be used as a supplement to the advance Horizontal Alignment warning sign. If used, the combination Horizontal Alignment/Advisory Speed sign shall be installed at the beginning of the turn or curve.

GUIDANCE:

The advisory speed displayed on the combination Horizontal Alignment/Advisory Speed sign should be based on the advisory speed for the horizontal curve using recommended engineering practices (see Section 2C.8).

2C.11 Combination Horizontal Alignment/Intersection Signs (W1-10 Series)

W1-10 W1-10a W1-10b

W1-10c W1-10d W1-10e

OPTION:

The symbols from the Turn (W1-1) sign or the Curve (W1-2) sign may be combined with the symbols from the Cross Road (W2-1) sign or the Side Road (W2-2 or W2-3) sign to create a combination Horizontal Alignment/Intersection (W1-10 series) sign that depicts the condition where an intersection within or immediately adjacent to a turn or curve.

GUIDANCE:

Elements of the combination Horizontal Alignment/Intersection sign related to horizontal alignment should comply with the provisions of Section 2C.7, and elements related to intersection configuration should comply with the provisions of Section 2C.46. The symbol design should approximate the configuration of the intersecting roadway(s). No more than one Cross Road or two Side Road symbols should be displayed on any one combination Horizontal Alignment/Intersection sign.

STANDARD:

The use of the combination Horizontal Alignment/Intersection sign shall be in accordance with the appropriate Turn or Curve sign information shown in Table 2C-5.

2C.12 One-Direction Large Arrow Sign (W1-6)

W1-6

OPTION:

A One-Direction Large Arrow (W1-6) sign may be used either as a supplement or alternative to Chevron Alignment signs in order to delineate a change in horizontal alignment (see Figure 2C-2).

A One-Direction Large Arrow (W1-6) sign may be used to supplement a Turn or Reverse Turn sign (see Figure 2C-2) to emphasize the abrupt curvature.

STANDARD:

The One-Direction Large Arrow sign shall be a horizontal rectangle with an arrow pointing to the left or right.

The use of the One-Direction Large Arrow sign shall be in accordance with the information shown in Table 2C-5.

If used, the One-Direction Large Arrow sign shall be installed on the outside of a turn or curve in line with and at approximately a right angle to approaching traffic.

The One-Direction Large Arrow sign shall not be used where there is no alignment change in the direction of travel, such as at the beginnings and ends of medians or at center piers.

The One-Direction Large Arrow sign directing traffic to the right shall not be used in the central island of a roundabout.

HANDOUT

2C.36 Advance Traffic Control Signs (W3-1, W3-2, W3-3, W3-4, W3-X2, W3-X4)

STANDARD:

The Advance Traffic Control signs include the Stop Ahead (W3-1), Yield Ahead (W3-2), and Signal Ahead (W3-3) signs. These signs shall be installed on an approach to a primary traffic control device that is not visible for a sufficient distance to permit the road user to respond to the device (see Table 2C-4). The visibility criteria for a traffic control signal shall be based on having a continuous view of at least two signal faces for the distance specified in Table 4D-2.

SUPPORT:

Figure 2A-4 shows the typical placement of an Advance Traffic Control sign.

Permanent obstructions causing the limited visibility might include roadway alignment or structures. Intermittent obstructions might include foliage or parked vehicles.

GUIDANCE:

Where intermittent obstructions occur, engineering judgment should determine the treatment to be implemented.

OPTION:

An Advance Traffic Control sign may be used for additional emphasis of the primary traffic control device, even when the visibility distance to the device is satisfactory.

An advance street name plaque (see Section 2C.58) may be installed above or below an Advance Traffic Control sign.

A warning beacon may be used with an Advance Traffic Control sign.

A BE PREPARED TO STOP (W3-4) sign may be used to warn of stopped traffic caused by a traffic control signal or in advance of a section of roadway that regularly experiences traffic congestion.

STANDARD:

When a BE PREPARED TO STOP sign is used in advance of a traffic control signal, it shall be used in addition to a Signal Ahead sign and shall be placed downstream from the Signal Ahead (W3-3) sign.

OPTION:

The BE PREPARED TO STOP sign may be supplemented with a warning beacon (see Section 4L.3).

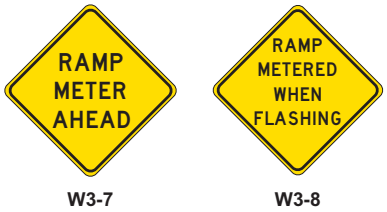
STANDARD:

When the warning beacon is interconnected with a traffic control signal or queue detection system, the BE PREPARED TO STOP sign shall be supplemented with a WHEN FLASHING plaque (W3-X2) or use the PREPARE TO STOP WHEN FLASHING sign (W3-X4). See Section 4M.

SUPPORT:

Section 2C.40 contains information regarding the use of a NO MERGE AREA (W4-5P) supplemental plaque in conjunction with a Yield Ahead sign.

2C.37 Advance Ramp Control Signal Signs (W3-7, W3-8)



OPTION:

A RAMP METER AHEAD (W3-7) sign may be used to warn road users that a freeway entrance ramp is metered and that they will encounter a ramp control signal (see Chapter 4I).

GUIDANCE:

When the ramp control signals are operated only during certain periods of the day, a RAMP METERED WHEN FLASHING (W3-8) sign should be installed in advance of the ramp control signal near the entrance to the ramp, or on the arterial on the approach to the ramp, to alert road users to the presence and operation of ramp meters.

HANDOUT

STANDARD:

The RAMP METERED WHEN FLASHING sign shall be supplemented with a warning beacon (see Section 4L.3) that flashes when the ramp control signal is in operation.

2C.38 Reduced Speed Limit Ahead Signs (W3-5, W3-5a)

W3-5 W3-5a

GUIDANCE:

A Reduced Speed Limit Ahead (W3-5 or W3-5a) sign should be used to inform road users of a reduced speed zone where the speed limit is being reduced by more than 10 mph, or where engineering judgment indicates the need for advance notice to comply with the posted speed limit ahead.

STANDARD:

If used, Reduced Speed Limit Ahead signs shall be followed by a Speed Limit (R2-1) sign installed at the beginning of the zone where the speed limit applies.

The speed limit displayed on the Reduced Speed Limit Ahead sign shall be identical to the speed limit displayed on the subsequent Speed Limit sign.

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2C.39 DRAW BRIDGE Sign (W3-6)

W3-6

STANDARD:

A DRAW BRIDGE (W3-6) sign shall be used in advance of movable bridge signals and gates (see Section 4J.2) to give warning to road users, except in urban conditions where such signing would not be practical.

2C.40 Merge Signs (W4-1)

W4-1

OPTION:

A Merge (W4-1) sign may be used to warn road users on the major roadway that merging movements might be encountered in advance of a point where lanes from two separate roadways converge as a single traffic lane and no turning conflict occurs.

A Merge sign may also be installed on the side of the entering roadway to warn road users on the entering roadway of the merge condition.

GUIDANCE:

The Merge sign should be installed on the side of the major roadway where merging traffic will be encountered and in such a position as to not obstruct the road user's view of entering traffic.

Where two roadways of approximately equal importance converge, a Merge sign should be placed on each roadway.

When a Merge sign is to be installed on an entering roadway that curves before merging with the major roadway, such as a ramp with a curving horizontal alignment as it approaches the major roadway, the Entering Roadway Merge (W4-5) sign should be used to better portray the actual geometric conditions to road users on the entering roadway.

The Merge sign should not be used where two roadways converge and merging movements are not required.

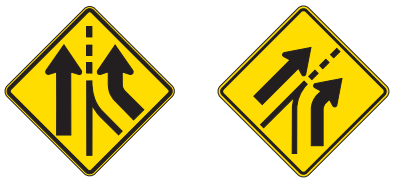
The Merge sign should not be used in place of a Lane Ends sign (see Section 2C.42) where lanes of traffic moving on a single roadway must merge because of a reduction in the actual or usable pavement width.

OPTION:

For a yield-controlled channelized right-turn movement onto a roadway without an acceleration lane, a NO MERGE AREA (W4-5P) supplemental plaque may be mounted below a Yield Ahead (W3-2) sign and/or below a YIELD (R1-2) sign when engineering judgment indicates that road users would expect an acceleration lane to be present. (see Section 2B.9 for YIELD sign applications)

HANDOUT

2C.41 Added Lane Sign (W4-3, W4-6)



W4-3 W4-6

GUIDANCE:

The Added Lane (W4-3) sign should be installed in advance of a point where two roadways converge and merging movements are not required. When possible, the Added Lane sign should be placed such that it is visible from both roadways; if this is not possible, an Added Lane sign should be placed on the side of each roadway.

When an Added Lane sign is to be installed on a roadway that curves before converging with another roadway that has a tangent alignment at the point of convergence, the Entering Roadway Added Lane (W4-6) sign should be used to better portray the actual geometric conditions to road users on the curving roadway.

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2C.42 Lane Ends Signs (W4-2, W9-1, W9-2)

W4-2 W9-1 W9-2

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GUIDANCE:

The LANE ENDS MERGE RIGHT (LEFT) (W9-2) sign or the Lane Ends (W4-2) sign should be used to warn of the reduction in the number of traffic lanes in the direction of travel on a multi-lane highway.

OPTION:

The RIGHT (LEFT) LANE ENDS (W9-1) sign may be used in advance of the Lane Ends (W4-2) sign or the LANE ENDS MERGE LEFT (RIGHT) (W9-2) sign as additional warning or to emphasize that the traffic lane is ending and that a merging maneuver will be required.

GUIDANCE:

If used, the RIGHT (LEFT) LANE ENDS (W9-1) sign should be installed adjacent to the Lane-Reduction Arrow pavement markings.

OPTION:

On one-way streets or on divided highways where the width of the median will permit, two Lane Ends signs may be placed facing approaching traffic, one on the right-hand side and the other on the left-hand side or median.

SUPPORT:

Section 3B.9 contains information regarding the use of pavement markings in conjunction with a lane reduction.

GUIDANCE:

Where an extra lane has been provided for slower moving traffic (see Section 2B.31), a Lane Ends word sign or a Lane Ends (W4-2) symbol sign should be installed in advance of the downstream end of the extra lane.

Lane Ends signs should not be installed in advance of the downstream end of an acceleration lane.

STANDARD:

In dropped lane situations, regulatory signs (see Section 2B.20) shall be used to inform road users that a through lane is becoming a mandatory turn lane. The W4-2, W9-1, and W9-2 signs shall not be used in dropped lane situations.

2C.43 RIGHT (LEFT) LANE EXIT ONLY AHEAD Sign (W9-7)

W9-7

OPTION:

The RIGHT (LEFT) LANE EXIT ONLY AHEAD (W9-7) sign may be used to provide advance warning to road users that traffic in the right-hand (left-hand) lane of a roadway that is approaching a grade-separated interchange will be required to depart the roadway on an exit ramp at the next interchange.

STANDARD:

The W9-7 sign shall be a horizontal rectangle with a black legend and border on a yellow background.

HANDOUT

HANDOUT

GUIDANCE:

If used, the W9-7 sign should be installed upstream from the first overhead guide sign that contains an EXIT ONLY sign panel or upstream from the first RIGHT (LEFT) LANE MUST EXIT (R3-33) regulatory sign, whichever is farther upstream from the exit.

SUPPORT:

Section 2B.23 contains information regarding a regulatory sign that can also be used for lane drops at grade-separated interchanges.

2C.44 Two-Way Traffic Sign (W6-3)

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W6-3

W16-9P

GUIDANCE:

A Two-Way Traffic (W6-3) sign should be used to warn road users of a transition from a multi-lane divided section of roadway to a two-lane, two-way section of roadway.

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A Two-Way Traffic (W6-3) sign with an AHEAD (W16-9p) plaque should be used to warn road users of a transition from a one-way street to a two-lane, two-way section of roadway (see Figure 2B-14).

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OPTION:

The Two-Way Traffic sign may be used at intervals along a two-lane, two-way roadway.

2C.45 NO PASSING ZONE Sign (W14-3)

W14-3

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STANDARD:

The NO PASSING ZONE (W14-3) sign shall be a pennant-shaped isosceles triangle with its longer axis horizontal and pointing to the right. When used, the NO PASSING ZONE sign shall be installed on the left side of the roadway at the beginning of no-passing zones identified by pavement markings or DO NOT PASS signs or both (see Sections 2B.29 and 3B.2).

2C.46 Intersection Warning Signs (W2-1 through W2-8)

W2-1

W2-2

W2-3

W2-4

W2-5

W2-7L

W2-7R

W2-8

HANDOUT

HANDOUT

OPTION:

A Cross Road (W2-1) symbol, Side Road (W2-2 or W2-3) symbol, T-Intersection symbol (W2-4), or Y-Intersection symbol (W2-5) sign may be used in advance of an intersection to indicate the presence of an intersection and the possibility of turning or entering traffic.

The Circular Intersection (W2-6) symbol sign may be installed in advance of a circular intersection (see Figures 2B-21 through 2B-23).

GUIDANCE:

If an approach to a roundabout has a statutory or posted speed limit of 40 mph or higher, the Circular Intersection (W2-6) symbol sign should be installed in advance of the circular intersection.

W2-6

W16-12P

W16-17P

OPTION:

A ROUNDABOUT (W16-17P) educational plaque may be mounted above or below a circular intersection symbol sign on the approach to a roundabout but may not be used on an approach to a traffic circle.

A TRAFFIC CIRCLE (W16-12P) educational plaque may be mounted above or below a circular intersection symbol sign on the approach to a traffic circle but may not be used on an approach to a roundabout.

The relative importance of the intersecting roadways may be shown by different widths of lines in the symbol.

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An advance street name plaque (see Section 2C.49) may be installed above or below an Intersection Warning sign.

GUIDANCE:

The Intersection Warning sign should illustrate and depict the general configuration of the intersecting roadway, such as cross road, side road, T-intersection, or Y-intersection.

Intersection Warning signs, other than the Circular Intersection (W2-6) symbol sign and the T-Intersection (W2-4) symbol sign should not be used on approaches controlled by STOP signs, YIELD signs, or signals.

If an Intersection Warning sign is used where the side roads are not opposite of each other, Offset Side Roads (W2-7) symbol sign should be used instead of the Cross Road symbol sign.

If an Intersection Warning sign is used where two closely-spaced side roads are on the same side of the highway, the Double Side Roads (W2-8) symbol sign should be used instead of the Side Road symbol sign.

No more than two side road symbols should be displayed on the same side of the highway on a W2-7 or W2-8 symbol sign, and no more than three side road symbols should be displayed on a W2-7 or W2-8 symbol sign.

2C.47 Two-Direction Large Arrow Sign (W1-7)

W1-7

STANDARD:

The Two-Direction Large Arrow (W1-7) sign shall be a horizontal rectangle.

If used, it shall be installed on the far side of a T-intersection in line with, and at approximately a right angle to, traffic approaching from the stem of the T-intersection.

The Two-Direction Large Arrow sign shall not be used where there is no change in the direction of travel such as at the beginnings and ends of medians or at center piers.

The Two-Direction Large Arrow sign directing traffic to the left and right shall not be used in the central island of a roundabout.

GUIDANCE:

The Two-Direction Large Arrow sign should be visible for a sufficient distance to provide the road user with adequate time to react to the intersection configuration.

4.4 Guide Signing

4.4.1 Purpose

Guide signs are necessary to inform motorists of intersecting routes; to direct them to cities, towns, villages, or other important destinations; to identify nearby rivers, streams, parks, forests, and historical sites; and generally to give such information as will help them along their way in the most simple, direct manner possible.

Numbered traffic routes and directional signs facilitate travel by enabling motorists to reach their intended destination when using an accurate transportation map. Proper directional signing consists of Route Markers and Route Marker auxiliaries; Destination signs; Distance signs; and, where necessary, Advance Street Name signs.

Install Route Markers and Route Marker auxiliaries in sign assemblies to identify the numbered traffic route and provide additional guidance (such as general direction of the route and other information required to follow a designated numbered traffic route). Destination and Distance signs provide directions and distances to communities and points of interest that may be reached by following certain roads. Advance Street Name signs provide advance notice of the names of intersecting major streets and highways.

4.4.2 MUTCD Chapter 2D and 2E Handouts

The information on the following pages is a handout from the MN MUTCD, Chapter 2D on Guide Signs for Conventional Roads. The entire section is not included, but only pages of interest for this manual. For full details on the MUTCD, refer to the OTST publications website found at, www.dot.state.mn.us/trafficeng/publ/index.html.

In addition, the entire 2013 Standard Signs Summary is included at the end of this chapter.

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PART 2. SIGNS
Chapter 2D. Guide Signs - Conventional Roads

2D.1 Scope of Conventional Road Guide Sign Standards

STANDARD:

The provisions of this Chapter shall apply to any road or street other than low-volume roads (as defined in Section 5A.1), expressways, and freeways.

2D.2 Application

SUPPORT:

Guide signs are essential to direct road users along streets and highways, to inform them of intersecting routes, to direct them to cities, towns, villages, or other important destinations, to identify nearby rivers and streams, parks, forests, and historical sites, and generally to give such information as will help them along their way in the most simple, direct manner possible.

Chapter 2A addresses placement, location, and other general criteria for signs.

2D.3 Color, Retroreflection, and Illumination

SUPPORT:

Requirements for illumination, retroreflection, and color are stated under the specific headings for individual guide signs or groups of signs. General provisions are given in Sections 2A.7, 2A.8, and 2A.10.

STANDARD:

Except where otherwise provided in this Manual for individual signs or groups of signs, guide signs on streets and highways shall have a white message and border on a green background. All messages, borders, and legends shall be retroreflective and all backgrounds shall be retroreflective or illuminated.

SUPPORT:

Color coding is sometimes used to help road users distinguish between multiple potentially confusing destinations. Examples of valuable uses of color coding include guide signs for roadways approaching or inside an airport property with multiple terminals serving multiple airlines, and community wayfinding guide signs for various traffic generator destinations within a community or area.

STANDARD:

Except where otherwise provided in this Manual, different color sign backgrounds shall not be used to provide color coding of destinations. The color coding shall be accomplished by the use of different colored square or rectangular sign panels on the face of the guide signs.

OPTION:

The different colored sign panels may include a black or white (whichever provides the better contrast with the panel color) letter, numeral, or other appropriate designation to identify an airport terminal or other destination.

SUPPORT:

Two examples of color-coded sign assemblies are shown in Figure 2D-1. Section 2D.50 contains specific provisions regarding Community Wayfinding guide signs.

2D.4 Size of Signs

STANDARD:

Except as provided in Section 2A.11, the sizes of conventional road guide signs that have standardized designs shall be as shown in Table 2D-1.

SUPPORT:

Section 2A.11 contains information regarding the applicability of the various columns in Table 2D-1.

OPTION:

Signs larger than those shown in Table 2D-1 may be used (see Section 2A.11).

SUPPORT:

For other guide signs, the legends are so variable that a standardized design or size is not appropriate. The sign size is determined primarily by the length of the message, and the size of lettering and spacing necessary for proper legibility.

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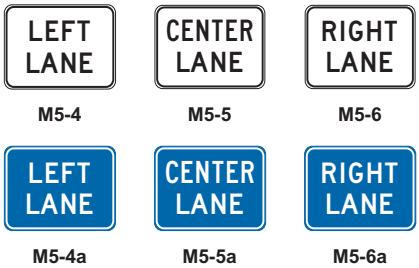
If used, the curved-stem Advance Turn Arrow auxiliary (M5-3) sign shall be used only on the approach to a circular intersection to depict a movement along the circulatory roadway around the central island and to the left, relative to the approach roadway and entry into the intersection.

GUIDANCE:

If the M5-3 sign is used, then this arrow type should also be used consistently on any regulatory lane-use signs (see Chapter 2B), Destination signs (see Section 2D.37), and pavement markings (see Part 3) for a particular destination or movement.

2D.27 Lane Designation Auxiliary Signs (M5-4, M5-5, and M5-6)



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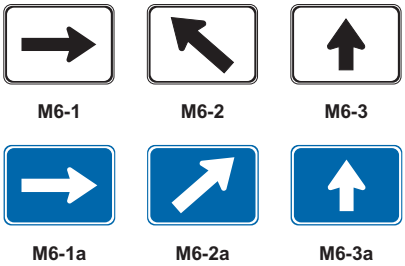
OPTION:

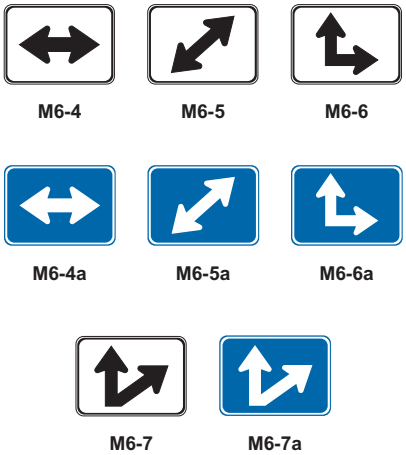
A Lane Designation (M5-4, M5-5, or M5-6) auxiliary sign may be mounted directly below the route sign in an Advance Route Turn assembly on multi-lane roadways to allow road users to move into the appropriate lane prior to reaching the intersection or interchange.

STANDARD:

If used, the Lane Designation auxiliary signs shall be used only where the designated lane is a mandatory movement lane and shall be located adjacent to the full-width portion of the mandatory movement lane. The Lane Designation auxiliary signs shall not be installed adjacent to a through lane in advance of a lane that is being added or along the taper for a lane that is being added.

2D.28 Directional Arrow Auxiliary Signs (M6 Series)





STANDARD:

If used, the Directional Arrow auxiliary sign shall be mounted below the route sign and any other auxiliary signs in Directional assemblies (see Section 2D.32), and displays a single- or double-headed arrow pointing in the general direction that the route follows.

A Directional Arrow auxiliary sign that displays a double-headed arrow shall not be mounted in any Directional assembly in advance of or at a circular intersection.

OPTION:

The downward pointing diagonal arrow auxiliary (M6-2a) sign may be used in a Directional assembly at the far corner of an intersection to indicate the immediate entry point to a freeway or expressway entrance ramp (see Section 2D.46).

STANDARD:

The M6-2a sign shall not be used on the approach to or on the near side of an intersection, such as to designate an approach lane.

2D.29 Route Sign Assemblies

STANDARD:

A Route Sign assembly shall consist of a route sign and auxiliary signs that further identify the route and indicate the direction. Route Sign assemblies shall be installed on all approaches to signed numbered routes that intersect with other signed numbered routes.

Where two or more routes follow the same section of highway, the route signs for Interstate, U.S., State, and County routes shall be mounted in that order from the left in

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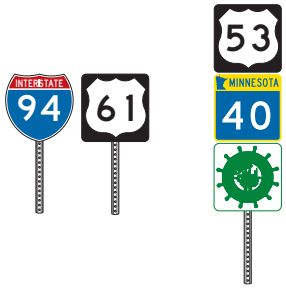
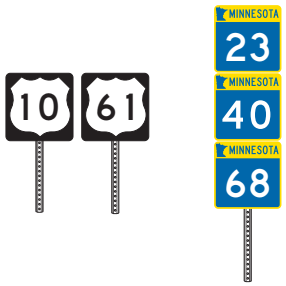
horizontal arrangements and from the top in vertical arrangements. Subject to this order of precedence, route signs for lower-numbered routes shall be placed at the left or top.

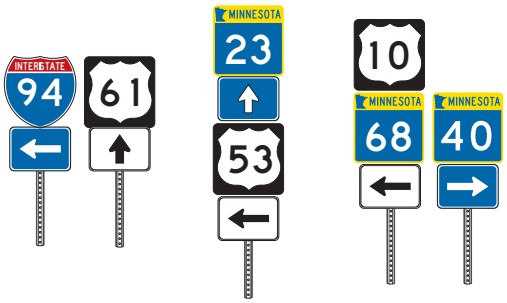


Route Markers Arranged by Class of Highway

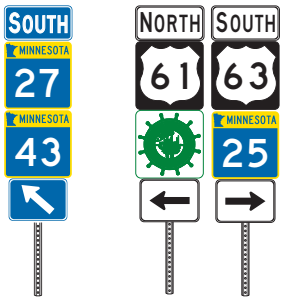
Within groups of assemblies, information for routes intersecting from the left shall be mounted at the left in horizontal arrangements and at the top or center of vertical arrangements. Similarly, information for routes intersecting from the right shall be at the right or bottom, and for straight-through routes at the center in horizontal arrangements or top in vertical arrangements.



Route Markers Arranged by Number Within the Class of Highway



Route Markers Arranged by Directional Arrows



Route Markers Arranged by Common Direction

Route Sign assemblies shall be mounted in accordance with the general specifications for highway signs (Chapter 2A), with the lowest sign in the assembly at the height prescribed for single signs.

GUIDANCE:

Assemblies for two or more routes, or for different directions on the same route, should be mounted in groups on a common support.

OPTION:

Route Sign assemblies may be installed on the approaches to numbered routes on unnumbered roads and streets that carry an appreciable amount of traffic destined for the numbered route.

The diagrammatic route guide sign format, such as the D1-4 and D1-5 signs shown in Figure 2D-8, may be used on approaches to roundabouts.

If engineering judgment indicates that groups of assemblies that include overlapping routes or multiple turns might be confusing, route signs or auxiliary signs may be omitted or combined, provided that clear directions are given to road users.

SUPPORT:

Figure 2D-6 shows typical placements of route signs.

2D.30 Junction Assembly

STANDARD:

A Junction assembly shall consist of a Junction auxiliary sign and a route sign. The route sign shall carry the number of the intersected or joined route.

The Junction assembly shall be installed in advance of every intersection where a signed numbered route is intersected or joined by another signed numbered route.

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2D.35 Trailblazer Assembly

SUPPORT:

Trailblazer assemblies provide directional guidance to a particular road facility from other highways in the vicinity. This guidance is accomplished by installing Trailblazer assemblies at strategic locations to indicate the direction to the nearest or most convenient point of access. The use of the word TO indicates that the road or street where the sign is posted is not a part of the indicated route, and that a road user is merely being directed progressively to the route.

STANDARD:

A Trailblazer assembly shall consist of a TO auxiliary sign, a route sign for a numbered or named highway (see Section 2D.53) or an Auto Tour Route sign (see Section 2H.07), and a single-headed Directional Arrow auxiliary sign pointing in the direction leading to the route. Where the Trailblazer assembly is for an alternative route, the appropriate auxiliary sign for an alternative route (see Section 2D.16) shall also be included in the assembly.

Example of Trailblazer Assembly

OPTION:

A Cardinal Direction auxiliary sign may be used with a Trailblazer assembly.

GUIDANCE:

The TO auxiliary sign, Cardinal Direction auxiliary sign, and Directional Arrow auxiliary sign should be of the standard size provided for auxiliary signs of their respective type. The route sign should be the size provided in Section 2D.11.

OPTION:

Trailblazer assemblies may be installed with other Route Sign assemblies, or alone, in the immediate vicinity of the designated facilities.

2D.36 Destination and Distance Signs

SUPPORT:

In addition to guidance by route numbers, it is desirable to supply the road user information concerning the destinations that can be reached by way of numbered or unnumbered routes. This is done by means of Destination signs and Distance signs.

OPTION:

Route shields and cardinal directions may be included on the Destination sign with the destinations and arrows.

GUIDANCE:

If Route shields and cardinal directions are included on a Destination sign, the height of the route shields should be at least two times the height of the upper-case letters of the principal legend and not less than 18 inches, and the cardinal directions should be in all upper-case letters that are at least the minimum height specified for these signs.

2D.37 Destination Signs (D1 Series)

STANDARD:

Except on approaches to interchanges (see Section 2D.45), the Destination (D1-1 through D1-3) sign (see Figure 2D-7), if used, shall be a horizontal rectangle displaying the name of a city, town, village, or other traffic generator, and a directional arrow.

OPTION:

The distance (see Section 2D.41) to the place named may also be displayed on the Destination (D1-1a through D1-3a) sign (see Figure 2D-7). If several destinations are to be displayed at a single point, the several names may be placed on a single sign with an arrow (and the distance, if desired) for each name. If more than one destination lies in the same direction, a single arrow may be used for such a group of destinations.

GUIDANCE:

Adequate separation should be made between any destinations or group of destinations in one direction and those in other directions by suitable design of the arrow, spacing of lines of legend, heavy lines entirely across the sign, or separate signs.

SUPPORT:

Separation of destinations by direction by the use of a horizontal separator line can enhance the readability of a Destination sign by relating an arrow and its corresponding destination(s) and by eliminating the need for multiple arrows that point in the same direction and excessive space between lines of legend.

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STANDARD:

Except as otherwise provided in this Manual, an arrow pointing to the right shall be at the extreme right of the sign, and an arrow pointing left or up shall be at the extreme left. The distance numerals, if used, shall be placed to the right of the destination names.

OPTION:

An arrow pointing up may be placed at the extreme right of the sign when the sign is mounted to the left of the traffic to which it applies.

GUIDANCE:

Unless a sloping arrow will convey a clearer indication of the direction to be followed, the directional arrows should be horizontal or vertical.

If several individual name signs are assembled into a group, all signs in the assembly should be of the same horizontal width.

Destination signs should be used:

A. At the intersections of U.S. or State numbered routes with Interstate, U.S., or State numbered routes; and
B. At points where they serve to direct traffic from U.S. or State numbered routes to the business section of towns, or to other destinations reached by unnumbered routes.

STANDARD:

Where a total of three or less destinations are provided on the Advance Guide (see Section 2E.33) and Supplemental Guide (see Section 2E.35) signs, no more than three destination names shall be used on a Destination sign. Where four destinations are provided by the Advance Guide and Supplemental Guide signs, no more than four destination names shall be used on a Destination sign.

GUIDANCE:

If space permits, four destinations should be displayed as two separate signs at two separate locations.

OPTION:

Where space does not permit, or where all four destinations are in one direction, a single sign may be used. Where a single sign is used and all destinations are in the same direction, the arrow may be placed below the destinations for the purpose of enhancing the conspicuity of the arrow.

STANDARD:

Where a single four-name sign assembly is used, a heavy line entirely across the sign or separate signs shall be used to separate destinations by direction.

GUIDANCE:

The closest destination lying straight ahead should be at the top of the sign or assembly, and below it the closest destinations to the left and to the right, in that order. The destination displayed for each direction should ordinarily be the next county seat or the next principal city, rather than a more distant destination. In the case of overlapping routes, only one destination should be displayed in each direction for each route.

STANDARD:

If more than one destination is displayed in the same direction, the name of a nearer destination shall be displayed above the name of a destination that is further away.

2D.38 Destination Signs at Circular Intersections

STANDARD:

Destination signs that are used at circular intersections shall comply with the provisions of Section 2D.37, except as provided in this Section.

OPTION:

Exit destination (D1-1d, D1-1e) signs (see Figure 2D-8) with diagonal upward-pointing arrows or Directional assemblies (see Section 2D.32) may be used to designate a particular exit from a circular intersection.

Exit destination (D1-2d, D1-3d) signs (see Figure 2D-8) with curved-stem arrows may be used on approaches to circular intersections to represent the left-turn movements.

Curved-stem arrows on circular intersection destination signs may point in diagonal directions to depict the location of an exit relative to the approach roadway and entry into the intersection.

Exit destination (D1-4 or D1-5) signs (see Figure 2D-8) with a diagram of the circular intersection may be used on approaches to circular intersections.

GUIDANCE:

If curved-stem arrows are used on destination signs, then this arrow type should also be used consistently on any regulatory lane-use signs (see Chapter 2B), Directional assemblies (see Section 2D.32), and pavement markings (see Part 3) for a particular destination or movement.

SUPPORT:

Figure 2D-9 illustrates two examples of guide signing for circular intersections.

Diagrammatic guide signs might be preferable where space is available and where the geometry of the circular

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PART 2. SIGNS

Chapter 2E. Guide Signs - Freeways and Expressways

2E.1 Scope of Freeway and Expressway Guide Sign Standards

SUPPORT:

The provisions of this Chapter provide a uniform and effective system of signing for high-volume, high-speed motor vehicle traffic on freeways and expressways. The requirements and specifications for expressway signing exceed those for conventional roads (see Chapter 2D), but are less than those for freeway signing. Since there are many geometric design variables to be found in existing roads, a signing concept commensurate with prevailing conditions is the primary consideration. Section 1A.13 includes definitions of freeway and expressway.

Guide signs for freeways and expressways are primarily identified by the name of the sign rather than by an assigned sign designation. Guidelines for the design of guide signs for freeways and expressways are provided in the "Standard Highway Signs and Markings" book (see Section 1A.11).

STANDARD:

The provisions of this Chapter shall apply to any highway that meets the definition of freeway or expressway facilities.

2E.2 Freeway and Expressway Signing Principles

SUPPORT:

The development of a signing system for freeways and expressways is approached on the premise that the signing is primarily for the benefit and direction of road users who are not familiar with the route or area. The signing furnishes road users with clear instructions for orderly progress to their destinations. Sign installations are an integral part of the facility and, as such, are best planned concurrently with the development of highway location and geometric design. For optimal results, plans for signing are analyzed during the earliest stages of preliminary design, and details are correlated as final design is developed. The excessive signing found on many major highways usually is the result of using a multitude of signs that are too small and that are poorly designed and placed to accomplish the intended purpose.

Freeway and expressway signing is to be considered and developed as a planned system of installations. An engineering study is sometimes necessary for proper solution of the problems of many individual locations, but, in addition, consideration of an entire route is necessary.

GUIDANCE:

Road users should be guided with consistent signing on the approaches to interchanges, when they drive from one State to another, and when driving through rural or urban areas. Because geographical, geometric, and operating factors regularly create significant differences between urban and rural conditions, the signing should take these conditions into account.

Guide signs on freeways and expressways should serve distinct functions as follows:

A. Give directions to destinations, or to streets or highway routes, at intersections or interchanges;
B. Furnish advance notice of the approach to intersections or interchanges;
C. Direct road users into appropriate lanes in advance of diverging or merging movements;
D. Identify routes and directions on those routes;
E. Show distances to destinations;
F. Indicate access to general motorist services, rest, scenic, and recreational areas; and
G. Provide other information of value to the road user.

2E.3 Guide Sign Classification

SUPPORT:

Freeway and expressway guide signs are classified and treated in the following categories:

A. Route signs and Trailblazer Assemblies (see Section 2E.27),
B. At-Grade Intersection signs (see Section 2E.29),
C. Interchange signs (see Sections 2E.30 through 2E.39),
D. Interchange Sequence signs (see Section 2E.40),
E. Community Interchanges Identification signs (see Section 2E.41),
F. NEXT XX EXITS signs (see Section 2E.42),
G. Weigh Station signing (see Section 2E.54),
H. Miscellaneous information signs (see Section 2H.04),
I. Reference Location signs (see Section 2H.05),
J. General Service signs (see Chapter 2I),
K. Rest and Scenic Area signs (see Section 2I.05),
L. Tourist Information and Welcome Center signs (see Section 2I.08),
M. Radio Information signing (see Section 2I.09),
N. Carpool and Ridesharing signing (see Section 2I.11),
O. Specific Service signs (see Chapter 2J), and
P. Recreational and Cultural Interest Area signs (see Chapter 2M).

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2E.4 General

SUPPORT:

Signs are designed so that they are legible to road users approaching them and readable in time to permit proper responses. Desired design characteristics include: (a) long visibility distances, (b) large lettering, symbols, and arrows, and (c) short legends for quick comprehension.

STANDARD:

Standard shapes and colors shall be used so that traffic signs can be promptly recognized by road users.

2E.5 Color of Guide Signs

STANDARD:

Guide signs on freeways and expressways, except as otherwise provided in this Manual, shall have white letters and numerals, symbols, arrows, and borders on a green background.

SUPPORT:

Color requirements for route signs and trailblazers, signs with blank-out or changeable messages, signs for services, rest areas, park and recreational areas, and for certain miscellaneous signs are provided in the individual Sections dealing with the particular sign or sign group.

2E.6 Retroreflection or Illumination

STANDARD:

Letters, numerals, symbols, arrows, and borders of all guide signs shall be retroreflectorized. The background of all guide signs that are not independently illuminated shall be retroreflective.

SUPPORT:

Where there is no serious interference from extraneous light sources, retroreflectorized post-mounted signs usually provide adequate nighttime visibility.

On freeways and expressways where much driving at night is done with low-beam headlights, the amount of headlight illumination incident to an overhead sign display is relatively small.

GUIDANCE:

Overhead sign installations should be illuminated unless an engineering study shows that retroreflectorization alone will perform effectively. The type of illumination chosen should provide effective and reasonably uniform illumination of the sign face and message.

2E.7 Characteristics of Urban Signing

SUPPORT:

Urban conditions are characterized not so much by city limits or other arbitrary boundaries, as by the following features:

A. Mainline roadways with more than two lanes in each direction;
B. High traffic volumes on the through roadways;
C. High volumes of traffic entering and leaving interchanges;
D. Interchanges closely spaced;
E. Roadway and interchange lighting;
F. Three or more interchanges serving the major city;
G. A loop, circumferential, or spur serving a sizable portion of the urban population; and
H. Visual clutter from roadside development.

Operating conditions and road geometrics on urban freeways and expressways usually make special sign treatments desirable, including:

A. Use of Interchange Sequence signs (see Section 2E.40);
B. Use of sign spreading to the maximum extent possible (see Section 2E.11);
C. Elimination of General or Specific Service signing (see Chapters 2I and 2J);
D. Reduction to a minimum of post-interchange signs (see Section 2E.38);
E. Display of advance signs at distances closer to the interchange, with appropriate adjustments in the legend (see Section 2E.33);
F. Use of overhead signs on roadway structures and independent sign supports (see Section 2E.25);
G. Use of Overhead Arrow-per-Lane or Diagrammatic guide signs in advance of intersections and interchanges (see Sections 2E.21 and 2E.22); and
H. Frequent use of street names as the principal message in guide signs.

.Lower speeds which are often characteristic of urban operations do not justify lower signing standards. Typical traffic patterns are more complex for the road user to negotiate, and large, easy-to-read legends are, therefore, just as necessary as on rural highways.

2E.8 Characteristics of Rural Signing

SUPPORT:

Rural areas ordinarily have greater distances between interchanges, which permits adequate spacing for the sequences of signs on the approach to and departure from each interchange. However, the absence of traffic in adjoining lanes and on entering or exiting ramps often adds monotony or inattention to rural driving. This increases the importance of signs that call for decisions or actions.

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GUIDANCE:

Where there are long distances between interchanges and the alignment is relatively unchanging, signs should be positioned for their best effect on road users. The tendency to group all signing in the immediate vicinity of rural interchanges should be avoided by considering the entire route in the development of sign plans. Extra effort should be given to the placement of signs at natural target locations to command the attention of the road user, particularly when the message requires an action by the road user.

2E.9 Signing of Named Highways

SUPPORT:

Section 2D.53 contains information, which is also applicable to freeways and expressways, regarding the use of highway names on the signing for unnumbered highways to enhance route guidance and facilitate travel.

Section 2M.10 contains information regarding memorial signing of routes, bridges, or highway components.

2E.10 Amount of Legend on Guide Signs

GUIDANCE:

No more than two destination names or street names should be displayed on any Advance Guide sign or Exit Direction sign. A city name and street name on the same sign should be avoided. Where two or three signs are placed on the same supports, destinations or names should be limited to one per sign, or to a total of three in the display. Sign legends should not exceed three lines of copy, exclusive of the exit number and action or distance information.

2E.11 Number of Signs at an Overhead Installation and Sign Spreading

GUIDANCE:

If overhead signs are warranted, as set forth in Section 2A.17, the number of signs at these locations should be limited to only those essential in communicating pertinent destination information to the road user. Exit Direction signs for a single exit and the Advance Guide signs should have only one sign with one or two destinations. Regulatory signs, such as speed limits, should not be used in conjunction with overhead guide sign installations. Because road users have limited time to read and comprehend sign messages, there should not be more than three guide signs displayed at any one location either on the overhead structure or its support.

OPTION:

At overhead locations, more than one sign may be installed to advise of a multiple exit condition at an interchange. If the roadway ramp or crossing roadway has complex or unusual geometrics, additional signs with confirming messages may be provided to properly guide the road user.

SUPPORT:

Sign spreading is a concept where major overhead signs are spaced so that road users are not overloaded with a group of signs at a single location. Figure 2E-1 illustrates an example of sign spreading.

GUIDANCE:

Where overhead signing is used, sign spreading should be used at all single exit interchanges and to the extent possible at multi-exit interchanges. Sign spreading should be accomplished by use of the following:

A. The Exit Direction sign should be the only sign used in the vicinity of the gore (other than the Exit Gore sign). It should be located overhead near the theoretical gore and generally on an overhead sign support structure.
B. The Advance Guide sign to indicate the next interchange exit should be placed near the crossroad location. If the crossroad goes over the mainline, the Advance Guide sign should be placed on the overcrossing structure or on a separate structure immediately in front of the overcrossing structure.

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2E.12 Pull-Through Signs

SUPPORT:

Pull-Through (E6-2, E6-2a) signs (see Figure 2E-2) are overhead guide signs intended for through traffic.

GUIDANCE:

Pull-Through signs should be used where the geometrics of a given interchange are such that it is not clear to the road user as to which is the through roadway, or where additional route guidance is desired. Pull-Through signs with down arrows should be used where the alignment of the through lanes is curved and the exit direction is straight ahead, where the number of through lanes is not readily evident, and at multi-lane exits where there is a reduction in the number of through lanes.

SUPPORT:

Sections 2E.20 through 2E.24 contain information regarding the use of Overhead Arrow-per-Lane or Diagrammatic guide signs at multi-lane exits where there is a reduction in the number of through lanes and a through lane becomes an interior option lane for through or exiting traffic.

4.5 Work Zone and Detour Signing

All traffic control devices used on MnDOT street and highway construction or maintenance work shall conform to the specifications of the latest edition of the MN MUTCD, the MnDOT Standard Specifications for Construction; and all other appropriate MnDOT technical manuals.

All devices shall be placed where they will convey their messages most effectively so the driver will have adequate time to react. All traffic control devices must be kept clean to insure proper effectiveness and retroreflectivity. All devices shall conform to the quality standards of the MN MUTCD Field Manual.

4.6 2013 Standard Signs Summary

The following is a handout from the 2013 Standard Signs Summary. The latest version can be downloaded from, www.dot.state.mn.us/trafficeng/publ/index.html.

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R Series

No.	Drawing	Color	Use & Size
R4-X7P	BEGIN / END Use with R4-X7	Black on White	42 x 12
R4-X8	BYPASS LANE	Black on White	30 x 30
R4-X8a	BYPASS AND TURN LANE	Black on White	30 x 36
R5-1	DO NOT ENTER	Red on White	CR-SL 30 x 30 CR-ML 36 x 36 E, O 36 x 36 F 48 x 48
R5-1a	WRONG WAY	Red on White	M 30 x 18 CR-SL 36 x 24 CR-ML, E 42 x 30 F, O 42 x 30
R5-2		Black and Red on White	CR-SL 24 x 24 CR-ML 24 x 24 E 30 x 30 F, O 36 x 36
R5-3	NO MOTOR VEHICLES	Black on White	CR-SL 24 x 24 CR-ML 24 x 24
R5-6		Black and Red on White	B-P 18 x 18 B/Rt 24 x 24 CR-SL 24 x 24 CR-ML 24 x 24 E 30 x 30 F 36 x 36 O 48 x 48
R5-10d	PEDESTRIANS BICYCLES MOTORIZED BICYCLES NON-MOTORIZED TRAFFIC PROHIBITED	Black on White	RA 18 x 24
R5-X1		Black and Red on White	18 x 18

No.	Drawing	Color	Use & Size
R5-X2	STATE PROPERTY KEEP OFF OUT	Black on White	24 x 18 30 x 24
R5-X3	NO TRESPASSING Mn DOT CROSSING HUNTING DUMPING FISHING CAMPING	Black on White	24 x 18
R5-X4	NO THRU TRAFFIC	Black on White	24 x 30
R6-1 (R or L) Right is shown	ONE WAY	Black on White	CR-SL 36 x 12 CR-ML 54 x 18 E, F, O 54 x 18
R6-2 (R or L) Right is shown	ONE WAY	Black on White	M 18 x 24 CR-SL 24 x 30 CR-ML 30 x 36 E, O 36 x 48 F 48 x 60
R6-3	DIVIDED HIGHWAY	Black on White	24 x 18 CR-SL 30 x 24 CR-ML 30 x 24 E, O 36 x 30
R6-3a	DIVIDED HIGHWAY	Black on White	24 x 18 CR-SL 30 x 24 CR-ML 30 x 24 E, O 36 x 30
R6-4 Roundabout Directional		Black on White	30 x 24
R6-4a Roundabout Directional For speed zones <45 mph and single lane approaches		Black on White	48 x 24
R6-4b Roundabout Directional For speed zones ≥45 mph and/or multi-lane approaches		Black on White	60 x 24

HANDOUT

R Series

No.	Drawing	Color	Use & Size
R6-6	BEGIN ONE WAY	Black on White	CR-SL 24 x 30 CR-ML 30 x 36
R6-7	END ONE WAY	Black on White	CR-SL 24 x 30 CR-ML 30 x 36
R7-8m	PARK ONLY VEHICLE REQUIRED $50 FINE FOR VIOLATION	White on Blue	12 x 18
R7-8bP Use with R7-8m	VAN ACCESSIBLE	White on Blue	12 x 6
R7-108 Permissive Parking Alternate legends available	15 MIN PARKING 8:00 AM TO 5:00 PM	Green on White	12 x 18
R7-X2	NO TRUCK PARKING	Red on White	18 x 24
R8-3		Black and Red on White	M 12 x 12 CR-SL 24 x 24 CR-ML 30 x 30 E, O 36 x 36 F 48 x 48
R8-3mP Use with R8-3; alternate legends are available	BETWEEN SIGNS 10 PM TO 6 AM	Red on White	M 12 x 9 CR-SL 18 x 12 CR-ML 24 x 12
R8-4	EMERGENCY PARKING ONLY	Black on White	CR-SL 30 x 24 CR-ML, E 30 x 24 F, O 48 x 36
R8-7	EMERGENCY STOPPING ONLY	Black on White	CR-SL 30 x 24 CR-ML, E 30 x 24 F, O 48 x 36

No.	Drawing	Color	Use & Size
R8-8	DO NOT STOP ON TRACKS	Black on White	CR-SL 24 x 30 CR-ML 24 x 30 E 36 x 48 O 48 x 60
R8-41	PARK - RIDE PARKING ONLY LOITERING VENDING SEMI TRUCK AND OVERNIGHT PARKING PROHIBITED	Red on White	48 x 42
R9-3		Black and Red on White	B-P, B/Rt 18 x 18 CR-SL 18 x 18 CR-ML 18 x 18 E 24 x 24 F, O 30 x 30
R9-5	USE PED SIGNAL	Black on White	B-P, B/Rt 12 x 18
R9-6	YIELD TO PEDS	Black on White	B-P, B/Rt 12 x 18
R9-7 (R or L) Right is shown	KEEP LEFT RIGHT	Black on White	B-P, B/Rt 12 x 18
R9-9	SIDEWALK CLOSED	Black on White	30 x 18
R9-9a	TRAIL CLOSED	Black on White	24 x 18
R9-10	SIDEWALK CLOSED USE OTHER SIDE	Black on White	24 x 12 48 x 24
R9-11 (R or L) Right is shown	SIDEWALK CLOSED AHEAD CROSS HERE	Black on White	24 x 12 48 x 36
R9-11a (R or L) Right is shown	SIDEWALK CLOSED CROSS HERE	Black on White	24 x 12 48 x 24

HANDOUT

HANDOUT

R Series

No.	Drawing	Color	Use & Size
R9-11b (R or L)	SIDEWALK CLOSED USE OTHER SIDE OF STREET →	Black on White	48 x 18
Right is shown			
R9-X1	USE SHOULDER	Black on White	B-P, B/Rt 12 x 18
R9-X2	MUST USE BIKEWAY	Black on White	B-P, B/Rt 12 x 18
R10-3	PUSH BUTTON FOR	Black on White	CR-SL 9 x 12 CR-ML 9 x 12
R10-3b	WALK FLASHING WAITS! WALK STEADY 7 SECONDS! DON'T CROSS PUSH BUTTON TO CROSS	Black and Orange on White	CR-SL 9 x 12 CR-ML 9 x 12
Alternate legends available			
R10-3d	WALK FLASHING WAITS! WALK STEADY 7 SECONDS! DON'T CROSS PUSH BUTTON TO CROSS	Black and Orange on White	CR-SL 9 x 12 CR-ML 9 x 12
Alternate legends available			
R10-3e	WALK FLASHING WAITS! WALK STEADY 7 SECONDS! DON'T CROSS PUSH BUTTON TO CROSS	Black and Orange on White	CR-SL 9 x 15 CR-ML 9 x 15
Alternate legends available			
R10-6 (R or L)	WAIT STOP HERE ON RED	Black on White	CR-SL 24 x 36 CR-ML 24 x 36 O 36 x 48
Left is shown Alternate legend available			
R10-7	DO NOT BLOCK INTERSECTION	Black on White	CR-SL 30 x 30 CR-ML 30 x 30

No.	Drawing	Color	Use & Size
R10-7a	DO NOT BLOCK CROSSWALK	Black on White	CR-SL 30 x 30 CR-ML 30 x 30
R10-10 (R or L)	LEFT RIGHT TURN SIGNAL	Black on White	CR-SL 30 x 36 CR-ML 30 x 36
R10-11b	NO TURN ON RED	Black on White	CR-SL 36 x 36 CR-ML 36 x 36
R10-12	LEFT TURN YIELD ON GREEN	Black and Green on White	CR-SL 30 x 36 CR-ML 30 x 36 O 36 x 48*
* For overhead use			
R10-16	U-TURN YIELD TO RIGHT TURN	Black on White	CR-SL 30 x 36 CR-ML 30 x 36
R10-X4	RAMP METERING BEGINS FEB 25	Black on White	24 x 30
R10-X6	1 CAR ON GREEN	Black on White	24 x 18
Ramp metering use only			
R10-X7	FORM 2 LANES WHEN METERED	Black on White	24 x 30 36 x 48
R10-X12	LEFT TURN YIELD ON FLASHING YELLOW ARROW	Black on White	CR-SL 36 x 42 CR-ML 36 x 42 O 36 x 48*
* For overhead use			

HANDOUT

R Series

No.	Drawing	Color	Use & Size
R11-1	KEEP OFF MEDIAN	Black on White	CR-SL 24 x 30 CR-ML 24 x 30
R11-2	STREET RAMP ROAD CLOSED	Black on White	48 x 30
R11-2a	BRIDGE CLOSED OUT	Black on White	48 x 30
R11-3a	ROAD CLOSED 10 MILES AHEAD LOCAL TRAFFIC ONLY	Black on White	60 x 30
R11-3c	BRIDGE OUT 10 MILES AHEAD LOCAL TRAFFIC ONLY	Black on White	72 x 30
R11-4	ROAD CLOSED TO THRU TRAFFIC	Black on White	60 x 30
R11-X1	ROAD CLOSED WHEN FLASHING	Black on White	CR-SL 72 x 24 CR-ML 72 x 24 E, F 96 x 36
R12-1a	BRIDGE WEIGHT LIMIT 9 TONS	Black on White	24 x 36
R12-2	AXLE WEIGHT LIMIT 5 TONS	Black on White	CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48
R12-5	WEIGHT LIMIT T T T	Black on White	CR-SL 24 x 36 CR-ML 24 x 36 E 36 x 48 F 48 x 60

No.	Drawing	Color	Use & Size
R12-5a	WEIGHT LIMIT XXT	Black on White	CR-SL 24 x 24 CR-ML 24 x 24 E 36 x 30
R12-5 Supplement	BRIDGE 14 MILES	Black on Yellow	CR-SL 24 x 9 CR-ML 24 x 9 E 36 x 12 F 48 x 12
Use with R12-5 of same width			
R12-X2	RESTRICTED BRIDGE 14 MILES AHEAD WEIGHT LIMIT 10 TONS	Black on White	60 x 36
R12-X2a	RESTRICTED BRIDGE 14 MILES AHEAD PERMIT WEIGHT LIMIT 45 TONS	Black on White	78 x 36
R12-X3	TRUCKS MUST NOT MEET ON BRIDGE	Black on White	36 x 24
R12-X3a	VEHICLES MUST NOT MEET ON BRIDGE	Black on White	42 x 24
R12-X4	RESTRICTED BRIDGE 14 MILES AHEAD WEIGHT LIMIT 10 TONS CLEARANCE 14FT 10IN	Black on White	60 x 42
R12-X4a	RESTRICTED BRIDGE 14 MILES AHEAD CLEARANCE 14FT 10IN	Black on White	60 x 36
R12-X5	VEHICLES OVER 9 TONS AXLE WT USE TRUCK DETOUR	Black on White	CR-SL 90 x 36 CR-ML 90 x 36 O 120 x 48 O 150 x 60
R12-X11	PERMIT WEIGHT LIMIT 45T	Black on White	36 x 36
R14-1	TRUCK ROUTE	Black on White	CR-SL 24 x 18 CR-ML 24 x 18

HANDOUT

HANDOUT

R Series

No.	Drawing	Color	Use & Size
R15-3P	EXEMPT	Black on White	CR-SL 24 x 12 CR-ML 24 x 12
Use with railroad crossbuck			
R15-7	DIVIDED HIGHWAY	Black on White	CR-SL 24 x 24 CR-ML 24 x 24
R15-7a	DIVIDED HIGHWAY	Black on White	CR-SL 24 x 24 CR-ML 24 x 24
R16-4	FENDER BENDER MOVE VEHICLES FROM TRAVEL LANES	Black and Yellow on White	CR-SL 54 x 24 CR-ML 54 x 24 E, O 84 x 42 F 120 x 54
R16-X1	STATE LAW STOP FOR SCHOOL BUS WHEN RED LIGHTS FLASHING	Black on White	72 x 48
R16-X2	STATE LAW TRUCKS AND VEHICLES WITH TRAILERS MUST MAINTAIN 500 FOOT INTERVAL	Black on White	72 x 48
R16-X3	UP TO $1000 FINE FOR LITTERING HIGHWAYS	Black on White	48 x 30
R16-X4	EMERGENCY STOPPING ONLY PEDESTRIANS BICYCLES MOTORIZED BICYCLES NON-MOTORIZED TRAFFIC PROHIBITED	Black on White	RA 36 x 36
R16-X6	SIGNAL YOUR TURN	Black on White	CR-SL 30 x 30 CR-ML 30 x 30 O 48 x 48
R16-X7 (R or L)	LEFT RIGHT LANE MUST EXIT	Black on White	48 x 60

No.	Drawing	Color	Use & Size
R16-X8	REST STOP 6 HR LIMIT NO CAMPING	Black on White	CR-SL 30 x 18 CR-ML 36 x 24
R16-X9	STATE LAW UNLAWFUL TO PASS ON SHOULDER	Black on White	60 x 48
R16-X10	NO FISHING FROM BRIDGE	Black on White	CR-SL 18 x 24 CR-ML 18 x 24 O 24 x 30
R16-X11	STATE LAW SEAT BELT USE REQUIRED	Black on White	72 x 36
R16-X12	FASTENED ?	Black on White	CR-SL 18 x 18 CR-ML 18 x 18 O 36 x 36
R16-X13	VEHICLE NOISE LAWS ENFORCED	Black on White	CR-SL 24 x 24 CR-ML 24 x 24 E 36 x 42
R16-X14	FINES DOUBLE IN WORK ZONES	Black on White	CR-SL 66 x 36 CR-ML 66 x 36 E, F 84 x 48
R16-X15	STATE LAW MOVE OVER FOR STOPPED EMERGENCY AND MAINTENANCE VEHICLES	Black on White	132 x 78
R16-X16	DO NOT CROSS DOUBLE WHITE LINE	Black on White	CR-SL 30 x 48 CR-ML 30 x 48 E, F, O 48 x 66
R16-X33	CHECK YOUR TURN SIGNAL	Black on White	24 x 30

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W Series

No.	Drawing	Color	Use & Size
W1-1 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W1-1a (R or L)	25 Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 x 48
W1-2 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W1-2a (R or L)	35 Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 x 48
W1-3 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W1-4 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W1-4b (R or L)	Right is shown	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48 O 60 x 60
W1-4c (R or L)	Right is shown	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48 O 60 x 60
W1-5 (R or L)	Right is shown	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48

No.	Drawing	Color	Use & Size
W1-6		Black on Yellow	CR-SL 48 x 24 CR-ML 48 x 24 E 72 x 36 F 96 x 48
W1-7		Black on Yellow	CR-SL 48 x 24 CR-ML 48 x 24 O 72 x 36 O 96 x 48
W1-8		Black on Yellow	CR-SL 18 x 24 CR-ML 18 x 24 O 24 x 30 E 30 x 36 F 36 x 48
W1-10 (R or L)	Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-10a (R or L)	Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-10b (R or L)	Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-10c (R or L)	Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-10d (R or L)	Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-10e (R or L)	Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

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HANDOUT

W Series

No.	Drawing	Color	Use & Size
W1-13 (R or L) Right is shown		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 36 x 36 F 48 x 48
W1-15		Black on Yellow	CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 F, O 48 x 48
W1-X1 (R or L) Right is shown		Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W1-X1b (R or L) Right is shown		Black on Orange	E, F 48 x 48 O 60 x 60
W2-1		Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 O 48 x 48
W2-2 (R or L) Right is shown		Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 O 48 x 48
W2-3 (R or L) Right is shown		Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 O 48 x 48
W2-4		Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 O 48 x 48
W2-5		Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 O 48 x 48
W2-6a		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 O 48 x 48
W2-7 (R or L) Right is shown		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 O 48 x 48
W2-8 (R or L) Right is shown		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 O 48 x 48
W2-X1	HIDDEN INTERSECTION AHEAD	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 O 48 x 48
W2-X12	HIDDEN ENTRANCE	Black on Yellow	CR-SL 30 x 30 CR-ML 30 x 30 O 36 x 36
W3-1		Black and Red on Yellow	B-P 18 x 18 B/Rt 30 x 30 CR-SL 30 x 30 CR-ML 36 x 36 E, F 48 x 48
W3-2		Black, Red and White on Yellow	B-P 18 x 18 B/Rt 30 x 30 CR-SL 30 x 30 CR-ML 36 x 36 E, F 48 x 48
W3-3		Black, Red and Green on Yellow	B-P 18 x 18 B/Rt 30 x 30 CR-SL 30 x 30 CR-ML 36 x 36 E, F 48 x 48
W3-4	BE PREPARED TO STOP	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

No.	Drawing	Color	Use & Size
W3-5	SPEED LIMIT 45	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 x 48
W3-8	RAMP METERED WHEN FLASHING	Black on Yellow	36 x 36
W3-X4	PREPARE TO STOP WHEN FLASHING	Black on Yellow	66 x 42
W3-X5	TRAFFIC CONTROL CHANGE AHEAD	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W3-X6	ROAD CLOSED WHEN FLASHING	Black on Yellow	72 x 24 96 x 36
W3-X8	ENTERING TRAFFIC WHEN FLASHING	Black on Yellow	66 x 42
W3-X8a	ENTERING TRAFFIC	Black on Yellow	48 x 48
W3-X8aP	WHEN FLASHING	Black on Yellow	42 x 24
W4-1 (R or L) Right is shown		Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W4-2 (R or L) Right is shown		Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W4-3 (R or L) Right is shown		Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W4-4P	CROSS TRAFFIC DOES NOT STOP	Black on Yellow	Use w/30" R1-1 30 x 15 Use w/36" R1-1 36 x 18 Use w/48" R1-1 48 x 24
W4-4aP (R or L)	TRAFFIC FROM LEFT TRAFFIC FROM RIGHT DOES NOT STOP	Black on Yellow	Use w/30" R1-1 30 x 15 Use w/36" R1-1 36 x 18 Use w/48" R1-1 48 x 24
W4-4bP	ONCOMING TRAFFIC DOES NOT STOP	Black on Yellow	Use w/30" R1-1 30 x 15 Use w/36" R1-1 36 x 18 Use w/48" R1-1 48 x 24
W4-5		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48
W4-5P	NO MERGE AREA	Black on Yellow	CR-SL 18 x 24 CR-ML 18 x 24 E 24 x 30
W4-6		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48
W4-X1 (R or L)	TRAFFIC MERGING FROM RIGHT LEFT	Black on Yellow	E, F 48 x 48 O 60 x 60
W5-1	ROAD NARROWS	Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

HANDOUT

W Series

No.	Drawing	Color	Use & Size
W5-2	NARROW BRIDGE	Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W5-3	ONE LANE BRIDGE	Black on Yellow	M 30x 30 CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W5-4a	PATH NARROWS	Black on Yellow	B-P 18 x 18
W5-X1	SHOULDER NARROWS	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W6-1		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W6-2		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W6-3		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W6-4		Black on Orange	12 x 18
W6-X1 (R or L)	LEFT RIGHT ACCELERATION LANE	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48

No.	Drawing	Color	Use & Size
W6-X2	ACCELERATION LANE ENDS	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W7-1		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W7-1a	9%	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 O 48 x 48
W7-2bP	TRUCKS USE LOWER GEAR	Black on Yellow	24 x 18
W7-3P	9% GRADE	Black on Yellow	24 x 18
W7-3aP	NEXT 4 MILES	Black on background color matching warning sign Use w/30" diamond 24 x 18 Use w/36" diamond 30 x 24 Use w/48" diamond 42 x 24	
W7-3bP	9% GRADE 7 MILES	Black on Yellow	24 x 18
W7-5		Black on Yellow	B-P 18 x 18 B/Rt 30 x 30
W8-1	BUMP	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML, E 36 x 36 F, O 48 x 48
W8-1a	BUMP AHEAD	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML, E 36 x 36 F, O 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

W Series

No.	Drawing	Color	Use & Size
W8-1b	BUMPS	Black on Yellow	CR-SL 30 x 30 CR-ML, E 36 x 36 F, O 48 x 48
W8-2	DIP	Black on Yellow	B-P 18 x 18 B/Rt 24 x 24 CR-SL 30 x 30 CR-ML, E 36 x 36 F, O 48 x 48
W8-3	PAVEMENT ENDS	Black on Yellow	B-P 18 x 18 B/Rt 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48
W8-4	SOFT SHOULDER	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 x 48
W8-5		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML, E 36 x 36 F, O 48 x 48
W8-5P	WHEN WET	Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 F, O 36 x 30
W8-5aP	ICE	Black on Yellow	CR-SL 24 x 12 CR-ML 24 x 12 E, F 30 x 18
W8-5bP	STEEL DECK	Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 F, O 36 x 30
W8-5cP	EXCESS OIL	Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 F, O 36 x 30
W8-7	LOOSE GRAVEL	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML, E 36 x 36 O 48 x 48

No.	Drawing	Color	Use & Size
W8-8	ROUGH ROAD	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F, O 48 x 48
W8-9	LOW SHOULDER	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F, O 48 x 48
W8-9a	SHOULDER DROP OFF	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W8-10		Black on Yellow	B-P 18 x 18 B/Rt 30 x 30
W8-10P	SLIPPERY WHEN WET	Black on Yellow	B-P, B/Rt 12 x 9
W8-11	UNEVEN LANES	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W8-12	NO CENTER LINE	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W8-12a	NO CENTER STRIPE	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W8-13	BRIDGE ICES BEFORE ROAD	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML, E 36 x 36 F, O 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

HANDOUT

W Series

No.	Drawing	Color	Use & Size
W8-14	FALLEN ROCKS	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 F, O 48 x 48
W8-15	GROOVED PAVEMENT	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 F, O 48 x 48
W8-15P		Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 F, O 36 x 30
W8-16	METAL BRIDGE DECK	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 F, O 48 x 48
W8-17 (R or L) Right is shown		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 F, O 48 x 48
W8-17P	SHOULDER DROP-OFF	Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 F, O 36 x 30
W8-18	ROAD MAY FLOOD	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F, O 48 x 48
W8-19	1 MI 1/2 1/4 1/3 1/2 1	Black on Yellow	12 x 72
W8-21	GUSTY WINDS AREA	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F, O 48 x 48
W8-22	FOG AREA	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F, O 48 x 48
W8-23	NO SHOULDER	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F, O 48 x 48
W8-25	SHOULDER ENDS	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 F, O 48 x 48
W8-X13	ROUGH CROSSING	Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36
W9-1 (R or L)	LEFT RIGHT LANE ENDS	Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F, O 48 x 48
W9-2 (R or L)	LANE ENDS MERGE RIGHT LEFT	Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F, O 48 x 48
W9-3a	CENTER LANE CLOSED	Black on Orange	48 x 48
W9-7 (R or L)	RIGHT LANE EXIT ONLY AHEAD	Black on Yellow	132 x 72
W10-1	R R	Black on Yellow	B-P 24 Diameter B/Rt 36 Diameter CR-SL 36 Diameter CR-ML 36 Diameter E, O 48 Diameter
W10-1aP	EXEMPT	Black on Yellow	24 x 12

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

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W Series

No.	Drawing	Color	Use & Size
W10-2 (R or L) Right is shown		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
W10-3 (R or L) Right is shown		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
W10-4 (R or L) Right is shown		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
W10-5		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
W10-5P	LOW GROUND CLEARANCE	Black on Yellow	30 x 24
W10-9	NO TRAIN HORN	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
W10-9P	NO TRAIN HORN	Black on Yellow	B-P 18 x 12 B/Rt 30 x 24 CR-SL 30 x 24 CR-ML 30 x 24
W10-11		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
W10-11a	100 FEET BETWEEN TRACKS AND HIGHWAY	Black on Yellow	CR-SL 30 x 36 CR-ML 30 x 36
W10-11b	100 FEET BETWEEN HIGHWAY AND TRACKS BEHIND YOU	Black on Yellow	CR-SL 30 x 36 CR-ML 30 x 36
W10-12 (R or L) Right is shown		Black on Yellow	B-P 18 x 18 CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
W10-X2	HIDDEN CROSSING	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
W10-X3	LOOK FOR TRAINS	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
W11-1		Black on Yellow-green	B-P 18 x 18 M, B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 30 x 30 E, O 36 x 36
W11-2		Black on Yellow-green	B-P 18 x 18 M, B/Rt 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-3		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-4		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-5		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-6		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

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W Series

No.	Drawing	Color	Use & Size
W11-7		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-8		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-9		Black on Yellow-green	CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-10		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-14		Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-15		Black on Yellow-green	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-15a	TRAIL CROSSING	Black on Yellow-green	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W11-15P	TRAIL X-ING	Black on Yellow-green	B-P 18 x 12 B/Rt 24 x 18 CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 O 36 x 30
W11-X3	TRUCKS ENTERING	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48

No.	Drawing	Color	Use & Size
W12-1		Black on Yellow	CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48
W12-2	13'-6"	Black on Yellow	B-P 18 x 18 B/Rt, M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W12-2a	13 FT 6 IN Mounted on structure	Black on Yellow	84 x 24
W13-1P	35 MPH	Black on Yellow	Use w/30" diamond 18 x 18 Use w/36" diamond 24 x 24 Use w/48" diamond 30 x 30 Use w/60" diamond 36 x 36
W13-2	EXIT 30 MPH	Black on Yellow	CR-SL 24 x 30 CR-ML 24 x 30 E, F 36 x 48 O 48 x 60
W13-3	RAMP 30 MPH	Black on Yellow	CR-SL 24 x 30 CR-ML 24 x 30 E, F 36 x 48 O 48 x 60
W13-4P	ON RAMP	Black on Orange	36 x 36
W13-6	EXIT 25 MPH	Black on Yellow	CR-SL 24 x 42 CR-ML 24 x 42 E, F 36 x 60 O 48 x 84
W13-7	RAMP 25 MPH	Black on Yellow	CR-SL 24 x 42 CR-ML 24 x 42 E, F 36 x 60 O 48 x 84
W14-1	DEAD END	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36 O 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

HANDOUT

W Series

No.	Drawing	Color	Use & Size
W14-3	NO PASSING ZONE	Black on Yellow	CR-SL 48 x 64 x 64 CR-ML 48 x 64 x 64
W14-X1	WATCH FOR FALLEN ROCK	Black on Yellow	CR-SL 30 x 30 CR-ML 30 x 30 E, F 36 x 36
W14-X2	WATCH FOR SLOW TRAFFIC	Black on Yellow	48 x 48
W14-X3	WEIGHT RESTRICTION AHEAD	Black on Yellow	36 x 36
W14-X9	WATCH FOR BUSES ON SHOULDER	Black on Yellow	30 x 36
W14-X10		Black on Yellow	12 x 18
W14-X11	EVENT CONGESTION AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 48 x 48 E, F, 48 x 48
W14-X12	CONTROLLED BURNING AHEAD	Black on Orange	48 x 48
W14-X13	SMOKE OVER ROAD	Black on Orange	48 x 48
W14-X15	EMERGENCY SCENE AHEAD	Black on Pink	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48

No.	Drawing	Color	Use & Size
W15-1		Black on Yellow-green	B-P 18 x 18 B/Rt, M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E 36 x 36
W16-1P	SHARE THE ROAD	Black on Yellow-green	B/Rt 18 x 24 CR-SL 18 x 24 CR-ML 18 x 24 E, O 24 x 30
W16-5mP (R or L)		Black on background color matching warning sign Right is shown	Use w/30" diamond 24 x 18 Use w/36" diamond 30 x 24 Use w/48" diamond 36 x 24 O 42 x 30
W16-6mP (R or L)		Black on background color matching warning sign Right is shown	Use w/30" diamond 24 x 18 Use w/36" diamond 30 x 24 Use w/48" diamond 36 x 24 O 42 x 30
W16-7mP (R or L)		Black on background color matching warning sign Use at crossing Right is shown	Use w/30" diamond 24 x 18 Use w/36" diamond 30 x 24 Use w/48" diamond 36 x 24 O 42 x 30
W16-8P	Second St Use with W2 and W3 Series, W10-2, W10-3, and W10-4 signs	Black on Yellow	Varies x 8
W16-8aP	← Katie Lane County B2 → Use with W2 and W3 Series, W10-2, W10-3, and W10-4 signs	Black on Yellow	Varies x 15
W16-9P	AHEAD Use with S1-1 (pentagon) signs	Black on Yellow-green	Use w/30" 24 x 12 Use w/36" 30 x 18 Use w/48" 36 x 24
W16-13P	WHEN FLASHING	Black on Yellow	24 x 18
W16-15P	NEW	Black on Yellow	24 x 12

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

HANDOUT

HANDOUT

W Series

No.	Drawing	Color	Use & Size
W16-17P	ROUNDABOUT	Black on Yellow	CR-SL 36 x 12 CR-ML 36 x 12 O 42 x 12
W19-1	FREEWAY ENDS 1 MILE	Black on Yellow	F 144 x 48
W19-2	EXPRESSWAY ENDS 1 MILE	Black on Yellow	E 144 x 48
W19-5	ALL TRAFFIC MUST EXIT	Black on Yellow	E, F 90 x 48
W20-1	ROAD WORK AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-1a	SIDEWALK WORK AHEAD	Black on Orange	36 x 18
W20-2	DETOUR AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-3	ROAD CLOSED AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-3a	TRAIL CLOSED AHEAD	Black on Orange	B-P 18 x 18
W20-4	ONE LANE ROAD AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-7		Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48 O 60 x 60

No.	Drawing	Color	Use & Size
W20-100P	500 FEET / 1/4 MILE / 15 MILES / 2 MILES Alternate legends available	Black on background color matching warning sign	Use w/30" diamond 24 x 18 Use w/36" diamond 30 x 24 Use w/48" diamond 42 x 18 Use w/48" diamond 42 x 24 Use w/60" diamond 48 x 36
W20-X3 (R or L)	MERGE Right is shown Arrow is demountable when used on orange	Black on Orange or Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-X4	BRIDGE CLOSED AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-X6	BYPASS AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-X9	BRIDGE WORK AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-X10	SIGNAL WORK AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-X11 Reduced Width	10 FT	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-X12	CENTER LANE MERGE LEFT	Black on Orange	E, F 48 x 48
W20-X13 (R or L)	RIGHT TWO LANES CLOSED Right is shown	Black on Orange	E, F 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

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W Series

No.	Drawing	Color	Use & Size
W20-X16	RAMP CLOSED AHEAD	Black on Orange	E, F 48 x 48
W20-X17	LANES NARROW	Black on Orange	CR-ML 36 x 36 E, F 48 x 48
W20-X18	TURN LANE CLOSED	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W21-1		Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W21-2	FRESH OIL	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W21-6a	SURVEY CREW AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W21-7	UTILITY WORK AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W21-X3		Black on Orange	18 x 18 24 x 24 30 x 30
	Use with high level warning device or as delineator		
W21-X4	ROAD WORK AHEAD RIGHT LANE CLOSED LEFT LANE RAMP	Black on Orange	72 x 42 96 x 54

No.	Drawing	Color	Use & Size
W21-X4 Supplement	BE PREPARED TO STOP NO SHOULDER Use with W21-X4	Black on Orange	60 x 20 80 x 26
W21-X4a (R or L)	SHOULDER RAMP LEFT RIGHT LANE CLOSED Right is shown	Black on Orange	66 x 24 96 x 36
W21-X5 (R or L)	RIGHT LANE CLOSED Right is shown	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W21-X5a	SHOULDER CLOSED	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W21-X6	CREW WORKING AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W21-X7 Flagger Paddle	STOP / SLOW * Automated flagging device size	Stop: White on Red Slow: Black on Yellow	18 x 18 * 36 x 36
W21-X8	MINIMUM MAINTENANCE ROAD Not for use onMnDOT or federal state aid roads	Black on Yellow	36 x 30
W21-X9	HIGH SHOULDER	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

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W Series

No.	Drawing	Color	Use & Size
W21-X10 Striper Train Sign	WET PAINT KEEP OFF LINES	Black on Orange	60 x 36 72 x 42
W21-X11 Striper Train Sign Arrow is demountable	WET PAINT	Black on Orange	54 x 22
W21-X12 Striper Train Sign	WET PAINT WET YELLOW WET WHITE	Black on Orange	72 x 18
W21-X13 Striper Train Sign	WET PAINT AHEAD	Black on Orange	72 x 36 90 x 42
W22-1	BLASTING ZONE AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W22-2 Blasting Area Prohibition	TURN OFF 2-WAY RADIO AND CELL PHONE	Black on Orange	42 x 36
W22-3	END BLASTING ZONE	Black on Orange	M 36 x 30 CR-SL 42 x 36 CR-ML 42 x 36 E, F 42 x 36
W23-2	NEW TRAFFIC PATTERN AHEAD	Black on Yellow or Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48

All diamond shaped warning signs installed on multi-lane conventional roads with speeds greater than 35 mph shall be at least 36" x 36".

HANDOUT

M Series

No.	Drawing	Color	Use & Size
M1-1 * 3 digit	INTERSTATE 94	White on Red and Blue	M 18 x 18 M 22.5 x 18* CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-2 Business Loop	BUSINESS LOOP 94	White on Green	M 18 x 18 CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
M1-3 Business Spur	BUSINESS SPUR 94	White on Green	M 18 x 18 CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
M1-4 Independent use *3 digit	61	Black on White	CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-4a Overlay use *3 digit	61	Black on White	M 18 x 18 M 22.5 x 18* CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-4b Independent use *3 digit	BUSINESS 14	Green on White	CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-4ab Overlay use *3 digit	BUSINESS 71	White on Green	CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-5a Independent use *3 digit	MINNESOTA 40	White and Gold on Blue	CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-5b Overlay use *3 digit	MINNESOTA 40	White and Gold on Blue	M 18 x 18 M 22.5 x 18* CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-5ab Independent use *3 digit	BUSINESS 40	White on Green	CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-5bb Overlay use *3 digit	BUSINESS 23	White on Green	M 18 x 18 M 22.5 x 18* CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-6 Independent use	WRIGHT 44 COUNTY	White and Yellow on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
M1-6a Overlay use *3 digit	COUNTY 44	White on Blue	M 18 x 18 M 22.5 x 18* CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*
M1-10a	EISENHOWER INTERSTATE SYSTEM	White on Blue	F 36 x 36
M1-X1		Green on White	CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
M1-X1P Use with M1-X1	NATIONAL ROUTE	Green on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F 36 x 18

HANDOUT

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M Series

No.	Drawing	Color	Use & Size
M1-X4	CARVER 5 COUNTY	Black on White	CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
Independent use			
M1-X4a	COUNTY 5	Black on White	CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
Overlay use			
M1-X4b	INTER-COUNTY D	White and Yellow on Blue	CR-SL 24 x 24 CR-ML 24 x 24
M2-1	JCT	Black on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M2-1a	JCT	White on Blue	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M3-1	NORTH	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-1a	NORTH	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-2	EAST	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-2a	EAST	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-3	SOUTH	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-3a	SOUTH	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-4	WEST	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18

No.	Drawing	Color	Use & Size
M3-4a	WEST	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-1	ALTERNATE	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-1a	ALT	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-2	BY-PASS	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-3	BUSINESS	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-4	TRUCK	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-5	TO	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-5a	TO	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-6	END	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-6a	END	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-7	TEMPORARY	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-7a	TEMP	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-8	DETOUR	Black on Orange	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18

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M Series

No.	Drawing	Color	Use & Size
M4-8a	END DETOUR	Black on Orange	CR-SL 24 x 18 CR-ML 24 x 18 E, F 24 x 18
M4-9m (R, L, R45 L45, ATR, ATL, ATR90, or ATL90)	DETOUR	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24 E, F, O 42 x 36
Right is shown			
M4-9ma (R, L, or T)	DETOUR	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24
Right is shown			
M4-9mb (R, L, or T)	DETOUR	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24
Right is shown			
M4-9mc (R, L, or T)	DETOUR	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24
Right is shown			
M4-10 (R or L)	DETOUR	Black on Orange	CR-SL 48 x 18 CR-ML 48 x 18
Right is shown			
M4-14	BEGIN	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-14a	BEGIN	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-X1	OLD	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M4-X1a	OLD	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M5-1 (R or L)		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
Right is shown			

No.	Drawing	Color	Use & Size
M5-1a (R or L)		White on Blue, Brown or Green	B-P, R/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
Right is shown		* These signs shall be white on green	
M5-2 (R or L)		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
Right is shown			
M5-2a (R or L)		White on Blue, Brown or Green	B-P, R/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
Right is shown			
M5-3		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M5-3a		White on Blue, Brown or Green	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M5-4	LEFT LANE	Black on White or Green on White	CR-SL 24 x 18 CR-ML 24 x 18 E, F 36 x 24
M5-4a	LEFT LANE	White on Blue, Brown or Green	CR-SL 24 x 18 CR-ML 24 x 18 E, F 36 x 24
M5-5	CENTER LANE	Black on White or Green on White	CR-SL 24 x 18 CR-ML 24 x 18 E, F 36 x 24
M5-5a	CENTER LANE	White on Blue, Brown or Green	CR-SL 24 x 18 CR-ML 24 x 18 E, F 36 x 24
M5-6	RIGHT LANE	Black on White or Green on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M5-6a	RIGHT LANE	White on Blue, Brown or Green	CR-SL 24 x 18 CR-ML 24 x 18 E, F 36 x 24

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M Series

No.	Drawing	Color	Use & Size
M6-1 (R or L) Right is shown		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-1a (R or L) Right is shown		White on Blue, Brown or Green	B-P, R/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24 * These signs shall be white on green
M6-2 (R or L) Right is shown		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-2a (R or L) Right is shown		White on Blue, Brown or Green	B-P, R/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24 * These signs shall be white on green
M6-3		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-3a		White on Blue, Brown or Green	B-P, R/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24 * These signs shall be white on green
M6-4		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-4a		White on Blue, Brown or Green	B-P, R/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24 * These signs shall be white on green
M6-5 (R or L) Right is shown		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-5a (R or L) Right is shown		White on Blue, Brown or Green	B-P, R/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24 * These signs shall be white on green

No.	Drawing	Color	Use & Size
M6-6 (R or L) Right is shown		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-6a (R or L) Right is shown		White on Blue, Brown or Green	B-P, R/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24 * These signs shall be white on green
M6-7 (R or L) Right is shown		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-7a (R or L) Right is shown		White on Blue, Brown or Green	B-P, R/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24 * These signs shall be white on green

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HANDOUT

M Series

No., Size & Color	Drawing	No., Size & Color	Drawing	No., Size & Color	Drawing	No., Size & Color	Drawing
M1-X2 24 x 24 Brown on White	HIAWATHA PIONEER TRAIL	M1-X5j White on Brown	Arthur V Rohweder MEMORIAL HIGHWAY	M1-X5s 18 x 24 White on Brown	MOBERG TRAIL	M1-X5dd 24 x 24 White on Green	AMISH BYWAY
M1-X5a 24 x 24 White on Green	CAPITOL HIGHWAY	M1-X5k 24 x 24 Red & Black on White	GLACIAL RIDGE TRAIL	M1-X5t 24 x 24 White on Green	PAUL BUNYAN EXPRESSWAY	M1-X5ee White on Brown	Czech MEMORIAL HIGHWAY
M1-X5b White on Brown	Colvill MEMORIAL HIGHWAY	M1-X5l White on Brown	John A Johnson MEMORIAL HIGHWAY	M1-X5u White on Brown	Disabled American Veterans HIGHWAY	M1-X5ff White on Brown	VICTORY DRIVE
M1-X5c White on Brown	Floyd B Olson MEMORIAL HIGHWAY	M1-X5m 24 x 24 Blue on White	VIKING TRAIL	M1-x5v White on Brown	BE Grottum MEMORIAL HIGHWAY	M1-X5gg White on Brown	Dale Wayrynen MEMORIAL HIGHWAY
M1-X5d White on Brown	Theodore Christianson MEMORIAL HIGHWAY	M1-X5n White on Brown	George Mann MEMORIAL HIGHWAY	M1-X5w White on Brown	Wally Nelson HIGHWAY	M1-X5hh White on Brown	Augie Mueller MEMORIAL HIGHWAY
M1-X5e White on Brown	PH McGarry MEMORIAL DRIVE	M1-X5o 24 x 24 Various on White	APPLE BLOSSOM SCENIC DRIVE	M1-X5x White on Brown	Laura Ingalls Wilder HISTORIC HIGHWAY	M1-X5jj White on Brown	Don Rickers MEMORIAL HIGHWAY
M1-X5f White on Brown	Veterans' Evergreen MEMORIAL DRIVE	M1-X5p 24 x 24 White on Blue	Voyageurs Highway	M1-X5y White on Brown	Minnesota Veterans MEMORIAL HIGHWAY	M1-X5kk White on Brown	STATE TROOPER Timothy J. Bowe MEMORIAL HIGHWAY
M1-X5g 24 x 24 White on Green	YELLOWSTONE TRAIL	M1-X5q White on Brown	Olof Hanson DRIVE	M1-X5bb White on Brown	POW/MIA MEMORIAL HIGHWAY	M1-X5ll White on Brown	Otter Tail Veterans MEMORIAL DRIVE
M1-X5h 24 x 24 White on Green	SIOUX TRAIL	M1-X5r White on Brown	American Veterans MEMORIAL HIGHWAY	M1-X5cc White on Brown	Veterans MEMORIAL HIGHWAY	M1-X5mm White on Brown	Richard J Mattiowetz MEMORIAL HIGHWAY

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M Series

No., Size & Color	Drawing	No., Size & Color	Drawing
M1-X5nn White on Brown	C Elmer Anderson MEMORIAL HIGHWAY	**M1-X5tt** White on Brown	Purple Heart MEMORIAL HIGHWAY
M1-X5oo 24 x 24 White, Red & Black on Green	RED BULL HIGHWAY	**M1-X5vv** White on Brown	BIAUSWAH BRIDGE IN HONOR OF NATIVE AMERICAN WAR VETERANS
M1-X5pp White on Brown	Old St. Anne's PASS	**M1-X5xx** 66 x 66 White on Blue	OFFICER Shawn Silvera MEMORIAL HIGHWAY
M1-X5rr 24 x 24 Yellow & Black on White	INTERNATIONAL 75 KING OF TRAILS	**M1-X5yy** 24 x 24 Violet, Red & Green on White	PURPLE HEART TRAIL
M1-X5ss White on Brown	Brad Waage MEMORIAL BRIDGE	**M1-X514** 24 x 36 Black on White and Yellow	Minnesota U.S. HWY 14 BLACK & YELLOW TRAIL

Not Shown:
M1-X5z Betty Adkins Bridge
M1-X5aa Bridge of Hope
M1-X5qq State Trooper Theodore Foss Mem. Hwy.
M1-X5uu Veterans Memorial Bridge
M1-X5ww POW/MIA Memorial Highway
M1-X5zz Dallas Sams Memorial Highway
M1-X51 Walter F. Mondale Drive
M1-X52 Jim Oberstar Causeway
M1-X53 Mayor William "Bill" Sandberg Mem. Br.
M1-X54 Clearwater County Veterans Mem. Hwy.
M1-X55 Speaker Irvin N. Anderson Mem. Hwy.
M1-X56 Norman County Veterans Mem. Hwy.
M1-X57 Corporal Johnathon Benson Mem. Hwy.
M1-X58 Veterans Memorial Highway
M1-X59 Becker County Veterans Mem. Hwy.
M1-X510 Granite City Crossing
M1-X511 Veterans Memorial Highway
M1-X512 Deputy John W. Liebenstein Mem. Hwy.
M1-X513 Arianna Celeste Macnamara Mem. Br.

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G Series

No.	Drawing	Color	Use & Size
G20-1	ROAD WORK NEXT 5 MILES	Black on Orange	CR-SL 60 x 24 CR-ML 84 x 36 E, F 84 x 36
G20-2a	END ROAD WORK	Black on Orange	48 x 24
G20-4	PILOT CAR FOLLOW ME	Black on Orange	36 x 18
G20-X1 Closure Notice	CROSSING BRIDGE RAMP ROAD CLOSED BEGINNING JUNE 24 DETOURED	Black on Orange	M 36 x 30 CR-SL 54 x 48 CR-ML, E 72 x 60 F 90 x 78
G20-X2 Work Zone Advance Notice	CLOSED BRIDGE ROUTE MARKER ROAD WORK Location TO Location BEGINS JUNE 24 ENDS	Black on Orange	M 66 x 60 CR-SL 96 x 84 CR-ML, E 132 x 108 F 168 x 132
G20-X3 Mount under G20-1	WORK ENDS JUNE 24	Black on Orange	60 x 24
G20-X4 Construction Zone Business Signing	SHEA HARDWARE JOHNSON CAR SALES PAUL AND SONS PLUMBING	Black on Orange	72 x 18
G20-X5 Contractor Identification Signing	CONSTRUCTION BY Contractor CONSTRUCTION BY Contractor Name CONSTRUCTION BY Contractor and MnDOT	Black on Orange	60 x 24 60 x 30

No.	Drawing	Color	Use & Size
G20-X6 (R or L) Business Access Signing	BUSINESS ACCESS	Black on Orange	CR-SL 36 x 24 CR-ML, E 48 x 36 O 66 x 48
G20-X7	EXIT Variable arrow angle	Black on Orange	E, F 48 x 48
G20-X8	NEWTOWN CITY GROCERY LODGING MIDDLEVIEW GROCERY LODGING ANY TOWN FOOD LODGING GAS CAMPING SKYLINE TRAIL GROCERY RETAIL CAMPING LODGING HARRINGTOWN GROCERY LODGING CAMPING	Black on Orange	42 x Var. 60 x Var. 72 x Var. 84 x Var. 96 x Var.
G20-X9	TURN LANE Variable arrow angle	Black on Orange	30 x 36
G20-X10	USE BOTH LANES DURING BACKUPS	Black on Orange	48 x 60
G20-X11	TAKE TURNS AT MERGE	Black on Orange	48 x 24 78 x 30
G20-X12	TAKE TURNS To be used over W21-X4A	Black on Orange	60 x 18 84 x 24
G20-X13	BEGIN MERGE	Black on Orange	42 x 24
G20-X14	STOPPED TRAFFIC WHEN FLASHING	Black on Orange	96 x 48
G20-X15 Ramp Closure Advance Notice	RAMP CLOSED FRI 10pm THRU MON 5am	Black on Orange	48 x 54

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S Series

No.	Drawing	Color	Use & Size
S1-1		Black on Fluorescent Yellow-Green	M 30 Pent CR-SL 36 Pent CR-ML 36 Pent O 48 Pent
S3-1		Black and Red on Fluorescent Yellow-Green	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 O 48 x 48
S3-2a	SCHOOL BUS TURN AROUND	Black on Fluorescent Yellow-Green	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 O 48 x 48
S3-X1	SCHOOL BUS LOADING AREA	Black on White	CR-SL 24 x 30 CR-ML 24 x 30
S4-1P	7:30-8:30 AM 2:30-3:30 PM	Black on White	CR-SL 24 x 10 CR-ML 24 x 10 O 36 x 18
S4-2P	WHEN CHILDREN ARE PRESENT	Black on White	CR-SL 24 x 10 CR-ML 24 x 10 O 36 x 18
S4-3P	SCHOOL	Black on Fluorescent Yellow-Green	CR-SL 24 x 8 CR-ML 24 x 8 O 36 x 12
S4-4P	WHEN FLASHING	Black on White	CR-SL 24 x 10 CR-ML 24 x 10 O 36 x 18
S4-5	SCHOOL SPEED LIMIT 20	Black and White on Fluorescent Yellow-Green	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 O 48 x 48
S4-6P	MON-FRI	Black on White	CR-SL 24 x 10 CR-ML 24 x 10 O 36 x 18
S4-7P	ALL YEAR	Black on Fluorescent Yellow-Green	CR-SL 24 x 12 CR-ML 24 x 12 O 30 x 18
S5-1	SCHOOL SPEED LIMIT 20 WHEN FLASHING	Black on Fluorescent Yellow-Green and White	CR-SL 24 x 48 CR-ML 24 x 48 O 36 x 72
S5-2	END SCHOOL ZONE	Black on White	CR-SL 24 x 30 CR-ML 24 x 30 O 36 x 48

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D Series

No.	Drawing	Color	Use & Size
D1-1 (R or L)	Darwin	White on Green	CR-SL Var. x 24 CR-ML Var. x 24 E Var. x 30
Left is shown			
D1-1a (R or L)	Albany 15	White on Green	CR-SL Var. x 24 CR-ML Var. x 24 E Var. x 30
Left is shown			
D1-2	St Paul Forest Lake	White on Green	CR-SL Var. x 42 CR-ML Var. x 42 E Var. x 54
D1-2a	Foreston 7 Gilman 3	White on Green	CR-SL Var. x 42 CR-ML Var. x 42 E Var. x 54
D1-2d	Amity Twin Falls	White on Green	CR-SL Var. x 42 CR-ML Var. x 42
D1-3	Marshall Balaton Tracy	White on Green	CR-SL Var. x 60 CR-ML Var. x 60 E Var. x 72
D1-3a	Barrett 5 Herman 13 Hoffman 4	White on Green	CR-SL Var. x 60 CR-ML Var. x 60 E Var. x 72
D1-3d	Redmond Bend Burns	White on Green	CR-SL Var. x 60 CR-ML Var. x 60
D1-X1 (R or L)	BUSINESS DISTRICT	White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 54 x 48
Right is shown			
D1-X1a (R, L or T)	DOWNTOWN	White on Green	M 30 x 18 CR-SL 54 x 24 CR-ML 54 x 24 E 66 x 36
Right is shown			
D1-X2 (R, L or DH)	FRONTAGE ROAD	White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 66 x 48
Right is shown			
D1-X3 (R or L)	SANITARY LANDFILL	White on Green	M 36 x 24 CR-SL 54 x 36 CR-ML 54 x 36 E 66 x 48
Right is shown			
D1-X4 (R or L)	AIRPORT	White on Green	CR-SL 48 x 12 CR-ML 48 x 12 E 60 x 18
Right is shown			
D1-X5 (R or L)	SOLID WASTE TRANSFER STATION	White on Green	M 48 x 24 CR-SL 72 x 36 CR-ML 72 x 36 E 96 x 48
Right is shown			
D1-X6 (R or L)	RECYCLING CENTER	White on Green	M 54 x 24 CR-SL 78 x 36 CR-ML 78 x 36 E 108 x 48
Right is shown			
D1-X7 (R, L or T)	HRA CENTER	White on Green	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48 O 60 x 60
Right is shown			
D1-X8 (R, L or T)	DEMOLITION LANDFILL	White on Green	M 36 x 24 CR-SL 54 x 36 CR-ML 54 x 36 E 72 x 48 O 90 x 60
Right is shown			
D1-X9 (R or L)	TOWN HALL	White on Green	CR-SL 30 x 36 CR-ML 30 x 36 E 42 x 48
Right is shown			
D2-1	Stillwater 10	White on Green	CR-SL Var. x 18 CR-ML Var. x 18 E Var. x 24
D2-2	Askov 8 Duluth 65	White on Green	CR-SL Var. x 30 CR-ML Var. x 30 E Var. x 36
D2-3	Hastings 13 Red Wing 42 Winona 104	White on Green	CR-SL Var. x 42 CR-ML Var. x 42 E Var. x 48
D3-X1	E Main St	White on Green	Var. x 18 * Var. x 24 **

* Use where speed limits are ≤ 40 mph
** Use where speed limits are ≥ 45 mph

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D Series

No.	Drawing	Color	Use & Size
D4-1	P ARKING	Green on White	30 x 24
D4-2 (R or L)	PARK - RIDE	White on Green	CR-SL 30 x 36 CR-ML 30 x 36 E 36 x 48 O 54 x 72
Right is shown Transit logo to be specified			
D4-2a	PARK - RIDE	White on Green	36 x 42
For on site use			
D5-1	REST AREA 1 MILE	White on Blue	CR-SL 78 x 36 CR-ML 78 x 36 E 114 x 48 F 132 x 60
D5-1a	REST AREA NEXT RIGHT	White on Blue	CR-SL 78 x 36 CR-ML 78 x 36 E 114 x 48 F 132 x 60
D5-1c	REST AREA 1 MILE NEXT REST AREA 25 MILES	White on Blue	F 138 x 114
D5-2a	REST AREA	White on Blue	CR-SL 42 x 48 CR-ML 42 x 48 E 66 x 72 F 78 x 78
D5-6	NEXT REST AREA 24 MILES	White on Blue	CR-SL 78 x 54 CR-ML 78 x 54 E 108 x 66 F 132 x 78
D5-X1 (R or L)	WAYSIDE REST ½ MILE ON RIGHT ON LEFT	White on Blue	36 x 36

No.	Drawing	Color	Use & Size
D5-X1a	FIREPLACES TOILETS WATER TELEPHONE TOURIST INFO	White on Blue	36 x 12
For use with D5-X1			
D5-X1b	HISTORICAL MARKER	White on Brown	36 x 18
D5-X1c	GEOLOGICAL MARKER	White on Brown	36 x 18
D5-X2 (R or L)	WAYSIDE REST	White on Blue	36 x 30
Right is shown			
D6-2a (R or L)	SCENIC OVERLOOK ½ MILE ON RIGHT ON LEFT	White on Blue	36 x 36
D6-3a (R or L)	SCENIC OVERLOOK	White on Blue	36 x 30
Right is shown			
D7-X1 (R or L)	GEOLOGICAL MARKER ½ MILE ON RIGHT ON LEFT	White on Brown	36 x 36
D7-X2 (R or L)	GEOLOGICAL MARKER	White on Brown	36 x 30
Right is shown			
D7-X5 (R or L)	HISTORICAL MARKER ½ MILE ON RIGHT ON LEFT	White on Brown	36 x 36

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D Series

No.	Drawing	Color	Use & Size
D7-X5a (R or L)	HISTORIC SITE ½ MILE ON RIGHT ON LEFT	White on Brown	36 x 36
D7-X6 (R or L)	HISTORICAL MARKER	White on Brown	36 x 30
Right is shown			
D7-X7 (R or L)	Lobster Lake 5	White on Brown	Var. x 30
Public Boat Launch Right is shown			
D7-X7a (R or L)	Lobster Lake 5	White on Brown	Var. x 30
Public Canoe Access Right is shown			
D7-X8		White on Brown	24 x 24
Public Boat Launch Trailblazer			
D7-X8a		White on Brown	24 x 24
Public Canoe Access Trailblazer			
D7-X9 (R, L or T)	STATE PARK	White on Brown	M 18 x 24 CR-SL 30 x 36 CR-ML 30 x 36 E 42 x 48
Right is shown			
D7-X10 (R, L or T)	CITY PARK	White on Brown	M 18 x 24 CR-SL 30 x 36 CR-ML 30 x 36 E 42 x 48
Right is shown			
D7-X11 (R, L or T)	HISTORIC SITE	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 60 x 48
Right is shown			

No.	Drawing	Color	Use & Size
D7-X11a (R, L or T)	HISTORIC DISTRICT	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 54 x 48
Right is shown			
D7-X12 (R, L or T)	COUNTY MUSEUM	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 54 x 48
Right is shown			
D7-X13		White on Brown	24 x 24
D7-X14		White on Brown	24 x 24
D7-X15 (R, L or T)	COUNTY PARK	White on Brown	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48
Right is shown			
D7-X15a (R or L)	COUNTY PARK 10 MI	White on Brown	CR-SL 48 x 36 CR-ML 48 x 36 E 66 x 48
Right is shown			
D7-X16 (R, L or T)	COUNTY FAIRGROUND	White on Green	M 36 x 24 CR-SL 54 x 36 CR-ML 54 x 36 E 66 x 48
Right is shown			
D7-X17 (R, L or T)	INDUSTRIAL PARK	White on Green	M 36 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 66 x 48
Right is shown			
D7-X18 (R, L or T)	WORKFORCE CENTER	White on Green	M 36 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 66 x 48
Right is shown			
D7-X19 (R, L or T)	HIGH SCHOOL	White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 54 x 48
Right is shown			

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D Series

No.	Drawing	Color	Use & Size
D7-X20 (R, L or T) Right is shown	PICNIC GROUNDS	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36
D7-X21 (R, L or T) Right is shown	GOLF COURSE	White on Brown	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36
D7-X22 (R, L or T) Right is shown	DISC GOLF COURSE	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 48 x 36
D7-Xp Approved Recreational & Cultural Interest Symbol Signs	BICYCLE RS-X01, BOAT LAUNCH RS-054, CAMPGROUND RS-X02, CANOE ACCESS RS-X03, CANOEING RS-079, CROSS COUNTRY SKIING RS-046, HIKING TRAIL RS-068, HORSE TRAIL RS-064, INFO, INFORMATION RS-X04, PICNIC SITE RS-044, ROCK CLIMBING RS-081, SANITARY STATION RS-041, SNOWSHOEING RS-078, SNOWMOBILE RS-052, SWIMMING RS-061, WILDLIFE VIEWING RS-076	White on Brown	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
D9-1		White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30

No.	Drawing	Color	Use & Size
D9-1P TTY Symbol		White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
D9-2	H	White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
D9-2a (R, L, T, or ALT) Hospital Trailblazer Right is shown	H, 4 BLKS	White on Blue	24 x 48
D9-2b (R or L) For non-freeway use Right is shown	H	White on Blue	CR-SL 48 x 24 CR-ML 48 x 24 E 60 x 30
D9-6		White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
D9-10a (R or L) Right is shown	TOURIST INFO	White on Blue	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 60 x 48
D9-X1 (R or L) Use with freeway services Right is shown		White on Blue	48 x 24
D9-X3 (R &/or L)	RESORTS	White on Blue	66 x 12
D9-X4 (R &/or L)	CAMPING	White on Blue	66 x 12

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D Series

No.	Drawing	Color	Use & Size
D9-X6 (R or L) Specific Service	ISLAND RESORT; ROUND LAKE CAMPGROUND; FREDDIE'S FEEDS; NEXT RIGHT; CLOSED	White on Blue	72 x 18 15 x 10 plate 18 x 12 logo 48 x 12 logo 72 x 12 for mainlines at interchanges
D10-1 Reference Location For one digit use	MILE 2	White on Green	CR-SL 10 x 18 CR-ML 10 x 18 E, F 12 x 24
D10-2 Reference Location For two digit use	MILE 25	White on Green	CR-SL 10 x 27 CR-ML 10 x 27 E, F 12 x 36
D10-3 Reference Location For three digit use	MILE 258	White on Green	CR-SL 10 x 36 CR-ML 10 x 36 E, F 12 x 48
D10-5a Enhanced Reference Location Route marker colors shall be as shown in the M Series	WEST, INTERSTATE 94, 16, .2	White on Green	18 x 48

No.	Drawing	Color	Use & Size
D10-X2 Highway Number Plate Use with Reference Location	HWY 280	White on Green	10 x 10
D11-1	BIKE ROUTE	White on Green	24 x 18
D12-2a	GOING TO WORK? TRY RIDESHARE! 651-602-1602	White on Blue	CR-SL 60 x 30 CR-ML 60 x 30 E, F 114 x 48
D12-2b	SHARE THE RIDE 251-RIDE	White on Blue	102 x 36
D12-4m	EMERGENCY DIAL 911	White on Blue	CR-SL 66 x 24 CR-ML 66 x 24 E 90 x 36 F 114 x 48
D12-X5	ROAD-WEATHER INFORMATION 511	White on Blue	CR-SL 90 x 36 CR-ML 90 x 36 E, F 114 x 48

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I Series

No.	Drawing	Color	Use & Size
I1-1	SIGNALS SET FOR 25 M.P.H.	White on Green	CR-SL 24 x 36 CR-ML 24 x 36
I2-3	Chaska POP. 27,227 * For use with two line names	White on Green	CR-SL Var. x 24 CR-ML Var. x 24 CR-SL Var. x 36* CR-ML Var. x 36* E, F Var. x 36 E, F Var. x 48*
I2-5	Hennepin County	White on Green	CR-SL Var. x 24 CR-ML Var. x 24 E, F Var. x 36
I2-10	WELCOME TO Minnesota	Various	66 x 42
I2-12	VISIT AGAIN	Various	66 x 42
I3-1	Red Lake River * For use with two line names	White on Green	CR-SL Var. x 18 CR-ML Var. x 18 CR-SL Var. x 24* CR-ML Var. x 24* E, F Var. x 24 E, F Var. x 36*
I-5		White on Green	CR-SL 24 x 24 CR-ML 24 x 24 O 30 x 30
I-6		White on Green	CR-SL 24 x 24 CR-ML 24 x 24 O 30 x 30
I-7		White on Green	CR-SL 24 x 24 CR-ML 24 x 24 O 30 x 30
I-8		White on Green	CR-SL 24 x 24 CR-ML 24 x 24 O 30 x 30

No.	Drawing	Color	Use & Size
I-11m		White on Green	CR-SL 24 x 24 CR-ML 24 x 24
I-12		White on Green	CR-SL 24 x 24 CR-ML 24 x 24 O 30 x 30
I-X1	ADOPT A REST AREA ADOPT A HIGHWAY THIS SECTION AVAILABLE MILOS STATION AND STORE SINCE 1998	White on Blue	42 x 24 CR-SL 60 x 36 CR-ML 60 x 36 E, F 60 x 36
	Rest Area and Ramp signs to be made in 42 x 24 size only		
I-X1P	DISPOSAL BY TRASH R US	White on Blue	24 x 24

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E Series

No.	Drawing	Color	Use & Size
E1-5aP	LEFT	Black on Yellow	E, F 72 x 30
E1-5bP	LEFT EXIT 52 A	Black on Yellow and White on Green	E, F Var. x 54
E1-5P	EXITS 33 A-B	White on Green	E, F Var. x 30
E1-6	FREEWAY ENTRANCE	White on Green	RA 36 x 18
E3-X1	HOSPITAL	White on Blue	E, F 90 x 16
E5-1	EXIT	White on Green	E 72 x 60
E5-1a	EXIT 4	White on Green	E, F 72 x 60
	For one digit only		
E5-1b	EXIT 247	White on Green	E, F Var. x 84
	For two or more digits		
E5-1bP	44	White on Green	E, F 42 x 30
	24 A		E, F 72 x 30
	245 A-B		E, F 120 x 30

No.	Drawing	Color	Use & Size
E10-1 Motorist Services	GAS DIESEL E85 LP-GAS FOOD LODGING CAMPING EXIT 234A NEXT RIGHT SECOND RIGHT Variable legends. Overlays may be used.	White on Blue	E, F 144 x 84
E10-1 Supplement	DIESEL GAS FOOD LODGING LP-GAS CAMPING HOSPITAL E85 Overlays for use on E10-1	White on Blue	Var. x 12
E10-3	HOSPITAL EXIT1 34A NEXT RIGHT SECOND RIGHT	White on Blue	E, F 120 x 48 E, F 132 x 48
E10-4 (R or L)	HOSPITAL 4 MILES	White on Blue	78 x 36
E10-5 (R &/or L)	GAS	White on Blue	RA 48 x 12
E10-6 (R &/or L)	FOOD	White on Blue	RA 48 x 12
E10-7 (R &/or L)	LODGING	White on Blue	RA 48 x 12
E10-8 (R &/or L)	HOSPITAL	White on Blue	RA 48 x 12
E10-9 (R &/or L)	CAMPING	White on Blue	RA 48 x 12
E10-10 (R &/or L)	DIESEL	White on Blue	RA 48 x 12
E10-11 (R &/or L)	LP-GAS	White on Blue	RA 48 x 12

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E Series

No.	Drawing	Color	Use & Size
E10-12 (R &/or L)	E85	White on Blue	RA 48 x 12
E11-1b Overlay	ONLY	Black on Yellow	CR-ML 42 x 14 E, F 52 x 16
E11-2 Overlay	LEFT	Black on Yellow	CR-ML 44 x 16 E, F 54 x 18
E11-X2 Overlay	PROHIBITED VEHICLES	White on Red	M 114 x 10 CR-SL 150 x 14 CR-ML 150 x 14 E, F 186 x 16
E13-1P	35 MPH	Black on Yellow	E, F 72 x 24

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X Series

No.	Drawing	Color	Use & Size
X1-1	BEGIN 10 MILE ODOMETER CHECK 1500 FEET AHEAD	Black on White	60 x 36
X1-2	END BEGIN ODOMETER CHECK HERE	Black on White	60 x 36
X1-3	MILE 1	Black on White	24 x 18
X1-5	AIRCRAFT APPROACH AREA	Black on White	CR-SL 42 x 30 CR-ML 42 x 30 E, F 72 x 48
X3-1 Right of Way Boundary Marker	RW B	Green on White	9.5 x 12.75
X3-2	CONTROLLED ACCESS	Black on White	12 x 8
X3-3 Scenic Easement Marker	SC E	Green on White	9.5 x 12.75
X3-4 Used for scenic easement	500 FEET	Black on White	12 x 8
X3-6a	KEEP OFF INFILTRATION AREA	Black on Yellow	18 x 12
X4-2 Type 1 Object Marker		Yellow on Black or Yellow Yellow w/o Buttons	18 x 18
X4-3 Culvert Delineator		Yellow	6 x 12
X4-4 Type 3 Object Marker	Left Center Right	Black on Yellow	CR-SL 12 x 36 CR-ML 12 x 36 E, F 18 x 36
X4-5 Snowplow Marker Raise Blade shown		Black on Yellow	6 x 12
X4-6 Guide Delineator		Black on White or Yellow	8 x 24
X4-8 One-Tenth Mile Delineator		White	4 x 4
X4-11 Type 4 Object Marker Used for end of roadway		Red on Black or Red Red w/o Buttons	18 x 18
X4-12a Bridge Number	1234 12345	Black on White	6 x 15 * 6 x 18 **
X4-13 Cylinder Style Delineator		White or Yellow on Black	9 - 12 high 6 - 8 wide
X4-24 Fire Hydrant Marker	48 A 48	Red on White	CR-SL 8 x 12 CR-ML 8 x 12 E, F 12 x 18

* 4-digit
** 5-digit

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5. SUPPLEMENTAL GUIDE SIGNS

In general, signs that require agreements would be supplemental guide sign programs.

5.1 Supplemental Signs and Costs

In order for a facility to receive supplemental guide signing, the sign location must meet engineering standards and the facility must meet MnDOT policy.

5.1.1 Supplemental Guide Signing

Supplemental Guide Signs - Guide signs which further orient the driver to geographical identification and secondary destinations. Destinations include cities, motorist services, and state parks. Exit numbers are included on interstate freeway signs. See Exhibit 5-1 for some examples.

Exhibit 5-1 Sample Supplemental Guide Signs

The installation of supplemental guide signing should be strictly controlled in areas with closely spaced interchanges due to the many demands on the motorist to make major decisions and the large number of requests from generators of high traffic volumes. Supplemental guide signs shall not interfere with primary guide signing and sign spacing criteria shall be met. In no case shall signs directing motorists to secondary or supplemental destinations be installed at interchanges of two or more freeways.

If qualified, supplemental guide signs may be provided for the following:

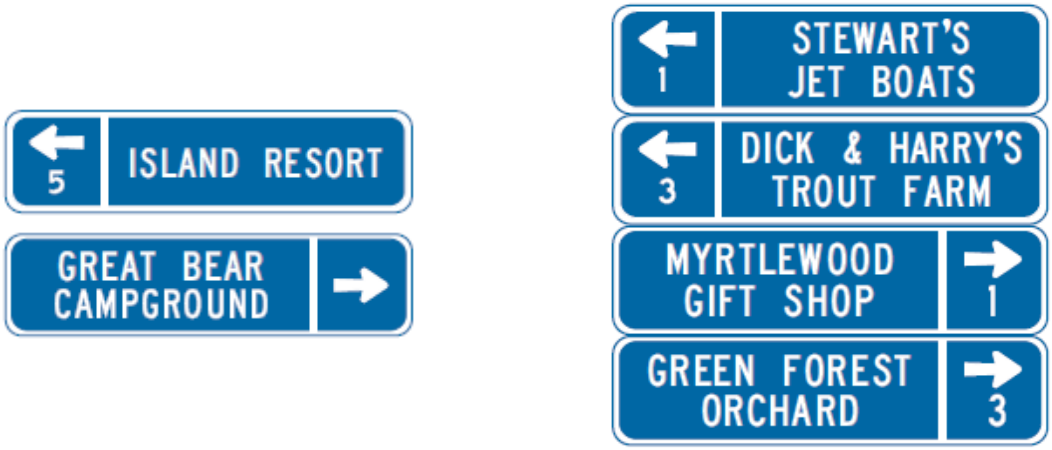
1. Geographical features, such as county lines, incorporated city limits, major river and stream crossings, highways and streets crossed by the freeway, and similar features which provide orientation for the driver.
2. A city in each direction along the intersected route.
3. National parks.
4. National monuments.

5. Major state parks which are a no more than distance of 15 miles from the freeway and have water, toilets, campsites, picnic areas, and accommodations for 35 overnight camp sites.
6. Airports.
7. Educational Institutions.
8. Major traffic generators.
9. General motorist services.
10. LOGO sign franchise program.

5.1.2 Tourist-Oriented Directional Signs

Tourist-oriented directional signs and Specific Service signs are not considered advertising; rather they are classified as motorist service signs. The policy for Specific Service Signing on state highways as established in State Statutes 160.292 through 160.296 is contained in the TEM Chapter 6. In addition, they are included in Chapter 2K of the MN MUTCD.

Exhibit 5-2 Sample Tourist-Oriented Directional Signs



5.1.3 General Motorist Service

General Motorist Service Signs are those that lead to the following locations (as long as they met the requirements of Appendix A in the TEM):

- ✓ Gas, Diesel, and/or alternative fuels (LP Gas, E85)
- ✓ Food
- ✓ Lodging
- ✓ Camping
- ✓ Hospitals

Generally, these signs are provided at no cost.

Exhibit 5-3 Sample General Motorist Service Sign

5.1.4 LOGO (Specific Service)

Logo signs shall be defined as guide signs that provide road users with business identification and directional information for services and for eligible attractions. Eligible service categories shall be limited to gas, food, lodging, camping, attractions, and 24-hour pharmacies.

The Minnesota Sign Franchise Program, which allows for the installation and maintenance of Logo Signs was established by Minnesota Statute 160.80 in 1984. This sign franchise program is in general conformance with the Specific Service Signing guidelines in the Federal MUTCD. Eligibility criteria for gas, food, camping and lodging businesses, and 24-hour pharmacies are contained in Minnesota Statute 160.80.

Qualified requester shall pay for these types of signs.

Exhibit 5-4 Sample Logo (Specific Service) Sign

5.1.5 Major Traffic Generator

Supplemental guide signs may be provided to direct motorists to major traffic generators. These traffic generators are major regional attractions, events, or facilities which attract persons or groups from beyond a local community, city, or metropolitan area. They are significant because of their unique educational, cultural, historical, or recreational experience and public appeal. Predominantly retail, business, or manufacturing centers are not normally eligible for guide signing.

Major Traffic Generator signs may be installed on all trunk highways. In order to be considered for signing, all of the following criteria shall be met by the major traffic generator requesting signing:

- ✓ Parking for at least 1,000 vehicles.
- ✓ A minimum of ten events per year.
- ✓ Average event attendance of at least 5,000 persons.
- ✓ Located within ten miles of the trunk highway interchange/intersection where signs are requested.

Qualified requester shall pay for these types of signs.

Exhibit 5-5 Sample Major Traffic Generator Sign

Other major generators may include the following:

- ✓ Airports
- ✓ Universities
- ✓ National Parks, National Monuments
- ✓ State Parks
- ✓ Regional Shopping Centers
- ✓ Casinos

5.1.6 Minor Traffic Generators

Minor traffic generators are facilities which generally attract non-local persons or groups unfamiliar with the location of the generator but which do not qualify as major traffic generators. The use and installation of highway signing shall be limited to only those generators which have broad motorist appeal, serve non-familiar motorists, or are the kind of facility for which a motorist normally expects highway signing.

Refer to the TEM Section 6, Appendix A for additional details.

Exhibit 5-6 Sample Minor Traffic Generator Sign

5.2 Supplemental Sign Handouts

The following is a handout from Appendix A of the TEM Chapter 6. The latest version can be downloaded from, www.dot.state.mn.us/trafficeng/publ/index.html.

Supplemental Guide Signing Programs

In order for a facility to receive supplemental guide signing, the sign location must meet engineering standards and the facility must meet MnDOT policy.

Engineering Standards

Engineering standards involve the design and placement of signs. The main purpose of signing is to inform motorists of regulations such as speed limits and stops, warn them of any impending dangers such as sharp curves and steep grades, and help them find their destination by clearly marking routes and cross streets. Signs must be properly spaced so that motorists have time to perceive the information on signs and make the appropriate driving maneuver. For example, on a freeway, guide signs should be spaced approximately 800 feet apart.

Furthermore, different types of signs (regulatory, warning, and guide) can not be combined. For example, mixing a golf course sign with a speed limit sign is not allowed. This leaves limited space for supplemental guide signs.

MnDOT Policy

There is tremendous demand for signing along our highway system; many businesses, organizations and agencies feel that they need and deserve signing to advertise, inform and/or aid the motorist in locating their establishment. As discussed under engineering standards, it is necessary to limit all signing to only that which is sufficient to aid drivers in safely arriving at their destination. As such, MnDOT policy and state law set out criteria that a facility must meet in order to be eligible for signing.

Produced by MnDOT Office of Traffic, Safety and Technology
November 2013

LOGO

- Gas, food, lodging, camping, 24-hour pharmacies and attractions.
- Signs may be installed on interstates and certain other controlled-access (freeway) highways.
- Each facility must meet certain criteria related to hours of operation, licensing, distance from interchange, etc.
- The cost of fabrication, installation, and maintenance are paid by the business.
- This program is managed by Minnesota Logos, Inc. under an agreement with MnDOT.

General Motorists Services

- Gas, food, lodging, camping and hospitals.
- Signs may be installed at rural freeway and expressway interchanges.
- Each facility must meet certain criteria related to hours of operation, licensing, distance from interchange, etc.
- The cost of fabrication, installation, and maintenance are paid by MnDOT. MnDOT provides trailblazing signs.

Major Traffic Generators

- Major regional attractions that attract persons or groups beyond the local area.
- Facilities must have parking for at least 1,000 vehicles, a minimum of 10 events per year, and average event attendance of at least 5,000 persons.
- Signs may be installed on any trunk highway.
- The cost of fabrication, installation, and maintenance of these signs are paid by the traffic generator. Trailblazing must be provided by the facility or local road authority.

Other Traffic Generators

- Include Airports, Casinos, Educational Institutions, National Parks, Regional Shopping Centers, and State Parks. Criteria vary.
- Signs may be installed on any trunk highway.
- The cost of fabrication, installation, and maintenance of these signs are paid by the traffic generator. Trailblazing must be provided by the facility or local road authority.

Minor Traffic Generators

- Facilities that generally attract non-local persons or groups, but do not qualify as major generators. These facilities should have broad motorist appeal, serve non-familiar motorists, and are the type of facility for which a motorist normally expects highway signing.
- Facilities are typically cultural, recreational, or historic attractions.
- Facilities must meet certain criteria related to hours of operation, etc.
- These signs may be installed at at-grade intersections and some expressway interchanges.
- The cost of fabrication, installation, and maintenance of these signs are paid by the traffic generator. Trailblazing must be provided by the facility or local road authority.

Specific Services

- Gas, food, lodging, places of worship, rural agricultural businesses and tourist-oriented businesses.
- The criteria for installation of these signs (hours, types of businesses, etc.) are primarily defined in Minnesota Statutes 160.292 – 160.297.
- These signs can only be installed in rural areas at at-grade intersections or at rural bypasses that have interchanges on expressways.
- The cost of fabrication, installation, and maintenance of these signs are paid by the facility. Trailblazing must be provided by the facility or local road authority.

HANDOUT

MnDOT Supplemental Guide Signs
Appendix A

www.dot.state.mn.us/trafficeng/signing/publications.html

May 2015

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APPENDIX A SUPPLEMENTAL GUIDE SIGNS

In order for a facility to receive supplemental guide signing, the sign location must meet engineering standards and the facility or business must meet the criteria set forth in this appendix.

Engineering standards involve the design and placement of signs. The main purpose of signing is to inform motorists of regulations such as speed limits and stops, warn them of any impending dangers such as sharp curves and steep grades, and help them find their destination by clearly marking routes and cross streets. Signs must be properly spaced so that motorists have time to perceive the information on signs and make the appropriate driving maneuver. For example, on a freeway, guide signs should be spaced approximately 800 feet apart. Furthermore, different types of signs (regulatory, warning, and guide) cannot be combined. For example, mixing a golf course sign with a speed limit sign is not allowed. This leaves limited space for supplemental guide signs.

There is tremendous demand for signing along our highway system. Many businesses, organizations, and agencies feel that they need and deserve signing to advertise, inform and/or aid the motorist in locating their establishment. As discussed under engineering standards, it is necessary to limit all signing to only that which is sufficient to aid drivers in safely arriving at their destination. As such, MnDOT policy and state law set out criteria that a facility must meet in order to be eligible for signing.

This appendix is an alphabetized list of various facility types falling into several different signing programs available for signing on MnDOT trunk highways if engineering standards can be met. Unless otherwise indicated, the General Criteria listed below apply to all facilities. In addition to the General Criteria, each facility type is listed with additional details regarding sign design, location from the intersection/interchange, roadway type allowed, and facility specific criteria.

A list of ineligible facilities is at the end of this appendix.

Contents

General Criteria A-1
Facility Type, Sign Design, Sign Program and Specific Criteria A-4
Logo Signs A-33
Specific Services Signing Program A-34
Ineligible Facilities A-37

GENERAL CRITERIA

Unless specifically noted under a particular signing program, the following general criteria apply to all of MnDOT's signing programs.

1. MnDOT shall fabricate, install, and maintain signs on trunk highways unless otherwise specified by the District Traffic Engineer.
2. The cost of fabrication, installation, and maintenance shall be paid by the requester.
3. Appropriate trailblazing signs shall be the responsibility of the facility and approved by the road authority. If appropriate trailblazing cannot be installed, signing on trunk highways shall not be installed. The color and design of trailblazing signs should match that of the signing installed on the trunk highway.
4. Signs shall not be allowed from intersections or interchanges that do not provide the closest or most direct route from a trunk highway to a facility.
5. MnDOT retains the authority to specify message content (including abbreviations), size of sign, sign location, and combination of messages, in accordance with standards for acceptable signing practice. The sign design, including message and logos if applicable, shall be identical on ramp and mainline signs at an interchange.
6. Location and placement of signs is dependent upon space availability as determined by the District Traffic Engineer. Sign installations shall meet sign spacing guidelines for the type of roadway on which they are allowed. No sign installations shall be placed at a location that will interfere with other necessary signing as determined by the District Traffic Engineer. If space is unavailable, requests shall be denied.
7. Mainline signs shall not be installed for a facility if there is no space available to install signs on the ramp and vice versa.
8. All sign installations on trunk highways shall conform to MnDOT's current sign design and sign sheeting standards.
9. Signs not meeting MnDOT's current criteria shall be removed through attrition. If mainline signing is removed, ramp signing and any trailblazing on trunk highways shall also be removed.
10. Only one sign per facility may be installed in each direction along a trunk highway.
11. The criteria for installing logos (business panels) on Specific Service and LOGO signs are specified in Section 6-7.09.01 and 6-7.09.02, respectively.

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General Criteria, continued.

12. Pictographs are defined as a pictorial representation used to identify a governmental jurisdiction, an area of jurisdiction, a governmental agency, a military base or branch of service, a governmental approved university or college, a toll payment system, or a government approved institution. They are allowed on certain signs as specifically designated in the MN MUTCD. The following are examples of such facilities allowed:
    - Casinos
    - Educational Institutions (post-secondary)
    - National Parks, National Monuments
    - State Parks
    - Trail Access

    If used, pictographs shall meet the following guidelines:
    a. Pictographs shall not resemble a traffic control device.
    b. Inappropriate pictographs shall not be permitted.
    c. There shall be only one pictograph per sign.
    d. The pictograph shall supplement the text message.
    e. The pictograph shall not exceed 33 percent of the size of the sign panel.
    f. The pictograph shall fit within the border of the sign panel. Pictographs shall not be a separate attachment outside the limits of the sign panel.
    g. The pictograph designs shall be reviewed and approved by the District Traffic Office prior to fabrication.
    h. The pictograph shall be fabricated on sheet aluminum conforming to MnDOT specification 3352 and installed as an overlay.
13. Signs may be considered on trunk highways that intersect with local roads which serve as logical, primary routes for motorists approaching from other directions.
14. Signs shall not be provided if the facility is readily visible or if effective off right-of-way directional signing is present or can be provided.
15. MnDOT retains the authority to deny requests for signing where acceptable standards cannot be met, including locations where other supplemental guide signs are already in place. At the discretion of

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General Criteria, continued.

the District Traffic Engineer, signing requests denied based on MnDOT policy may be appealed to the External Sign Variance Committee. Requests denied based on Minnesota statutes or engineering standards (i.e. insufficient space and design standards found in the MN MUTCD) may not be appealed.

16. If a district traffic office decides that a contract for signing a minor traffic generator is required, the following process shall be used:
    a. The requester should obtain proposals from at least three consulting engineering firms to prepare the signing contract.
    b. The requester evaluates the proposals and enters into a contract with one of the consulting engineering firms to provide all of the following:
        - A complete design of a signing plan (including field cross sections if necessary), assembly of special provisions, and proposal. Technical assistance is available from the State Signing Engineer, Office of Traffic, Safety, and Technology (OTST).
        - Submit the plan and proposal to the signing contractors. Typically allow 10 days for the contractor to review and submit bids.
        - Review the bids and award the contract to the signing contractor.
        - Inspect the signing contractor's work with technical assistance provided by MnDOT's district staff.

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Agricultural Equipment	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
Airports	▪ D1-X4 ▪ I-5 ▪ E10-3* *Modified according to #3 under installation guidelines.	15	15	▪ Freeway ▪ Expressway ▪ Conventional	In addition to the general criteria for all signing programs, all of the following criteria apply to the Airport Signing Program. In order to be considered for signing, the following criteria shall be met by the requesting facility: 1. Private airports requiring owner's permission to use shall not be eligible for signing. 2. Signing from one trunk highway onto a second trunk highway may be allowed if the airport is located within: 10 miles for an Air Carrier/Commercial Service airport, and 7.5 miles for a General Aviation airport. 3. These guidelines may also be applied to heliports. Signs should be installed in accordance with the following: 1. Individual airport names may be used on signing, as necessary, to ensure adequate identification for motorists. 2. The AIRPORT (D1-X4) sign with arrow will be adequate for most intersections at which airport signing is permitted. 3. At interchanges, a green version of the E10-3 sign design (with the word AIRPORT or proper name replacing the word HOSPITAL) shall be installed on the mainline. The D1-X4 sign, or custom guide sign if proper name is used, shall be installed on ramp(s). The message on the ramp sign shall match the message on the mainline sign. 4. Trailblazing signing on local roads, when needed, shall utilize the Airplane Symbol sign (I-5) with appropriate arrow.
AMTRAK/ Train Stations	▪ I-7 ▪ E10-3* *Modified according to #3 under installation guidelines.	1	1	▪ Freeway ▪ Expressway ▪ Conventional	Signs should be installed in accordance with the following: 1. Signing from one trunk highway may be allowed if the AMTRAK station is located within 10 miles. 2. At interchanges, a green version of the E10-3 sign design (with the word AMTRAK replacing the word HOSPITAL) shall be installed on the mainline. 3. Ramp signing should be done in accordance with the following. a. If a custom guide sign is used, the message on the ramp sign shall match the message on the mainline sign. b. If a Federal passenger station symbol sign panel (I-7) is used, it shall have a plaque including the word AMTRAK mounted below it. 4. Trailblazing signing on local roads, when needed, shall utilize the Federal passenger station symbol (I-7) with a plaque including the word AMTRAK mounted below it.

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Amusement Park	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Tourist Oriented Business**
	▪ Brown Custom Design 	10	10	▪ Freeway ▪ Expressway ▪ Conventional	See **Major Traffic Generator**
Antiques/ Gift Shops	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Tourist Oriented Business**
Arboretum	▪ Brown Custom Design 	3	3	▪ Expressway ▪ Conventional	In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply. The facility should provide: 1. Parking for at least 50 vehicles. 2. Walking or driving trails along with viewing facilities. 3. An interpretive program, and/or audio/visual self-guiding presentations.
Archery Range	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Tourist Oriented Business**
Attractions	▪ Logo Sign 	3	15	▪ Freeway	For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and http://www.dot.state.mn.us/logosigns/ For Eligibility Criteria refer to: http://www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.aspx
Bait and Tackle	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Tourist Oriented Business**
Bed and Breakfasts	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Motel**

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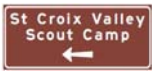
Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Boat Launch	▪ D9-X7 	1	10	▪ Expressway ▪ Conventional	See **Public Access to Lakes/Rivers**
Bookstore	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Tourist Oriented Business**
Bus Station	▪ I-6 	1	1	▪ Expressway ▪ Conventional	See **Minor Traffic Generator** This facility is a bus terminal with staffed ticket counters and public waiting rooms providing inter-city and inter-state motor coach bus services.
Business District	▪ D1-X1 	N/E	3	▪ Expressway ▪ Conventional	See **Downtown**
Camping	▪ Logo Sign 	10	15	▪ Freeway	For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and http://www.dot.state.mn.us/logosigns/ For Eligibility Criteria refer to: http://www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.aspx
	▪ E10-1 	N/E	10	▪ Freeway ▪ Expressway	In addition to the criteria under the **General Motorist Service Signing Program**, the business shall meet the following requirements: 1. Have a State Department of Health license as required by Minnesota Statutes, Chapter 327.15. 2. Provide at least 20 spaces available for camping and parking. 3. Provide modern sanitary facilities (flush, chemical, or incinerator toilets). 4. Provide services 24-hours per day, seven days per week. 5. Be located within ten miles of the interchange via an all-weather road with adequate trailblazing signing provided by the operator to enable the traveler to reach the site.

Camping, cont.	▪ D9-X4 				See **Resorts** for the Resort and Camping Signing Program defined by Minnesota Statute 160.283.
	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Recreational Camping Area** See **Resorts**
Camps, Private	▪ Brown Custom Design  	N/E	10	▪ Expressway ▪ Conventional	This facility is generally a specialized, rural summer camp. It is operated or sponsored by church, fraternal, scouting, or similar organizations and is not open to the general public for overnight camping. The facility generally accommodates prearranged sessions of several days duration and is oriented toward recreation, education, training, or combinations thereof. Visitors are usually not familiar with the camp location. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply. The facility shall: 1. Provide full-time staff on site to accommodate clientele. 2. Be a private operation. 3. Accept prearranged accommodations only. 4. Not allow public, overnight camping. For a seasonal camp, MnDOT may incorporated signing indicated periods of closure where appropriate.
Casinos	▪ Brown Custom Design 	10	10	▪ Freeway ▪ Expressway ▪ Conventional	In order to be considered for signing, the following criteria shall be met by the requesting facility: 1. Events or activities shall be held continuously throughout the year. 2. Events or activities shall be non-local in scope and draw visitors from outside the local area. 3. The facility shall provide adequate on-site parking or parking in the immediate area of the facility. 4. The facility shall provide seating for at least 200 people. The facility should be located within ten miles of the trunk highway intersection or interchange where signs are requested. Casino signs should be installed in accordance with all of the following: 1. Distances to casinos located two miles or more from the trunk highway intersection or interchange shall be shown on the sign. 2. Signs shall only be allowed from the nearest trunk highway and signs shall not be provided if the facility is readily visible or if effective off right-of-way directional signing is present or can be provided. 3. Additional proposed signing locations on other trunk highways are to be processed with MnDOT in accordance with the following procedures (developed and concurred with the Indian Affairs Council in 2003): a. The Tribe assembles the proposed signing package (road system map, locations of proposed signing, and casino business local panel design). continued..

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Casinos, cont.					b. The Tribe assembles the proposed signing package to the MnDOT District Engineer for evaluation (including field review of roadway network and existing signing). This may include coordination with local road authorities (county, city) if any proposed signing is to be installed on local roads. c. In order to assist in the decision making process, the MnDOT district office will contact the State Traffic Engineer and State Signing Engineer to field review the proposed signing locations. d. After completion of the field review and evaluation, MnDOT staff shall assemble a response package (sign panel designs, private sign company contracts, sign fabrication specifications) and meet with the Tribe to present to MnDOT's proposed sign locations. e. Upon concurrence of acceptable sign locations by the Tribe, the Tribe shall submit completed application form(s) and business logo panel design to the District Traffic Engineer for review and approval. f. After approval by MnDOT, the Tribe shall submit sign panel designs, business logo panel design, and fabrication specifications to a private sign company(ies) for bid(s). g. The private sign vendor will invoice the Tribe and fabricate and deliver sign panel(s) to the Tribe. h. The Tribe coordinates with the MnDOT district office to arrange for installation of signs. Sign installation costs are to be paid for by the Tribe. 4. In place casino signs shall be replaced through attrition in accordance with both the general and above criteria. Existing casino signs should remain eligible for signing.
Churches	▪ D9-X6 				See **Places of Worship**
Civic/ Convention Centers	▪ Green Custom Design 	1	1	▪ Expressway ▪ Conventional	This facility accommodates various types of activities and is primarily oriented toward conventions, meetings, expositions, and performances. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply. The facility shall: 1. Hold events or activities that are non-local in scope and draw visitors from outside the local area. 2. Hold events or activities continuously throughout the year on an average of at least once a month (rural environment) and three times a month (urban environment). 3. Provide adequate on-site parking or parking in the immediate area of the facility. 4. Provide seating for at least 1000 people (urban environment).
Colleges					See **Educational Institutions**

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Commodity Storage/ Elevators	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
Community Centers					See **Multi-Purpose Facilities**
Community Wayfinding	▪ Custom Design 			▪ Conventional	Signs shall comply with the Community Wayfinding Signs section of the Minnesota Manual on Uniform Traffic Control (MN MUTCD), Part 2D.50 and the MnDOT policy found in Chapter 6-8.03 of the Traffic Engineering Manual (TEM).
Correctional Institutions	▪ Green Custom Design 	3	3	▪ Expressway ▪ Conventional	This facility may be a state or federal penal institution that generates a significant number of non-local visitors. The general criteria for the **Minor Traffic Generator Signing Program** apply to this type of facility.
County Fairgrounds	▪ D7-X16 ▪ Green Custom Design	1	5	▪ Expressway ▪ Conventional	The general criteria for the **Minor Traffic Generator Signing Program** apply to this type of facility.
Demolition Landfills					See **Sanitary Landfills**
Disc Golf Course	▪ D7-X22 ▪ Brown Custom Design	N/E	10	▪ Expressway ▪ Conventional	In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply. The facility shall: 1. Be its own entity located on its own property (not located on or in another facility that can be signed as a minor traffic generator). 2. Have at least 18 holes. 3. Be a member of the Professional Disc Golf Association (PDGA).

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Downtown	▪ D1-X1 ▪ D1-X1A 	N/E	3	▪ Expressway ▪ Conventional	Signing may be provided to direct motorists to the primary business district of a rural city when a conventional highway does not pass through it. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply. 1. Signing is allowed to designate the primary business center, NOT to designate any other business or shopping area. 2. The signs shall use either the legend "DOWNTOWN" or "BUSINESS DISTRICT", based on the preference of the city administration. See also **Business District**
Drivers License/ Road Test Exam Stations	▪ Green Custom Design 	1	3	▪ Expressway ▪ Conventional	This facility shall be a permanent site. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply. The facility shall: 1. Provide a complete staff, including road testing of drivers. 2. Be an official facility operated or designated by the Minnesota Department of Public Safety.
Educational Institutions (post secondary schools)	▪ Green Custom Design 	5	10	▪ Freeway ▪ Expressway ▪ Conventional	All of the following criteria apply to the Educational Institution Signing Program. 1. The school grants two or four-year degrees and is accredited by the North Central Association of colleges and schools. Examples are the University of Minnesota, state universities, state community colleges, private two and four-year colleges, private professional schools, private vocational schools, and technical colleges. 2. The minimum on-campus average daily student enrollment for credit shall be 400 students except in the Metro District where the minimum enrollment shall be 1500 students. 3. In rural districts, schools which front directly on trunk highways may be allowed signs to assist the motorist in making proper entrance turns. 4. In the Metro District, signs shall only be allowed from the nearest trunk highway intersection. Signs directing motorist from one trunk highway to another trunk highway shall not be allowed. Educational Institution signs should be installed in accordance with the following: 1. Signs on freeways shall have the institution name on the top line and EXIT XXX on the bottom line if the exit is numbered. If the exit is not numbered, the bottom line shall read NEXT (or SECOND) RIGHT. 2. Signs on freeway ramps shall display the institution name and appropriate arrow without extraneous legend. 3. Distances to schools located two miles or more from the trunk highway intersection or interchange shall be shown on the ramp or intersection sign.

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Fairgrounds					See **County Fairgrounds**
Farm Implement Dealers	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services** - **Rural Agricultural Business**
Feed, Seed, Fertilizer Stores	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
Food	▪ Logo Sign 	3	15	▪ Freeway	For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and www.dot.state.mn.us/logosigns/ For Eligibility Criteria refer to: www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstates.com/state/home.aspx
	▪ E10-1 ▪ E10-6 	N/E	2	▪ Freeway ▪ Expressway	In addition to the criteria under the **General Motorist Service Signing Program**, the business shall meet the following requirements: 1. Serve three meals each day, seven days per week. 2. Be licensed by the State and/or the appropriate political subdivision. 3. Be located within two miles of the interchange.
	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Restaurant**
Gas, Diesel, LP Gas, E85, Gasoline Service Stations	▪ Logo Sign 	3	15	▪ Freeway	For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and www.dot.state.mn.us/signs/ For Eligibility Criteria refer to: www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.aspx

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Gas, Diesel, LP Gas, E85, Gasoline Service Stations, cont.	▪ E10-1 ▪ E10-5 ▪ E10-10 ▪ E10-11 ▪ E10-12 	N/E	2	▪ Freeway ▪ Expressway	In addition to the criteria under the **General Motorist Service Signing Program**, the business shall meet the following requirements: 1. Provide vehicle services including fuel and oil. 2. Provide restroom facilities and drinking water. 3. Provide continuous staffed operation for at least 12 hours per day, 7 days per week. 4. Provide public access to a telephone. 5. Be located within two miles of the interchange.
	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Gasoline Service Station**
General Motorist Service	▪ E10-1 	N/E	Varies	▪ Freeway ▪ Expressway	General Motorist Service signs may be provided for all of the following (see each facility type for specific criteria): 1. Gas, Diesel, and/or alternative fuels (LP Gas, E85) 2. Food 3. Lodging 4. Camping 5. Hospitals In addition to the general criteria for all signing programs, the following criteria apply. 1. Signs may be installed at rural freeway and expressway interchanges. 2. Cost of fabrication, installation, and maintenance of the signs shall be paid by MnDOT. 3. If a business or effective advertising is visible at an interchange and the business requests signing, that service (gas, food, lodging or camping) will be signed based on the following: a. If there are in place General Motorist Service signs, the service will be added to in place signs if the service is not currently displayed. b. If there are no in place General Motorist Service signs, and there is space available, signs will be installed for only that type of service. Design of the mainline sign (font sizes and series for services and action line message) will be based on Standard Sign E10-1.

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Geological Markers	▪ D7-X1 ▪ D7-X2 ▪ D5-X1c 			▪ Expressway ▪ Conventional	The Geological Society of Minnesota (GSM), a non-profit corporation, has constructed and maintained geological markers throughout the state for many years. The markers consist of descriptive bronze plaques, approximately 24" x 36" mounted on stone work pedestals or walls. Many geological markers exist in MnDOT rest areas, wayside rests, scenic overlooks, and/or wayside historical marker sites. The markers detail the geological significance of the area near their location. Signing of the sites began in 1997 and continues in accordance with the following guidelines. Criteria: 1. Sites shall be approved by the GSM. 2. Sites shall be easily accessible as part of a wayside development such as wayside rests, scenic overlooks, historical marker sites, adjacent city parks, or similar sites. 3. Sites within state parks shall not be signed. Signing Method: 1. Sites with geological markers only: a. Install advance sign D7-X1 GEOLOGICAL MARKER 1/2 MILE on RIGHT/LEFT. b. Install sign D7-X2 GEOLOGICAL MARKER with arrow at the entrance road or turnoff. 2. Sites located in other facilities (as listed above): a. Install sign D5-X1c beneath the in place advance sign. b. If there is no advance sign in place for the facility, install sign D5-X1c below the directional sign. 3. Sign fabrication, installation, and maintenance costs will be paid by MnDOT.
Gifts, Crafts, Art Sales	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Tourist Oriented Business**
Golf Courses (public)	▪ D7-X21 ▪ Brown Custom Design 	3	10	▪ Expressway ▪ Conventional	In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply. The facility shall: 1. Have at least nine holes. 2. Be open to the public. See also **Miniature Golf/Driving Ranges**, and **Disc Golf Course**.

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Great River Road Amenity Sites	▪ M1-X1 ▪ Brown Custom Design 	1	3	▪ Expressway ▪ Conventional	This facility includes parks, boat/canoe access sites, picnic areas, campsites, historic sites, and other points of interest that are directly related to the officially designated national Great River Road (GRR) route. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply for a GRR amenity site: 1. Only those sites directly tied to the national GRR system and identified on GRR maps or brochures may be signed. 2. The sign format and size shall be determined by MnDOT's Office of Traffic, Safety and Technology. 3. The district traffic office should coordinate sign requests with the Office of Environmental Services.
Greenhouses	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
High Schools	▪ D7-X19 ▪ Green Custom Design 	1	3	▪ Expressway ▪ Conventional	This is a multi-purpose facility which hosts a variety of activities throughout the year. Some of these facilities may have a remote stadium or athletic complex which generates traffic and also qualifies for signing. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply. The facility shall: 1. Hold events or activities that are non-local in scope and draw visitors from outside the local area. 2. Provide adequate on-site parking.
Historic District	▪ D7-X11a ▪ Brown Custom Design	1	10	▪ Expressway ▪ Conventional	Listing in the National Register of Historic Places means that the district has been judged by professional historians to be worthy of preservation because its significance speaks to the broad themes of human history and because it retains enough integrity to accurately document that experience. Historic Districts so listed are worthy of public attention and serve the useful purpose of cultural heritage education. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, the following criteria apply: 1. Requests for signs will be accepted from a local government agency. 2. Requests for directional signage shall include: a. Location: Historic District boundaries must be distinguishable through local street signage. The application must include a map of the district and photographic evidence of distinguishing signage.

Historic District, cont.					b. Interpretation: Historic Districts shall provide information regarding the district in a publicly accessible location within the district such as a self-service kiosk or welcome center. A copy of that information must be included with the application. The information must supplement the National Register nomination with new information. 3. Requests for signing of Historic Districts shall be submitted to the State Signing Engineer, OTST. These requests shall be forwarded to the Minnesota Historical Society (MHS) for recommendations. The MHS recommendations shall govern MnDOT's approval or denial of requests. 4. The Historic District shall be listed in the National Register of Historic Places, a federal program of the National Park Service. The MHS will confirm whether a district is listed. Signing Method: 1. A city could potentially qualify for a Downtown or Business District sign and a Historic District sign. The Historic District may or may not include the whole city. Therefore, directions to different locations may be required. Signing for both would be accepted if both qualify and there is space. If spacing is an issue, both requests could be combined on the same sign if signed at the same trunk highway intersection. 2. Three sizes of Historic District signs have been developed and included in the Standard Signs Manual. 3. Optional guide signs (other than the standard sign design) may be used: a. "[City Name] Downtown & Historic District" b. "[City Name] Historic & Business District" with directional arrow(s)
Historical Markers and State Monuments	▪ D5-X1b ▪ D7-X5 ▪ D7-X6 	1	10	▪ Expressway ▪ Conventional	In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply: 1. Minnesota Historical Society (MHS) sites and monuments: a. Requests for signing to State historical markers and monuments maintained by the MHS shall be submitted to the State Signing Engineer, OTST. b. All costs for MHS historical marker and monument signs shall be paid by MnDOT. 2. Non-MHS sites and monuments: a. Requests for the signing of non-MHS historical markers and monuments shall be submitted to the State Signing Engineer, OTST. These requests shall be forwarded for the MHS for recommendations. The MHS recommendations shall govern MnDOT's approval or denial of the request. b. A historical marker or monument shall: I. Document a topic with historical significance. Fifty years is a general rule of thumb of the time require to develop historical perspective and to establish significance. Topics that explain the recent past shall be exceptionally significant to be considered for approval. To establish significance, requesters should explain why a topic played a role or why it made a difference in the context of local, regional, or state history. Requesters shall provide a copy of the text and a photograph of the historical marker. As a general rule, signing shall not be approved for historical markers or monuments that represent ubiquitous historical phenomena or places that were common everywhere. Examples of these places include: the sites of towns, communities, or settlements that no longer exist; the birthplaces or grave sites of significant individuals; and cemeteries. continued..

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Historical Markers and State Monuments, cont.					II. Be located on public land and accessible to the public. III. Be legible using letters at least 5/8 inches high (typically a font size 22 or greater). c. The requester shall be responsible for maintaining and ensuring access to the historical marker or monument. d. There shall be at least three year-round parking spaces located off the road or street. Within city limits, parking spaces may be located on-street. e. All costs shall be paid by the requester. f. See **National Monuments** as applicable.
Historic Sites	▪ D7-X5a ▪ D7-X11 	1	10	▪ Expressway ▪ Conventional	In addition to the general criteria for the **Minor Traffic Generator Signing Program**, requests for signing of historic sites shall be submitted to the State Signing Engineer, OTST. These requests shall be forwarded to the Minnesota Historical Society (MHS) for recommendations. The MHS's recommendations shall govern MnDOT's approval or denial of the request.

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Hospitals	▪ D9-2a ▪ D9-2b ▪ E10-1 ▪ E10-3 ▪ E10-4 ▪ E10-8 	10	10	▪ Freeway ▪ Expressway ▪ Conventional	In addition to the general criteria for all signing programs, the following criteria apply. 1. Hospitals requesting signing shall meet all of the following criteria: a. Accept all emergency cases without discrimination for any reason (including ability to pay). b. Be readily accessible from the nearest intersection or interchange (normally within a ten mile radius). c. Provide 24-hour emergency medical care with a physician on the premises (metropolitan area) or on-call (rural areas). 2. The costs of fabrication, installation, and maintenance of signs shall be paid by MnDOT. 3. Signing directing motorists from one trunk highway onto another may be allowed if the facility is within ten miles of the intersection of the two trunk highways. Signs directing motorists from one freeway to another freeway shall not be allowed. 4. In place EMERGENCY HOSPITAL signs shall be removed through attrition and replaced with HOSPITAL signs. Mainline signing and ramp signing at an interchange shall be replaced at the same time. 5. HOSPITAL signs should be installed in accordance with the following: a. Interchange signs (E10-1, E10-3, E10-4, and E10-8) I. At rural interchanges where General Motorist Service signs (E10-1) are in place, the word HOSPITAL (E10-1 Supplement) may be included on the General Motorist Service sign if the word CAMPING is not displayed. II. At urban or rural interchanges where General Motorist Services are not signed, the E10-3 sign shall be installed at the interchange nearest the hospital. The appropriate signing (E10-4 or E10-8) shall be installed on the ramp(s). III. If the hospital is located less than two miles from an interchange, the E10-8 sign shall be installed on the ramp(s). If the hospital is located two miles or more from an interchange, the E10-4 sign shall be installed on the ramp(s). IV. Trailblazing signs on trunk highways shall display the number of miles in one mile increments (E10-8 or E10-4 if mileage is required). V. Trailblazing signs (D9-2a) on local roads shall display the number of blocks from the trunk highway to the facility. b. At-grade intersection signs (D9-2a and D9-2b) I. The D9-2b sign shall be ground-mounted in advance of the intersection (or on a traffic signal mast arm at the intersection) with the road leading to the hospital. II. Trailblazing signing (D9-2a) on trunk highways and/or local roads shall display either the number of blocks or miles (in one mile increments) to the facility. Trailblazing signs on local roads directing motorists to the facility shall display the appropriate distance and arrow.
Hotels					See **Lodging**
Household Hazardous Waste Site					See **Sanitary Landfills**

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Humane Societies	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
Indoor Ice Arenas	▪ Brown Custom Design	1	3	▪ Expressway ▪ Conventional	This is a high use facility build primarily to accommodate ice skating activities, both competitive and recreational in nature. The general criteria for the **Minor Traffic Generator Signing Program** apply to this type of facility.
Industrial Parks	▪ D7-X17 	N/E	3	▪ Expressway ▪ Conventional	In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply. The facility shall: 1. Be in a rural environment. 2. Be serviced mainly by non-local delivery vehicles. 3. Be open to both local and non-local customers.
Interpretive Centers	▪ Brown Custom Design	1	3	▪ Expressway ▪ Conventional	This facility provides explanations and interpretations of historical, cultural, and educational subject matter. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, the facility shall have on premise staff and/or guides to present continuing service to visitors.
Kennels	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
Landfills					See **Sanitary Landfills**
Libraries	▪ I-8 	1	1	▪ Expressway ▪ Conventional	The general criteria for the **Minor Traffic Generator Signing Program** apply to this type of facility.

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Lock and Dam Sites	▪ Brown Custom Design 	1	5	▪ Expressway ▪ Conventional	This facility is operated and maintained by the US Army Corps of Engineers. The visitors to this facility are interested in viewing boating operations through the locks and/or utilizing other available recreational facilities. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply for a lock and dam site: 1. The facility shall provide viewing provisions for the public 2. The facility should provide parking for at least 15 vehicles. 3. The facility should provide restroom facilities. 4. The facility should have a telephone available.
Lodging	▪ Logo Sign 	3	15	▪ Freeway	For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and www.dot.state.mn.us/logosigns/ For Eligibility Criteria refer to: www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.aspx
	▪ E10-1 ▪ E10-7 	N/E	10	▪ Freeway ▪ Expressway	In addition to the criteria under the **General Motorist Service Signing Program**, the business shall meet the following requirements: 1. Provide lodging 24-hours per day throughout the year. 2. Be licensed by the State and/or the appropriate political subdivision. 3. Be located within ten miles of the interchange.
	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Motel, Resort**

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Major Traffic Generators	▪ Brown Custom Design ▪ Green Custom Design 	10	10	▪ Freeway ▪ Expressway ▪ Conventional	These traffic generators are major regional attractions, events, or facilities which attract persons or groups from beyond a local community, city, or metropolitan area. They are significant because of their unique educational, cultural, historical, or recreational experience and public appeal. Predominately retail, business or manufacturing centers are not normally eligible for signing. The business shall meet the following criteria: 1. Parking for at least 1000 vehicles. 2. A minimum of ten events per year. 3. Average event attendance of at least 5000 persons. Signs should be installed in accordance with the following: 1. Distances to major generators located two miles or more from the trunk highway intersection or interchange shall be shown on the sign approaching the intersection or on the ramp at an interchange. 2. Signs directing motorists from one trunk highway to another trunk highway may be allowed except when they direct a motorist from one freeway to a second freeway. 3. In the Metro District, Major Traffic Generator signs may have a dynamic element specifying an alternate route for the purpose of traffic management and in accordance with the following criteria: a. Alternate Route Guidance: I. The alternate route must be a direct route to the facility. II. The alternate route exit/turn must be located within the next two interchanges/ intersections. III. There needs to be verification of traffic data showing that the alternate route is a better option than the primary signed route. Some things to consider are travel times, construction impacts, signal timing, train schedules, etc. b. Sign Location: I. Only one structure is allowed per direction of travel. A second structure will not be installed on the mainline at the alternate route exit/turn. II. Signing is required on both the primary exit ramp and alternate route exit ramp. III. Trailblazing is required on both the primary and alternate routes. c. There must be an agreement between MnDOT and another government agency for these types of signs. The agreement will include: I. All costs to be paid by the requester, including fabrication, installation, maintenance, replacement, relocation, utility, etc. II. MnDOT will operate the signs. Another government agency may operate the signs, but the message must be approved by MnDOT and they must supply the alternate route traffic data for MnDOT to approve before the signs are changed. III. Maintenance of the signs is the responsibility of the requester. IV. Replacement of the signs and associated elements is the responsibility of the requester. The life of the static sign and dynamic elements should be the same as MnDOT's guidelines for service life replacement. V. Relocation of the signs and associated elements is the responsibility of the requester. For example, if a construction project needs to relocate the signs, the requester is responsible for relocating it. VI. The requester must obtain a permit when work is performed on MnDOT right-of-way.

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Malls					See **Regional Shopping Centers and Outlet Malls**
Marina, Boat Launch, Guide Service	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Public Access to Lakes/Rivers** See **Specific Services - Tourist Oriented Business**
Miniature Golf and Driving Range	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Tourist Oriented Business**
Minor Traffic Generators	▪ Standard Sign (if applicable) ▪ Brown Custom Design ▪ Green Custom Design	Varies	Varies	▪ Expressway ▪ Conventional	Minor traffic generators are facilities that generally attract non-local persons or groups unfamiliar with the location of the generator but do not qualify as major traffic generators. The use and installation of highway signing shall be limited to only those generators which have broad motorist appeal, serve non-familiar motorists, or are the kind of facility for which a motorist normally expects highway signing. In addition to the general criteria for all signing programs, the following criteria apply for the Minor Traffic Generator Signing Program. 1. Minor Traffic Generator signs may be installed on conventional highways, at at-grade intersections on expressways, and on rural bypasses that have interchanges at non-trunk highways. In order to be considered for signing, the following criteria must be met by the minor traffic generator requesting signing: a. Unless specified otherwise, facilities shall be open at least 40 hours per week and a minimum of five days per week. b. For seasonal generators, MnDOT may incorporate signing indicating periods of closure where appropriate. c. Signing shall not be permitted within the corporate limits of one city directing motorists to a facility located in another city. d. Generators shall be located within specified distances from the trunk highway intersection or interchange at which signing is permitted. These distances vary depending on the type of generator and whether the signed intersection is located within an urban or rural environment. I. Urban Environment - typical characteristics are highly developed areas having slower speeds, higher proportion of local traffic, increased difficulty in finding acceptable locations for traffic signs, and a more complicated driving environment. II. Rural Environment - typical characteristics are relatively undeveloped or agricultural lane, higher speeds, higher proportion of non-local traffic, easy ability to find acceptable locations for traffic signs, and relatively uncomplicated driving environment. Small cities in otherwise rural areas are included in this definition. e. The local governing body(ies) shall prioritize which facilities may be signed when MnDOT determines that the number of qualifying generators that a community is requesting signing for cannot all be accommodated on signing at the same intersection due to driver information overload and sign spacing guidelines. 2. Signs shall only be allowed from the nearest trunk highway intersection. Signs directing motorists from one trunk highway to another trunk highway shall not be allowed. continued..

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Minor Traffic Generators, cont.					3. Signing shall not be provided if the facility is readily visible or if effective off right-of-way directional signing is present or can be provided. Visibility from the approach to an intersection may be determined by adding 175 feet to Condition B (deceleration to 10 mph from the posted speed) in **MN MUTCD Table 2C-4.** Signing is not allowed if the facility can be readily identified or if effective off highway right-of-way directional signing is legible at or beyond this distance. Minor Traffic Generator Signs should be designed in accordance with the following: 1. Distances to generators are to be shown in one-mile increments. 2. When designing sign panels to be installed on rural expressways for private minor generators: a. Use the appropriate chart **(Charts 6.1A, 6.1B, or 6.1C in MnDOT's Traffic Engineering Manual)** to determine the required font size for guide signs on expressways. b. The next smaller font size may be used to design the sign panels for private generators if existing guide signing to other private generators on the highway section were designed with one font size smaller than that specified in the charts.
Motels					See **Lodging**
Multi-Purpose Facilities	▪ Green Custom Design 	N/E	3	▪ Expressway ▪ Conventional	The general criteria for the **Minor Traffic Generator Signing Program** apply to this type of facility. This facility includes but is not limited to public community centers and National Guard Armories. A public community center is a public building designed for a community's social, cultural, educational, and recreational activities. A National Guard Armory is a facility where arms and military equipment are stored and/or is used for training military reserve personnel. It is frequently used for other public purposed.
Museum	▪ D7-X12 ▪ Brown Custom Design 	1	5	▪ Expressway ▪ Conventional	In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply: 1. Requests for signing shall be submitted to the State Signing Engineer, OTST. These requests shall be forwarded to the Minnesota Historical Society (MHS) for recommendations. The MHS recommendations shall govern MnDOT's approval or denial of the requests. 2. Seasonal museums may qualify but shall have a CLOSED plaque installed on signs during the months that they are not open for business. 3. A non-profit museum is required to be a Federal Tax Exempt Organization, Internal Revenue Code [IRC] 501(c)(3).

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National Monuments	▪ Brown Custom Design 	15	15	▪ Freeway ▪ Expressway ▪ Conventional	General Criteria Only
Nurseries/ Tree Farms	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
Orchards/ Produce Sales	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
Outlet Malls	▪ Green Custom Design 	2	2	▪ Freeway ▪ Expressway ▪ Conventional	In order to be considered for signing, all of the following criteria shall be met by the outlet mall: 1. At least 400,000 square feet of retail floor space available for lease. 2. Minimum of 100 stores. 3. Primary function of the mall is to house tenants who are manufacturers that sell their stock directly to the public. 4. Located outside of the downtown or central business district except in the Metro District.
Parks (City, County, Regional)	▪ D7-X10 ▪ D7-X15 ▪ Brown Custom Design	3	10	▪ Expressway ▪ Conventional	This is a recreational facility, open to the public, of varying size, type, and purpose. It can be operated by various agencies or jurisdictions. The facility typically provides picnic tables, playground equipment, drinking water, trash barrels, and restroom facilities. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply: 1. The facility shall meet Minnesota Department of Health standards regarding water supply and restroom facilities. 2. The facility shall be maintained in a sanitary and park-like condition.

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Parks (National)	▪ Brown Custom Design 	15	15	▪ Freeway ▪ Expressway ▪ Conventional	General Criteria Only
Parks (State)	▪ D7-X9 ▪ Brown Custom Design 	15	15	▪ Freeway ▪ Expressway ▪ Conventional	In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply. The facility shall: 1. Meet Minnesota Department of Health standards regarding water supply and restroom facilities. 2. Be maintained in a sanitary and park-like condition. 3. Have water, restrooms, and picnic areas. 4. Have accommodations for at least 35 overnight camp sites.
Pharmacy (24-Hour)	▪ Logo Sign	3	3	▪ Freeway	For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and www.dot.state.mn.us/logosigns/ For Eligibility Criteria refer to: www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.aspx
Places of Worship	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Places of Worship**
Public Access to Lakes/Rivers	**Trunk Highways**: ▪ D7-X7 ▪ D7-X7A 	1	10	▪ Expressway ▪ Conventional	See Section 2I.5.1 of the MN MUTCD for Public Water Access Signs including the Minnesota Department of Natural Resources (DNR) sign (DNR NRM 8.2.35). In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply: 1. All requests for signing to State provided public access sites shall be approved by the Department of Natural Resources (DNR). Requests for signing to all other access sites shall be approved by MnDOT. 2. The facility shall have: a. An access road that is maintained in passable condition. b. A parking area at the access site with a gravel, bituminous, or concrete surface. c. The parking area should have space for at least 20 vehicles. A smaller parking area is acceptable at remote access sites. d. A concrete boat launching ramp or equivalent for trailered boats. e. Free admission.

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Public Access to Lakes/ Rivers cont.	**Local Roads:** ▪ D7-X8 ▪ D7-X8A ▪ DNR Sign (DNR NRM 8.2.35) 				3. The public access sign shall be one of the following: a. Trunk Highway: Standard D7-X7 or D7-X7A. b. Local Road/Trailblazing: Standard Sign D7-X8 or D7-X8A c. DNR Public Water Access Sign The DNR may continue its current sign replacement program (replacing exiting 12" x 18" signs with new 18" x 24" signs) in accordance with all of the following: 1. DNR staff will remove any PUBLIC WATER ACCESS sign panel attached to a MnDOT sign structure and install it on its own structure which shall be an FHWA accepted breakaway sign support. 2. The location of the DNR sign structure shall be authorized by the MnDOT district traffic office. 3. The sign installation shall not hide from view nor interfere with the effectiveness of any official traffic control device.
Public Office Buildings	▪ Green Custom Design 	1	3	▪ Expressway ▪ Conventional	This facility includes public administrative offices (federal, state, and local) where the general public visits on a regular basis to conduct business. The general criteria for the **Minor Traffic Generator Signing Program** apply to this type of facility.
Recreational Rentals: Bikes, Boats, Canoes, Jet Skis, Snowmobiles	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Tourist Oriented Business**
Recycling Centers	▪ D1-X6 ▪ Green Custom Design (no symbol)	1	5	▪ Expressway ▪ Conventional	This facility shall comply with the permit rules of, and be officially designated by, the Minnesota Pollution Control Agency (MPCA). Reference Minnesota Statute 173.086 and 115A.555. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply for a recycling center. The facility shall: 1. Be open to receive materials at least 12 hours per week, 12 months per year. 2. Accept at least four different types of recyclable materials. 3. Comply with Minnesota Rule 7035.2845 regarding the permitting of recycling facilities.
Regional Human Services/ Treatment Centers	▪ Green Custom Design	1	3	▪ Expressway ▪ Conventional	This is a public treatment facility operated by the Minnesota Department of Human Services. Reference Minnesota Statutes Chapters 252, 253, and 254). The general criteria for the **Minor Traffic Generator Signing Program** apply to this type of facility.

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Regional Shopping Centers	▪ Green Custom Design 	2	2	▪ Freeway ▪ Expressway ▪ Conventional	In order to be considered for signing, all of the following criteria shall be met by the regional shopping center: 1. At least 600,000 square feet of retail floor space, all under one roof, available for lease. 2. At least two major department stores owned by a national or regional chain organization. 3. Located outside of the downtown or central business district, except in the Metro District.
Resorts	▪ D9-X3 ▪ D9-X4 	N/E	?	▪ Expressway ▪ Conventional	**Resort and Camping Signing Program** Signs direct the motorist to campgrounds or resorts in rural areas where the Advertising Regulation Law has restricted the installation of private advertising signs off the highway right-of-way. These signs may only be installed where resort information (or County Slat Sign Program) are in place on local roads in accordance with Minnesota Statutes 160.283-160.285. See Figure 6.26. In addition to the general criteria for all signing programs, the following criteria apply: 1. Signs may be installed in rural areas on conventional highways and at at-grade intersections on expressways. 2. Signs shall only be allowed from the nearest trunk highway intersection. Signs directing motorists from one trunk highway to another trunk highway shall not be allowed. 3. The cost of fabrication, installation, and maintenance of the signs shall be paid by MnDOT. 4. One guide sign from each direction in advance of a private road or entrance is allowed when the following conditions exist: a. The main access from the trunk highway is via a private road or entrance. b. The resort or campground is located near, but not visible from, the trunk highway. c. The sign located on private property cannot be effectively seen by approaching drivers because of the width of the highway right-of-way and/or growth of vegetation. 5. Where the access to resorts or private campgrounds is via county, township, or other public road, and the road is identified with a road name or destination sign, the sign panel or panels may be combined with the in place sign. Minimum height to the bottom of the lowest sign panel shall be seven feet. 6. Businesses signed under this signing program shall not be signed under the Specific Service Signing Program. Normally, these signs are installed where SPECIFIC SERVICE signs are not erected at intersections. 7. Resorts shall have a State Department of Health license as required by Minnesota Statute 157.16. A resort is defined in Minnesota Statute 157.15, subd. 11. 8. Private campgrounds shall have a State Department of Health license as required by Minnesota Statute 327.15, modern sanitary facilities (flush, chemical, or incinerator toilets), and no restrictions on type of camping (tent, RV, trailer, etc.).
	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Resorts**

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Restaurants					See **FOOD**
Riding Stable	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Tourist Oriented Business**
Sanitary Landfills Demolition Landfills Solid Waste Transfer Stations Household Hazardous Waste Sites	▪ D1-X3 ▪ D1-X5 ▪ D1-X7 ▪ D1-X8 	3	5	▪ Expressway ▪ Conventional	These facilities shall be approved by the Minnesota Pollution Control Agency (MPCA). MPCA literature refers to a household hazardous waste site as a HHW Center. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply: 1. The facility shall be open to the public as well as commercial and governmental users. 2. Compost sites shall not be signed.
Scientific and Natural Areas	▪ Brown Custom Design 	1	10	▪ Expressway ▪ Conventional	These facilities offer various types of displays in a natural setting. They are developed by the Department of Natural Resources or other state or federal agencies. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply: 1. The facility shall provide viewing areas. 2. The facility should provide: a. Parking for at least 20 vehicles. b. An on-site explanation (audio, visual, or staff person) of the subject matter. c. Restroom facilities.
Schools					See **Educational Institutions** or **High Schools**

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Ski Areas	▪ Brown Custom Design ▪ D7-X13 ▪ D7-X14 	5	10	▪ Expressway ▪ Conventional	This is a public or private winter recreational site which provides downhill and/or cross-country skiing. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply for a ski area: 1. The facility shall be open to the public. 2. The facility should provide parking for at least 100 vehicles at downhill sites and at least 30 vehicles at cross-country sites. 3. Downhill skiing facilities shall provide adequate staff in case of an emergency. 4. Cross-country facilities shall have trails which are maintained with trail guide signs or maps placed at key locations indicating location and distances. 5. The message on the ski area signs shall be as follows: a. Trunk highway signing: SKI AREA or name of ski area with left (right) arrow at an intersection or NEXT RIGHT at an interchange. b. Local road trailblazing signing: downhill symbol sign (D7-X13) or cross-country symbol sign (D7-X14) with appropriate arrow.
Solid Waste Transfer Stations					See **Sanitary Landfills**
Specific Services	▪ D9-X6 Series 	N/E	15	▪ Expressway ▪ Conventional	See the Traffic Engineering Manual, Chapter 6, for more information on the history of the Specific Signs Program in Minnesota and for definitions, sign installations, and sign panel design. See the last page of this appendix for a list of ineligible facilities. The Specific Services Signing Program is described starting on page 34 of this appendix.

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Star Lake or River Sign				▪ Expressway ▪ Conventional	Before installing signs along county, city, or township roads, permission must be granted by the road authority. Before installing signs at boat landings or other public or private facilities, written permission must be granted by the facility owner. The requirements for installing signs on state highways are as follows: 1. Signs shall be fabricated and installed by MnDOT. 2. The cost of fabrication, installation, and maintenance shall be paid by the requester. Maintenance includes replacing damaged or missing signs, and replacement of signs that have reached the end of their useful life (expected life of a sign panel is 12-15 years). 3. One sign may be erected at each approach to a lake or river within the right-of-way of an interstate or other highway that passes over a lake or river in the Department of Transportation's eight-county metropolitan district or near or over a lake or river in greater Minnesota. 4. Signs shall not be installed contrary to other federal and state highway sign standards. 5. The 24" X 12" sign may be installed below existing named river or lake standard guide signs on the post furthest from roadway. The Variable X 36" sign may be installed in lieu of the river or lake standard guide sign on conventional roadways. More information regarding MN Star Lakes and Rivers can be found here: http://www.starlakes.org/home.html
State Recreational Areas					See **Parks (State)**
Tourist Information	▪ D9-10A ▪ D9-10 	1	3	▪ Expressway ▪ Conventional	In addition to the general criteria for all signing programs, Tourist Information signs may be installed on conventional highways, at at-grade intersections on expressways, and on rural bypasses that have interchanges at non-trunk highways. In order to be considered for signing, all of the following criteria must be met: 1. Only Office of Tourism sites may be signed. 2. Requests shall only be accepted from a community group (e.g. Chamber of Commerce), business association, or governmental unit. 3. Only one site in a city or area may be approved for signing. 4. A sign shall be in place on the outside of the facility, clearly stating the operator and means of contact. 5. If the facility is operated seasonally, the signs shall be removed, covered, or the closure clearly indicated.

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible Urban	Rural	Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
Travel Information Center					Contact MnDOT's Office of Traffic Safety and Technology at www.dot.state.mn.us/trafficeng/index.html for assistance with signing for MnDOT Travel Information Centers.
Township Hall	▪ D1-X9 ▪ Green Custom Design 	2	2	▪ Expressway ▪ Conventional	In addition to the General Criteria in the **Minor Traffic Generator Signing Program**, the following criteria apply. The facility: 1. Shall hold monthly meetings that are open to the public. Township halls are not required to be open eight hours per day, five days per week. 2. Shall be primarily intended for use as a town hall. 3. Should provide adequate on-site parking or parking in the immediate area. 4. Shall post contact information that is visible from the exterior of the building. Signing Method: 1. All costs associated with township hall signing shall be paid by the township. 2. The sign shall have the legend "TOWN HALL" with directional arrow. 3. If a township hall is in close proximity to another township hall, and the district traffic engineer determines that using the standard sign could be confusing for motorists, the name of the township may be included on the sign.
Trail Access	Brown Custom Design 	10	10	▪ Freeway* ▪ Expressway ▪ Conventional * See Criteria #1	Signing may be permitted for access points to major recreational trails having improved and well maintained surfaces for hiking, biking, etc. All trails shall provide complete marking or trail maps for user guidance. In addition to the general criteria for all signing programs, the following criteria apply: 1. Trail Access signs may be installed on all trunk highways, except in the Metro District where signs shall not be installed on freeways. 2. Parking shall be provided at the site or within the immediate vicinity. The parking facility shall be surfaced and maintained year-round. Parking shall be provided for at least 40 vehicles at freeway signed sites and at least 20 vehicles at other sites. Smaller lots are acceptable at remote areas with the approval of the district traffic engineer. 3. The minimum trail length shall be five miles. 4. All requests for signing to DNR provided public trails shall be approved by the DNR and MnDOT. Signing for other trails is at the discretion of MnDOT. Signing Method: 1. Signing shall only be allowed from the nearest trunk highway intersection or interchange. Signs directing motorists from one trunk highway to another trunk highway shall not be allowed. 2. The format of the Trail Access signs should be as follows: a. Freeway - the official trail name and the freeway exit number. b. Expressway interchanges - the official trail name and the message NEXT RIGHT c. At-grade intersections - the word ACCESS plus the official trail name and a directional arrow.

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Trap and Skeet Shooting Ranges	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services – Tourist Oriented Business**
Tree Farms/ Nurseries	▪ D9--X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services – Rural Agricultural Business**
Universities					See **Educational Institutions**
Veterans and War Memorials	▪ Brown Custom Design 	1	3	▪ Expressway ▪ Conventional	This is an independently located outdoor site built to commemorate veterans of U.S. military actions and/or the actions themselves. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply: 1. The facility shall provide adequate on-site parking or parking in the immediate area of the memorial. 2. The facility should: a. Be of a unique size and presence. b. Be easily available for public viewing. c. Not be part of any other building or facility.
Veterinary Clinics	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
Welding and Machine Shops for Agricultural Equipment	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services - Rural Agricultural Business**
Wildlife Park/ Animal Park	▪ D9-X6 	N/E	15	▪ Expressway ▪ Conventional	See **Specific Services – Tourist Oriented Business**

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange N/E = Not Eligible		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Wildlife Refuges and Wildlife Management Areas	▪ Brown Custom Design 	1	10	▪ Expressway ▪ Conventional	This is a facility which is open to the public and offers viewing of a variety of wildlife. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply: 1. The facility shall provide interpretive facilities or programs or provide viewing areas or nature trails. 2. The facility should provide: a. Parking for at least 20 vehicles in rural areas and at least 50 vehicles in urban areas. b. Restroom and telephone facilities.
Workforce Centers	▪ D7-X18 ▪ Green Custom Design	1	3	▪ Expressway ▪ Conventional	This facility is formed through a partnership between locally based community, county, and state agencies that the general public visits on a regular basis to obtain employment and training services. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, the facility shall have adequate on-premise signing visible to the motorist.
Zoos	▪ Brown Custom Design 	5	10	▪ Expressway ▪ Conventional	This is a zoological garden or park where a wide variety of living wild animals are kept and safely displayed for public exhibition. In addition to the general criteria for the **Minor Traffic Generator Signing Program**, all of the following criteria apply: 1. The facility shall be registered and approved by the American Association of Zoological Parks and Aquariums. 2. The facility shall provide identification and explanation of displays and wildlife.

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Logo Attraction Sign Categories and Criteria

Historic Sites or Districts	Historic Sites shall have definite historical significance as determined and approved by the Minnesota Historical Society (MHS) and State Signing Engineer. Requests shall be forwarded to the State Signing Engineer. Historic District requests shall be listed on the National Register of Historic Places. Requests will be accepted from a local government agency and shall contain the following: ▪ A map of the district. ▪ Photographic evidence of street signage. Historic District must be distinguishable through local street signage. ▪ Evidence that the district is providing information regarding the district in a publicly accessible location within the district such as a self-service kiosk or welcome center. Include the location of the kiosk, hours open to the public, and a copy of the information provided to the public, such as a pamphlet. Requests shall be forwarded to the State Signing Engineer.
Cultural Sites	Sites shall be limited to include any facility for the live performing arts, exhibits, or concerts. In lieu of hours of operation, the facility must have a seating capacity of 2,500 seats and hold at least 50 events per year.
Recreational Sites	**Recreational Area** Areas that include recreational activities such as: hiking, bicycling, boating, fishing, kayaking, rafting, public golfing, skiing, and off-highway vehicle riding. **Amusement Park** A permanent area which is open to the general public for entertainment rides and foods services. **Arenas** A stadium, sports complex, auditorium, fairgrounds, civic or convention center or racetrack. In lieu of hours of operation, the facility must have a seating capacity of at least 2,500 seats and hold at least 50 events per year. **Natural Interest Area** An area of natural or scenic beauty shall be limited to a naturally occurring area of interest to the general public, including State or National Parks, forests, nature preserve, wilderness areas, or mountain ranges. A feature created by nature or naturally occurring area of outstanding interest to the general public. Examples include, but are not limited to, unusual rock formations, caves, lakes, rivers, fossil beds, waterfalls, and similar areas.
Educational Sites	**Zoo, Aquarium or Botanical Park** A non-retail facility in which living animals, insects, fish, or plants are kept and exhibited to the public. **Facility Tour Location** A facility such as a factory, institution, or plant which conducts daily public tours on a regular scheduled basis during hours of operations. **Museum** A museum shall be limited to facilities open to the public in which works of historic, artistic, or scientific value are cared for and exhibited. Requests for signing shall be submitted to the State Signing Engineer. These requests will be forwarded to the MHS for recommendations. The Society's recommendations shall govern the Minnesota Department of Transportation's approval or denial of requests. A non-profit museum is also required to be a Federal tax exempt organization [IRC (Internal Revenue Code) 501 (c) (3)].

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Specific Services Signing Program

Specific Services signs may be provided for the following (Minnesota Statute Sections 160.292-160.296).

1. **Gasoline Service Station or other retail motor fuel business** - defined in Minn. Stat. Sec. 160.292, Subd. 13 as "A business that provides vehicle services including fuel and oil; restroom facilities and drinking water; staff for continuous operation at least 12 hours per day, seven days per week; and public access to a telephone."

2. **Motel** - defined in Minn. Stat. Sec. 157.15, Subd. 7 as "a building, structure, enclosure, or any part thereof used as, maintained as, advertised as, or held out to be a place where sleeping accommodations are furnished to the public and furnishing accommodations for periods of less than one week." It shall be licensed by the State Department of Health. Bed and breakfast facilities were previously allowed signing as a tourist-oriented business that met the motel criteria, but are now eligible for signing as a motel.

3. **Resort** - defined in Minn. Stat. Sec. 157.15, Subd. 11 as "a building, structure, enclosure, or any part thereof located on, or on property neighboring, any lake, stream, skiing or hunting area, or any recreational area for purposes of providing convenient access thereto, kept, used, maintained, or advertised as, or held out to the public to be a place where sleeping accommodations are furnished to the public, and primarily to those seeking recreation for periods of one day, one week, or longer and having for rent five or more cottages, rooms, or enclosures."

4. **Place of Worship** (no legislative definition provided) - MnDOT defines a place of worship as any church, chapel, temple, synagogue, mosque, building, area, space, plaza, or dwelling wherein or whereat respect, reverence, or devotion is paid to a Divine Being. There is no restriction on time or frequency of devotional activities. However, the place or structure should be primarily intended for such purpose, and may not be a private home or school or any other site which is not primarily a place of worship.

   Minnesota Statute 173 allows religious notices signs to be permitted in areas adjacent to trunk highway right-of-way. If this type of signing is permissible and effective, specific service signs shall not be installed.

5. **Recreational Camping Area** - defined in Minn. Stat. Sec. 327.14, Subd. 8 as "any area, whether privately or publicly owned, used on a daily, nightly, weekly, or longer basis for the accommodation of five or more tents or recreational camping vehicles free of charge or for compensation. "Recreational camping area" excludes:
   - Children's camps
   - Industrial camps
   - Migrant labor camps as defined in Minnesota Statutes and state commissioner of health rules.
   - United States Forest Service camps
   - State Forest Service camps
   - State wildlife management areas or state-owned public access areas which are restricted in use to picnicking and boat landing, and
   - Temporary holding areas for self-contained recreational camping vehicles created by and adjacent to motor sports facilities if the chief law enforcement officer of an affected jurisdiction determines that it is in the interest of public safety to provide a temporary holding area.

   The recreational camping area shall meet the following criteria:
   I. Be licensed by the State Department of Health.
   II. Provide at least 15 camping spaces.
   III. Provide modern sanitary facilities (flush, chemical, or incinerator toilets) and drinking water.
   IV. Services available 24-hours per day.
   V. Accept all forms of campers (tent, trailer, motor home, etc.) unless restriction is included in the official name ("Smith's Tent Camping" or "Joe's RV Camping".

6. **Restaurant** – defined in Minn. Stat. Sec. 157.15, Subd. 12 as ""a food and beverage service establishment, whether the establishment serves alcoholic or nonalcoholic beverages, which operates from a location for more than 21 days annually. Restaurant does not include a food cart or a mobile food unit."" A restaurant shall meet the following criteria:
   a. Provide a continuously staffed food service operation open at least four hours per day, five days per week except holidays as defined in Minn. Stat. Sec. 645.44, Subd. 5, and except as provided for seasonal restaurants.
   b. Provide seating for at least 20 people.
   c. Serve meals prepared on the premises (reheated, prepackaged, ready-to-eat food is not food prepared on the premises.
   d. Possess any required state or local licensing or approval.
   e. Seasonal restaurants shall provide a continuous staffed food service operation at least four hours per day, five days per week during their months of operation.
   f. Coffee shops are eligible for signing as restaurants provided that they meet the same criteria with the exception of criteria c.

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Specific Services Signing Program, continued.

7. **Rural Agricultural Business** - defined in Minn. Stat. Sec. 160.292, Subd. 20, as "includes but is not limited to (1) a grain-handling facility, (2) a business providing care and well-being to animals, and (3) the sale of feed or seed."

   MnDOT further defines a rural agricultural business as any commercial activity engaged in as a means of livelihood or profit, located completely outside any urban district or suburban area or residence district or business district, which receives the major portion of its income from providing goods, services, commerce trade, or industry directly related to agriculture or providing for the care and well-being of animals. Year-round businesses shall be open a minimum of eight hours per day, six days per week, and 12 months per year. Seasonal businesses shall be open eight hours per day and six days per week during the normal seasonal period.

   Agriculture is the science or art of cultivating the soil, producing crops, or raising livestock of any kind and in varying degrees preparing these products for marketing and consumer use. Rural agricultural businesses shall be located in rural areas in order to be eligible.

   The following is a list of eligible rural agricultural businesses (see last page of this appendix for a list if ineligible facilities):
   - Agricultural Equipment
   - Commodity storage/elevator
   - Farm implement dealer
   - Food, seed, fertilizer store
   - Greenhouse
   - Humane society
   - Kennel
   - Orchard/produce sales
   - Tree farm, nursery
   - Veterinary clinic
   - Welding and machine shop for agricultural equipment

8. **Tourist Oriented Business** – Minn. Stat. Sec. 160.292 Subd. 25 defines a tourist-oriented business as "(a) a business, service, or activity that receives a major portion of its income or visitors during the normal business season from motorists not residing in the immediate area of the business or activity. (b) Tourist-oriented business includes, but is not limited to (1) a greenhouse or nursery, (2) a bait and tackle shop, (3) a marina, and (4) a gift or antique shop."

   A Tourist Oriented business shall have a majority of its retail floor space dedicated to the specific type of business for which signing is being requested. Year-round businesses shall be open a minimum of eight hours per day, six days per week, and 12 months per year. Seasonal businesses shall be open eight hours per day and six days per week during the normal seasonal period.

   The following is a list of businesses that are eligible for signs (see last page of this appendix for a list of ineligible facilities).
   - Amusement park
   - Antiques, antique shop (where greater than 50% of total inventory is 50+ years old)
   - Archery range
   - Bait and tackle
   - Bookstore (where greater than 25% of total inventory is 50+ years old)
   - Gift, craft, art sales
   - Marina, boat launch, guide service
   - Miniature golf
   - Recreational rentals (bicycle, boat, canoe, jet ski, snowmobile)
   - Riding stable
   - Trap and skeet shooting range
   - Wildlife park, animal park.

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Specific Services Signing Program, continued.

In addition to the general criteria for all signing programs, all of the following criteria apply for the Specific Service Signing Program:

1. Specific Service signs may be installed in rural areas at at-grade intersections on conventional highways and expressways, and on rural bypasses of outstate municipalities that have interchanges at intersections of trunk highways with local roads or with other trunk highways.

2. A Specific Service sign is allowed on an approach to an intersection if either one or both sides of the approach meets less than four of the following factors:
   - Within corporate limits and/or zoned (residential, commercial, industrial)
   - Curb and gutter
   - Sidewalk/trail
   - Continuous street lighting
   - Posted speed limit of 45 mph or less
   - Multi-lane divided highway
   - Established local road system
   - Frontage roads

3. Minnesota Statutes are not perfectly clear on urban qualifying businesses to be signed from rural intersections. The general authorization for each of the four basic combinations of specific service/intersection locations is summarized as follows:
   a. Service rural, intersection rural - authorized
   b. Service rural, intersection urban - not qualified
   c. Service urban, intersection urban - not qualified
   d. Service urban, intersection rural - need consideration of the following:
      I. The environment of the rural intersection as well as municipal boundaries.
      II. Straight ahead signing if overlapping routes are involved and one route does not serve the municipality.

4. In order be considered for signing on trunk highways, the following criteria shall be met by the specific service requesting signing:
   a. Businesses shall conform with all applicable laws and rules concerning the provisions for public accommodation without regard to race, religion, color, sec, or national origin.
   b. Businesses shall be located within 15 miles of the signed intersection or interchange.

5. Signing shall not be provided if the facility is readily visible or if effective off right-of-way directional signing is present or can be provided. Visibility from the approach to an intersection may be determined by adding 175 feet to Condition B (deceleration to 10 mph from the posted speed) in MN MUTCD Table 2C-4. If the facility can be readily identified or if effective off right-of-way directional signing is legible at this distance or beyond, then signing is not allowed.

6. A facility is limited to signing at one intersection or interchange on the trunk highway system. Additional signing may be considered when the facility is located between, or approximately equal distance from, two or more trunk highways.

7. When a place of business is located off a conventional highway and can be served by two intersections with a local road (e.g. a bypass), one sign may be installed at each of the two intersections to provide the shortest route for motorists on the conventional highway. See Figure 6.36B.

8. A facility that meets eligibility criteria from only one approach to an intersection or interchange shall only be signed from that approach.

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Ineligible Facilities

NOTE: This list is <u>not</u> all-inclusive. It only contains frequently requested signs that are routinely denied or have been determined by MnDOT to be ineligible for signing.

American Legion/VFW and other "fraternal" Facilities	Live Theater (orchestra, band concert)
Athletic Fields	Lumber Yards
Barber Shops	Movie Theaters
Bowling Alleys	Nursing/Senior Citizens Homes or Centers
Butcher Shops	Office Buildings or Facility (Private)
Car Sales/Service/Rentals	Office Parks
Car Washes	Performing Arts Theaters
Carpet Sales	Pet Shops
Cemeteries (except national cemeteries)	Post Offices
Compost Sites	Recreation Equipment Sales/Service
Convenience Stores	Recreational Vehicle sales/service/rental
Correctional Facilities (local and regional)	Rehabilitation Centers
Dance Halls	Repair Business
Day Care Centers	Road Maintenance Facilities
Drive-In Theaters	RV sales/service/rental
Fish Hatcheries	Schools (Elementary, Junior High)
Flea Markets	Second Hand Stores
Forest Preserves (county, state, or federal)	Shopping Centers (other than regional malls)
Game Farms and Preserves	Softball, Baseball, Soccer Fields
Grocery Stores	Sportsman Clubs
Gun Shops	Storage Facilities
Half-way House/Shelter Houses	Swimming Beaches/Pools
Hardware Stores	Tennis Courts
Health Clubs	Veterans Homes
Ice Cream Shops	Wildlife Treatment Facilities
Laundromats	Any other predominately retail, business or manufacturing center

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5.3 Requester Pay Memo

The following is a handout of Technical Memorandum No. 12-02-T-01 dates January 23, 2012.

Updates to Tech Memos can be found at http://techmemos.dot.state.mn.us/.

HANDOUT

MINNESOTA DEPARTMENT OF TRANSPORTATION
Engineering Services Division
Technical Memorandum No. 12-02-T-01
January 23, 2012

To: Electronic Distribution Recipients

From: Jon M. Chiglo, P.E.
Division Director, Engineering Services

Subject: Requester-Pay Signing Costs

Expiration
This Technical Memorandum (TM) supersedes TM 11-08-T-03 and will remain in effect until January 23, 2017, unless superseded prior to that date.

Implementation
This technical memorandum, which updates signing costs currently specified in the Traffic Engineering Manual, shall be effective immediately.

Introduction
Requester-pay signs include, but are not limited to, signs for local street and road identification, airports, educational institutions, regional shopping centers, tourist and travel information, economic development and major and minor traffic generators. Major traffic generators are regional attractions which are unique due to their educational, cultural, historical, or recreational experience and public appeal. Examples of minor traffic generators include museums, public water accesses, parks, ski areas, and recycling centers. Requester-pay signs also include Specific Service Signs. Further explanation of these signs can be found in Chapter 6 of the MnDOT Traffic Engineering Manual. Requester-pay sign costs are currently specified in Chapter 6 in the MnDOT Traffic Engineering Manual.

Purpose
The purpose of this technical memorandum is to establish current costs for all types of requester-pay signs, including Specific Service Signs. The costs in this technical memorandum will be reviewed annually and reissued in new technical memoranda as necessary.

Guidelines

Requester-Pay Signing Costs
The cost for requester-pay signs is composed of a base cost plus a fabrication cost. The base cost includes preparation and installation expenses. The fabrication cost is a per square foot cost based on current prices for full cube prismatic retroreflective sheeting, new aluminum substrate, colored electronic cuttable film, and labor for fabricating each sign. Overhead charges are included in all costs.

The assumptions used to develop the costs in the original Technical Memorandum 97-19-T-06 were also used to develop the current costs contained in Tables 1-3 (see attachment).

All labor costs are based on average hourly wages and benefits for each classification of worker. The average trip is assumed to be 40 miles. The return trip is not charged because it is assumed that other work will be done on the trip. No costs have been included for maintenance.

Specific Service Signs
The charges in Table 4 for Specific Service Signs have been derived from the other attached tables and cost analysis chart for a 9-square-foot sign panel.

-MORE-

HANDOUT

Questions
For information on the technical contents of this memorandum, please contact **Heather Lott,** State Signing Engineer at **(651) 234-7371.**

Any questions regarding publication of this Technical Memorandum should be referred to the Design Standards Unit, DesignStandards.DOT@state.mn.us. A link to all active and historical Technical Memoranda can be found at http://techmemos.dot.state.mn.us/techmemo.aspx.

To add, remove, or change your name on the Technical Memoranda mailing list, please visit the web page http://techmemos.dot.state.mn.us/subscribe.aspx

Attachments:
A. Tables (1 - 4)
B. Cost analysis chart

-END-

Attachment A
TM 12-02-T-01
January 23, 2012
Page 1 of 2

HANDOUT

REQUESTER PAY SIGN COSTS

Table 1: Initial Sign Structure and Sign Panel

Sign size	Total Cost [Base Cost] + [(Cost per sq ft) * sq ft of sign panel]	
	Base Cost (1)	Cost per sq ft (2)
up to 20 sq ft	$678.00	$19.60
20 - 50 sq ft	$777.00	$19.60
50.1 - 90 sq ft	$904.00	$20.50

Notes:
(1) Includes structural materials, equipment, and installation labor costs.
(2) Includes aluminum, sheeting materials and panel fabrication costs.

Table 2: Replace Sign Panel Only

Sign size	Total Cost [Base Cost] + [(Cost per sq ft) * sq ft of sign panel]	
	Base Cost (1)	Cost per sq ft (2)
up to 20 sq ft	$216.00	$19.60
20 - 50 sq ft	$258.00	$19.60
50.1 - 90 sq ft	$300.00	$20.50

Notes:
(1) Includes structural materials, equipment, and installation labor costs.
(2) Includes aluminum, sheeting materials and panel fabrication costs.

HANDOUT
HANDOUT
HANDOUT

Attachment A
TM 12-02-T-01
January 23, 2012
Page 2 of 2

HANDOUT

Table 3: Sign Relocation Costs

Sign size	Cost to move in place sign
0 - 20 sq ft	$339.00
20.1 - 50 sq ft	$382.00
50.1 - 90 sq ft	$424.00

Table 4: Specific Service Sign Costs

Work Type	Total Cost
Initial Sign Structure and Panel Installation	$854.00
Replace Sign Structure and Sign Panel	$629.00
Replace Sign Structure or Relocate	$453.00
Replace Sign Panel	$392.00

HANDOUT

Attachment B
TM 12-02-T-01
January 23, 2012
1 of 1

REQUESTER-PAY SIGN COSTS

				SIGN SIZE BY CATEGORY					
				up to 20 sq ft		20 - 50 sq ft		50 - 90 sq ft	
Labor (includes the Labor Additive of 27.2% AND Maintenance/Billing Overhead of 21.5			Rate/hr	hr	equal	hr	equal	hr	equal
1 TGS to field spot sign location and draw up plans for TSS work order			**45**	2.5	$ 112.50	2.5	$ 112.50	2.5	$ 112.50
1 TGS to locate			**45**	1	$ 45.00	1	$ 45.00	1	$ 45.00
2 TG's to install			**42.18**	4	$ 168.72	5	$ 210.90	6	$ 253.08
2 TG's to relocate and/or remove 1 sign			**42.18**	2	$ 84.36	2	$ 84.36	2	$ 84.36
					$ 410.58	0	$ 452.76	0	$ 494.94
Sign Structure (includes the Material Handling Charge of 12.59%)					$ 113.49	0	$ 170.24	0	$ 255.35
Equipment (includes Maintenenace/Billing Overhead of 21.5%)									
Use average trip mileage of 40 miles	rate /mile	miles	equal						
1/2 ton extended cab pickup for field spotting	**0.7**	40	$ 28.00						
1/2 ton extended cab pickup for locating	**0.7**	40	$ 28.00						
Sign Truck for sign installation	**2.44**	40	$ 97.60						
			$ 153.60		$ 153.60		$ 153.60		$ 153.60
TOTAL BASE COST					$ 677.67		$ 776.60		$ 903.89
SIGN PANEL FABRICATION COST PER SQ. FT.					$ 19.56		$ 19.56		$ 20.45

HANDOUT

HANDOUT

5.4 External Sign Variance Committee

MnDOT retains the authority to deny requests for signing where acceptable standards cannot be met, including locations where other supplemental guide signs are already in place. Requests denied based on Minnesota statutes or engineering standards (i.e. insufficient space and design standards) may not be appealed. At the discretion of the District Traffic Engineer, signing requests denied based on MnDOT policy may be appealed to the External Sign Variance Committee (ESVC).

The ESVC is composed of persons outside of MnDOT who meet periodically to consider various requests for signing. The group serves as a variance committee making recommendations to the Commissioner's Office on signing requests that have been denied by the district office. They review requests to see if the denials can be substantiated to have negative effects on the requester and/or motorists. The ESVC also reviews policies and criteria on informational signing matters.

The Chairperson is a MnDOT employee who serves in a non-voting capacity to organize and schedule all functions of the ESVC. This individual serves as secretary and records decisions on sign variance requests. The chair represents the ESVC, not MnDOT, on all matters pertaining to the ESVC.

The procedures for this Committee are as follows:

1. A requester who has been denied signing by the district office and is interested in appealing the decision must submit a written request for a hearing by the ESVC. The requester should contact the chair of the ESVC directly, and will then be advised of procedures and meeting date. The ESVC hears the requester's appeal and MnDOT's presentation separately. The recommendations of the ESVC will be based on pertinent factors, and will always consider the degree of financial hardship to the requester and safety implications.
2. For each signing request, the recommendations made by the ESVC and the State Traffic Engineer are forwarded to the Commissioner's Office for review. Presentations on each request are made to a special committee (Internal Sign Variance Committee) appointed by the Commissioner for final concurrence or denial. The requester and the district involved will be notified by the chair of the ESVC of the decision made by the Commissioner.
3. If the ESVC and the Commissioner approve the variance, the letter from the ESVC will notify the requester and the District Traffic Engineer with additional instructions. The requester will then work with the MnDOT District responsible for installing the sign to complete the process. All costs pertaining to signing will be the responsibility of the requester.
4. If the ESVC and the Commissioner deny the variance, the requestor will be unable to reapply unless there is a significant change in the request.
5. If the requestor is unable to attend the appointed ESVC meeting, they are required to notify the ESVC Chairperson at least 48 hours prior to the meeting date. Nonattendance without prior notification will result in an automatic denial for the facility. The requestor cannot present to the ESVC again unless there is a significant change in their request.

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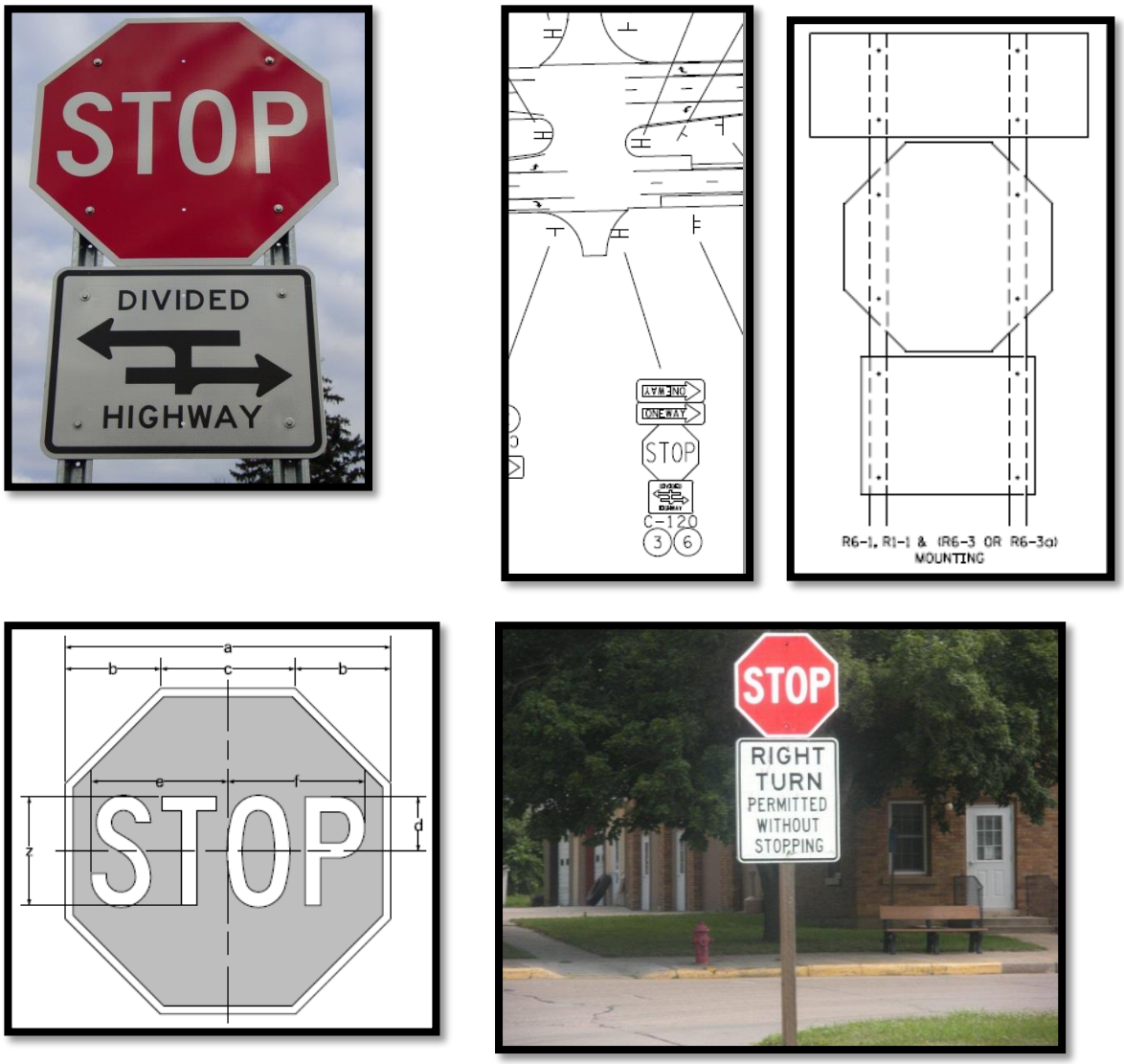
6. SIGN COMPONENTS

In this chapter, you will be introduced to some common pictures of traffic signs and sign components. In addition, refer to the next chapter for a discussion on a signing plan set and the Appendix for a copy of a sample plan.

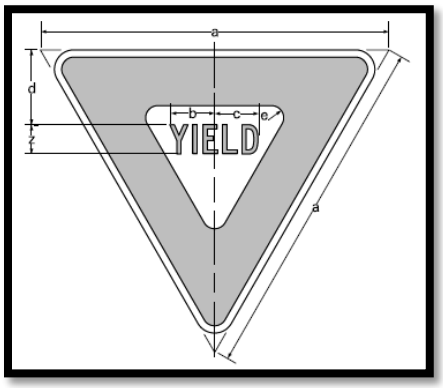
6.1 Common Signs

Exhibit 6-1 Stop Signs



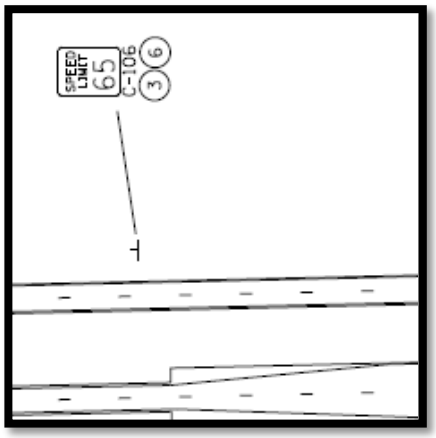
The picture on the upper left is a stop sign (R1-1) on a divided highway. The image in the upper right is a sample stop sign layout on a signing plan set. The lower left is the layout of a stop sign in the Standard Signs Manual. The image in the lower right is a stop sign on a wood post with a Right Turn Permitted Without Stopping sign.

Exhibit 6-2 Yield Signs



The image on the left is a picture of a yeild sign and the image on the right is from the Standard Signs Manual.

Exhibit 6-3 Speed Limit Sign

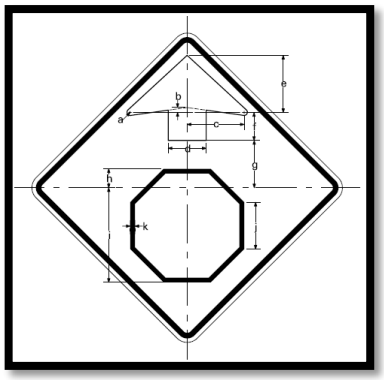


The picture in the upper left is a Speed Limit sign mounted on U-Post. Notice the single knee brace on the back of the sign. The image on the right is from the Standard Signs Manual. The image to the left is a Speed Limit Sign as layed out on a signing plan.

Exhibit 6-4 Lane Use Signs

Images of a Lane Use Sign in advance of an intersection.

Exhibit 6-5 Stop Ahead Signs



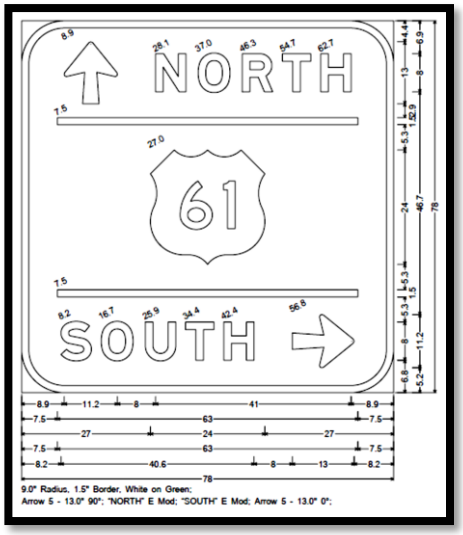
Images are of a Stop Ahead Warning sign and the layout per the Standard Sign Manual.

Exhibit 6-6 School Crossing Signs

Images of a School Crossing sign and the layout from the Standard Signs Manual.

Exhibit 6-7 Guide Signs

The image on the left is of a Directional Guide Sign. The images in the middle are from the SignCad® software which MnDOT uses to design Guide Signs. The bottom sign is a series of guide signs on a structure.



6.2 Sign Structures

Exhibit 6-8 Sign on Telespar® Square Post

The image on the left is a picture of a sign on a series of square posts. The image on the center is a closeup picture of a squre (Telespar®) post and the picture on the right is a concrete mounted post.

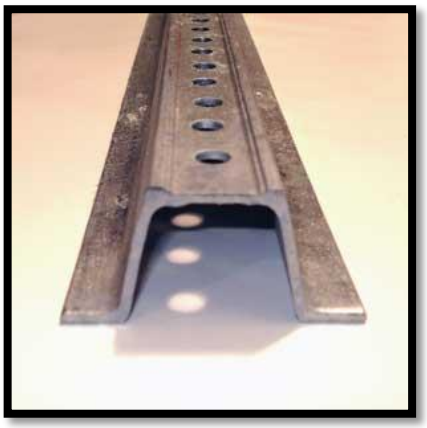
Exhibit 6-9 Cantilever Guide Sign Mounting

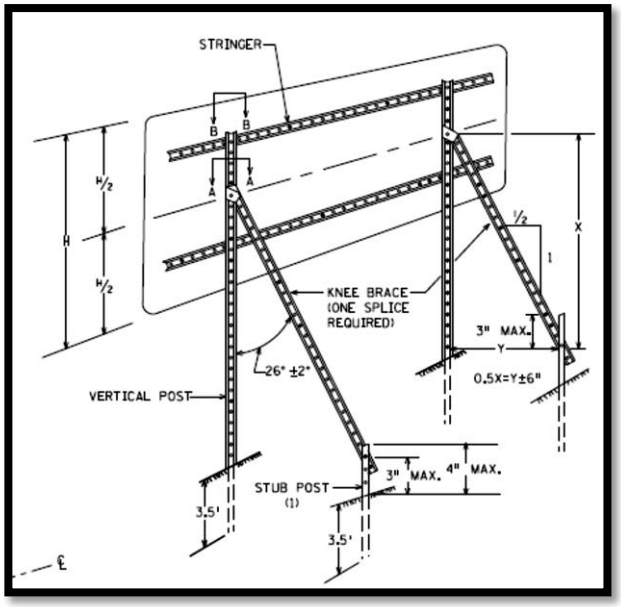
The above pictures show a sign structure and concrete foundation.

Exhibit 6-10 Truss Structure Guide Sign Mounting

Above are pictures of a sign truss structure for guide signing.

Exhibit 6-11 U-Post Mounted Signs with Knee Braces





The images above show a variety of signs mounted with U-posts and knee braces. In this instance, the sign requires two knee braces.

Exhibit 6-12 Traffic Signal Mounted Signs

6.3 Other Signs

Exhibit 6-13 Minnesota Sesquicentennial Sign Installation

Exhibit 6-14 Six Panel Logo Signs

A six panel logo sign.

Exhibit 6-15 Memorial Signing

The rectangular brown sign is for memorial signing. Here it is shown mounted with a variety of other sign groups.

6.4 Sign Degradation

Exhibit 6-16 Hidden and Faded Guide Sign

6.5 Sign Installations and Maintenance

Exhibit 6-17 Sign Removal

Exhibit 6-18 Repairing Signs

Images of maintenance crews repairing guide signs.

Exhibit 6-19 Flashing Stop Sign Installation

Installation of a Stop sign with a flashing border.

Exhibit 6-20 Installing Mast Arm Signing

Various images of sign crews installing signs on traffic signal mast arms. Notice the size of the sign and the equipment required for this operation.

Exhibit 6-21 Images of Sign Hit by Contractor Equipment

Exhibit 6-22 Images of Sign Hit by Vehicle

7. SIGNING PLAN SETS

7.1 Design

Standard detail sheets for signing plans can be found on the OTST website: http://www.dot.state.mn.us/trafficeng/signing/plans.html**.** The plan format and sequence of details is as follows:

1. Title sheet.
2. Statement of Estimated Quantities.
3. Utility Sheet.
4. Sign tabulation sheets giving pertinent information for each sign.
5. Traffic barrier data sheets.
6. Roadway plan sheets for signing.
7. Sign panel drawings for all non-standard signs.
8. Standard details.
9. Structural details.
10. Electrical details.
11. Cross sections for Type A and Type OH signs

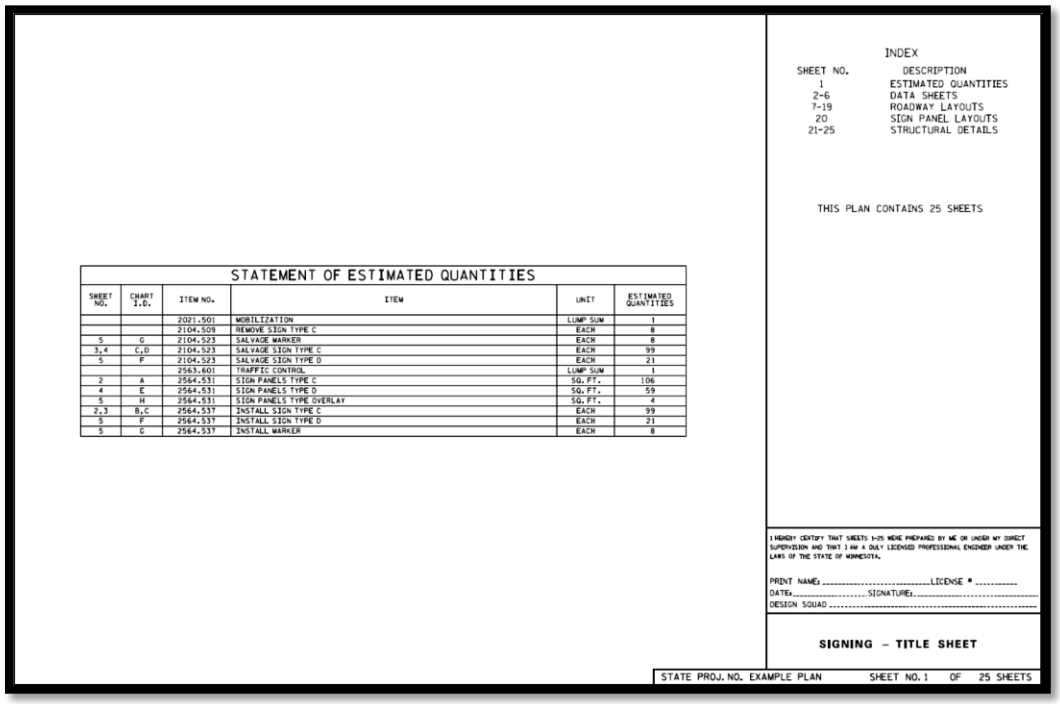
Final signal plans should be prepared on 11” x 17” plan sheets.

The licensed professional engineer responsible for or under whose supervision the work is performed shall sign the title sheet.

A sample plan set is included in the Appendix in Section **10.2** on page **10-7**. Most of the images shown in this Chapter come from the sample plan set. To see them in larger detail, refer to the Appendix handout. In addition, a few of the images come from other sources to illustrate items that may not be included in the sample plan.

7.2 Title Sheet / Estimate of Quantities

The Title Sheet includes information such as the title block, project location, governing specifications, etc. A sample title sheet is shown below from the sample plan. This includes the estimate of quantities. The second image is from a different sample plan and illustrates a more detailed title sheet.



INDEX

SHEET NO.	DESCRIPTION
1	ESTIMATED QUANTITIES
2-6	DATA SHEETS
7-19	ROADWAY LAYOUTS
20	SIGN PANEL LAYOUTS
21-25	STRUCTURAL DETAILS

THIS PLAN CONTAINS 25 SHEETS

STATEMENT OF ESTIMATED QUANTITIES

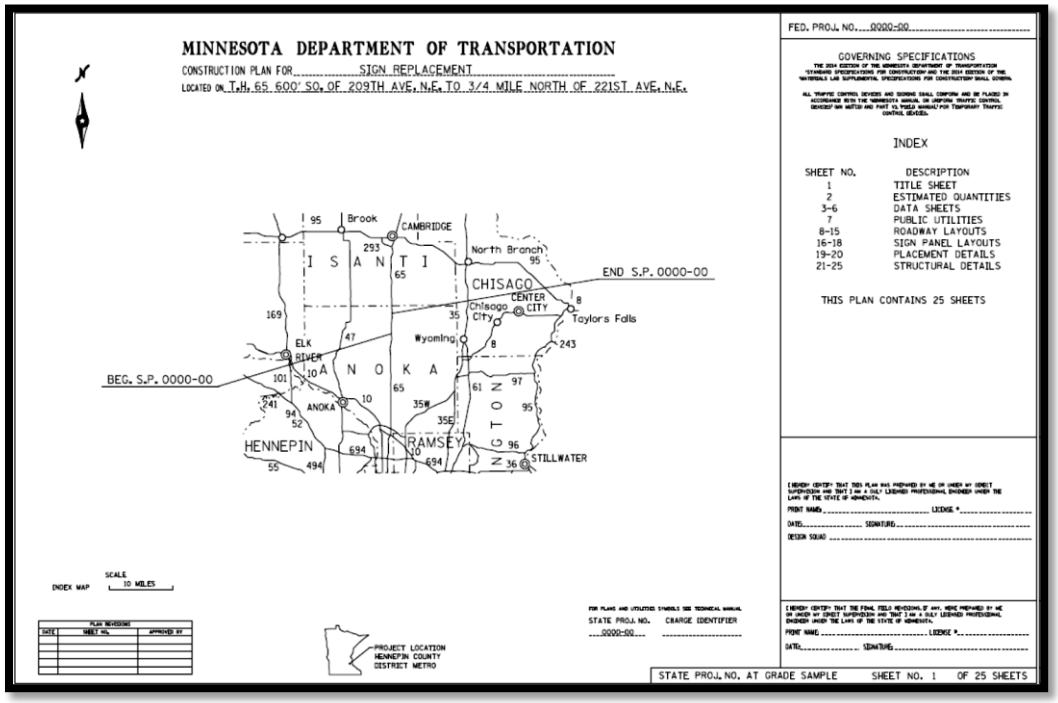
SHEET NO.	CHART I.D.	ITEM NO.	ITEM	UNIT	ESTIMATED QUANTITIES
		2021.501	MOBILIZATION	LUMP SUM	1
		2104.509	REMOVE SIGN TYPE C	EACH	8
5	G	2104.523	SALVAGE MARKER	EACH	8
3,4	C,D	2104.523	SALVAGE SIGN TYPE C	EACH	99
5	F	2104.523	SALVAGE SIGN TYPE D	EACH	21
		2563.601	TRAFFIC CONTROL	LUMP SUM	1
2	A	2564.531	SIGN PANELS TYPE C	SQ. FT.	106
4	E	2564.531	SIGN PANELS TYPE D	SQ. FT.	59
5	H	2564.531	SIGN PANELS TYPE OVERLAY	SQ. FT.	4
2,3	B,C	2564.537	INSTALL SIGN TYPE C	EACH	99
5	F	2564.537	INSTALL SIGN TYPE D	EACH	21
5	G	2564.537	INSTALL MARKER	EACH	8

I HEREBY CERTIFY THAT SHEETS 1-25 WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINT NAME: ..... LICENSE # .....
DATE: ..... SIGNATURE: .....
DESIGN SQUAD .....

SIGNING – TITLE SHEET

STATE PROJ. NO. EXAMPLE PLAN SHEET NO. 1 OF 25 SHEETS



MINNESOTA DEPARTMENT OF TRANSPORTATION

CONSTRUCTION PLAN FOR SIGN REPLACEMENT

LOCATED ON T.H. 65 600' SO. OF 209TH AVE. N.E. TO 3/4 MILE NORTH OF 221ST AVE. N.E.

FED. PROJ. NO. 0000-00

GOVERNING SPECIFICATIONS

THE 2014 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" AND THE 2014 EDITION OF THE "MN/DOT LAB SUPPLEMENTAL SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

ALL TRAFFIC CONTROL DEVICES AND SIGNING SHALL CONFORM AND BE PLACED IN ACCORDANCE WITH THE "MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND PART VI, "FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL DEVICES."

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	ESTIMATED QUANTITIES
3-6	DATA SHEETS
7	PUBLIC UTILITIES
8-15	ROADWAY LAYOUTS
16-18	SIGN PANEL LAYOUTS
19-20	PLACEMENT DETAILS
21-25	STRUCTURAL DETAILS

THIS PLAN CONTAINS 25 SHEETS

INDEX MAP SCALE 10 MILES

PLAN REVISIONS

DATE	SHEET NO.	APPROVED BY

PROJECT LOCATION HENNEPIN COUNTY DISTRICT METRO

FOR PLANS AND UTILITIES SYMBOLS SEE TECHNICAL MANUAL

STATE PROJ. NO. 0000-00 CHARGE IDENTIFIER

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINT NAME ..... LICENSE # .....
DATE ..... SIGNATURE .....
DESIGN SQUAD .....

I HEREBY CERTIFY THAT THE FINAL FIELD REVISIONS, IF ANY, WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINT NAME ..... LICENSE # .....
DATE ..... SIGNATURE .....

STATE PROJ. NO. AT GRADE SAMPLE SHEET NO. 1 OF 25 SHEETS

7.2.1 Plan Description and Location

This defines the type of work being performed and the location of the work. The location identified should list intersections from west to east or south to north.

MINNESOTA DEPARTMENT OF TRANSPORTATION

CONSTRUCTION PLAN FOR TRAFFIC SIGNS AND DEVICES

LOCATED ON FROM TO

7.2.2 Governing Specifications and Index of Sheets

This defines the governing specifications for the project, the project funding and the index of the sheets contained within the plan set. Generally it is located in the upper right hand corner of the title sheet, under the Federal Project number or statement "STATE FUNDS".

If designed in metric units, there must also be a statement to the left of this box: "Attention, this is a metric plan".

GOVERNING SPECIFICATIONS

THE 2014 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" AND THE 2014 EDITION OF THE "MATERIALS LAB SUPPLEMENTAL SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

ALL TRAFFIC CONTROL DEVICES AND SIGNING SHALL CONFORM AND BE PLACED IN ACCORDANCE WITH THE "MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MN MUTCD) AND PART VI, "FIELD MANUAL" FOR TEMPORARY TRAFFIC CONTROL DEVICES.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	ESTIMATED QUANTITIES
3-6	DATA SHEETS
7	PUBLIC UTILITIES
8-15	ROADWAY LAYOUTS
16-18	SIGN PANEL LAYOUTS
19-20	PLACEMENT DETAILS
21-25	STRUCTURAL DETAILS

THIS PLAN CONTAINS 25 SHEETS

Always use the most current version of the governing specifications.

7.2.3 Plan Preparation Certification Note

This identifies:

- ✓ Who the plan set was developed by (or under the direct supervision of)
- ✓ That individual's state registration information.

I HEREBY CERTIFY THAT SHEETS 1-25 WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINT NAME: _____ LICENSE # _____
DATE: _____ SIGNATURE: _____
DESIGN SQUAD _____

7.2.4 Project Numbers and Sheet Numbers

The project numbers and sheet numbers are shown in the lower right hand corner of the title sheet and on all other sheets.

A SP in the project number stands for State Project. A SP is necessary for any project on a trunk highway signal. A SAP is a State Aid Project number indicating that the local agency is using State Aid funds to finance their share of the project. If the project has federal funding the SAP becomes a SP. All state aid numbers should be listed on all sheets to which they apply.

The general format for a SP is "CCNN-A". CC is the county number in alphabetical order (i.e., Anoka County is 02). NN is the control section number within the county unique to the roadway in the County. A is the number of the project on that control section (i.e., -269 means that there have been 268 other projects on this section of roadway prior to this project).

The general format for an SAP is CCC-NNN-A. CCC is a 3-digit city number, a two digit number is a county number. NNN is a number related to the roadway and project type. A is the number of the project in that city or county of that type.

STATE PROJ. NO. EXAMPLE PLAN SHEET NO. 1 OF 25 SHEETS

7.2.5 Signature Block

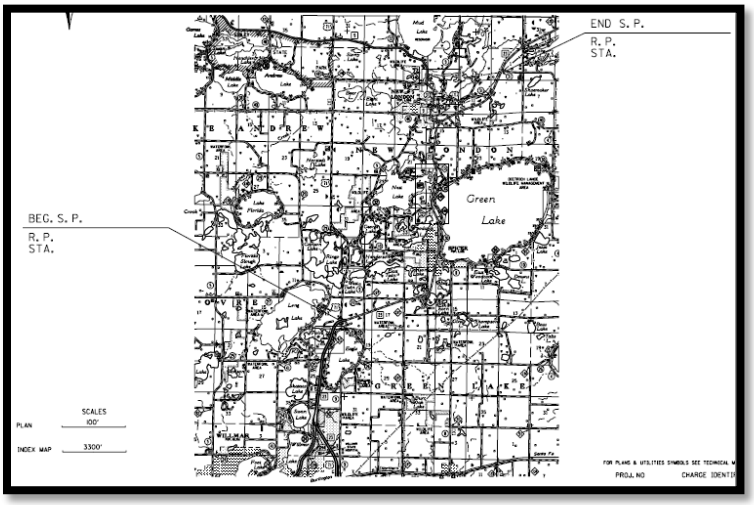
I HEREBY CERTIFY THAT SHEETS 1-25 WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINT NAME: _____ LICENSE # _____
DATE: _____ SIGNATURE: _____
DESIGN SQUAD _____

7.2.6 Index Map

The index map is used to identify the location of the project(s). Provide leader lines from the beginning and end of the project limits to the appropriate points on the map. This is generally located near the center of the title sheet.

If appropriate, identify all State Aid project numbers applicable to the project. Also, label all traffic signal systems.



7.2.7 Project Location

The information included in this block is the generalized location (county and city). This is generally located in the lower right part of the title sheet, left of the signature block and above the project number block.

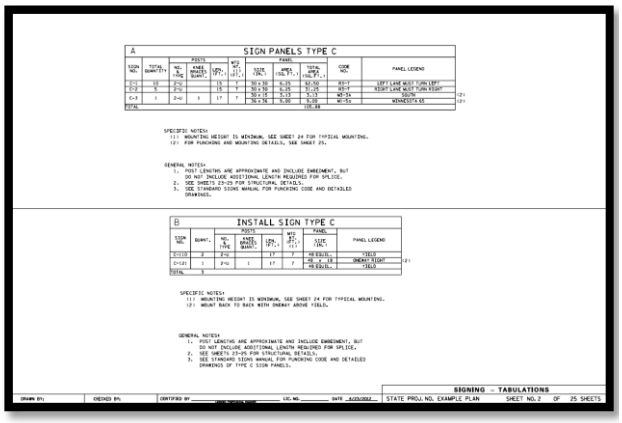
7.2.8 Plan Revisions Block

The block is included so that future plan revisions can be documented. This is generally located in lower center portion of the title sheet. Pencil in the charge identifier number. MnDOT plan processing will edit this as necessary.

PLAN REVISIONS		
DATE	SHEET NO.	APPROVED BY

7.3 Sign Data Sheets

The sign data sheets include a summary of data that is pertinent to the signs within the project area. Below are some examples of the sign data tables.



A SIGN PANELS TYPE C

SIGN NO.	TOTAL QUANT.	POSTS NO. & TYPE	POSTS PANEL QUANT.	POSTS LEN. (FT.)	POSTS WT. (LB./FT.)	PANEL SIZE (IN.)	PANEL AREA (SQ. FT.)	TOTAL PANEL (SQ. FT.)	CODE NO.	PANEL LEGEND
C-1	10	2-U		15	7	30 x 30	6.25	62.50	R3-7	LEFT LANE MUST TURN LEFT
C-2	5	2-U		15	7	30 x 30	6.25	31.25	R3-7	RIGHT LANE MUST TURN RIGHT
C-3	1	2-U	1	17	7	30 x 15	3.13	W1-3A	(2)	SOUTH
						36 x 36	9.00	W1-5A	(2)	MINNESOTA 65
TOTAL								106.88		

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM. SEE SHEET 24 FOR TYPICAL MOUNTING.
(2) FOR PUNCHING AND MOUNTING DETAILS, SEE SHEET 25.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEETS 23-25 FOR STRUCTURAL DETAILS.
3. SEE STANDARD SIGNS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS.

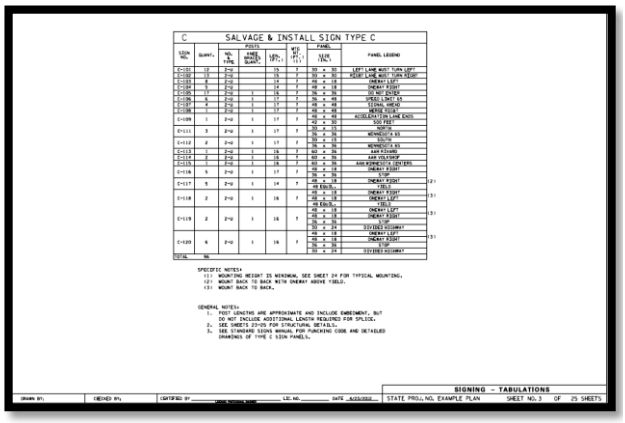
B INSTALL SIGN TYPE C

SIGN NO.	QUANT.	POSTS NO. & TYPE	POSTS PANEL QUANT.	POSTS LEN. (FT.)	POSTS WT. (LB./FT.)	PANEL SIZE (IN.)	PANEL LEGEND
C-110	2	2-U		17	7	48 EQUAL	YIELD
C-120	1	2-U	1	17	7	48 x 18	ONEWAY RIGHT (2)
						48 EQUAL	YIELD
TOTAL	3						

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM. SEE SHEET 24 FOR TYPICAL MOUNTING.
(2) MOUNT BACK TO BACK WITH ONEWAY ABOVE YIELD.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEETS 23-25 FOR STRUCTURAL DETAILS.
3. SEE STANDARD SIGNS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS OF TYPE C SIGN PANELS.

SIGNING - TABULATIONS
DRAWN BY: CHECKED BY: CERTIFIED BY: LIC. NO. DATE 4/23/2012 STATE PROJ. NO. EXAMPLE PLAN SHEET NO. 2 OF 25 SHEETS



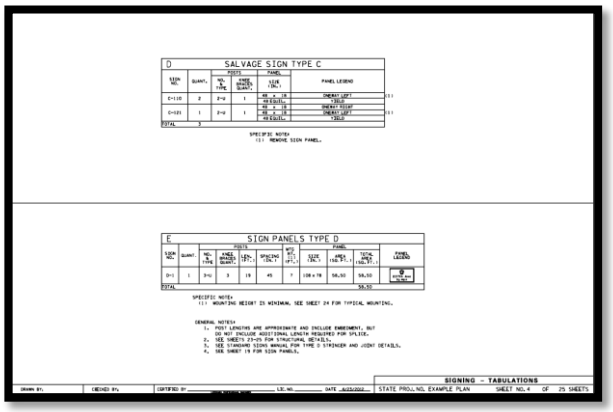
C SALVAGE & INSTALL SIGN TYPE C

SIGN NO.	QUANT.	POSTS NO. & TYPE	POSTS PANEL QUANT.	POSTS LEN. (FT.)	POSTS WT. (LB./FT.)	PANEL SIZE (IN.)	PANEL LEGEND
C-101	12	2-U		15	7	30 x 30	LEFT LANE MUST TURN LEFT
C-102	13	2-U		15	7	30 x 30	RIGHT LANE MUST TURN RIGHT
C-103	8	2-U		14	7	48 x 18	ONEWAY LEFT
C-104	13	2-U		14	7	48 x 18	ONEWAY RIGHT
C-105	13	2-U	1	14	7	36 x 36	DO NOT ENTER
C-106	6	2-U	1	17	7	36 x 48	SPEED LIMIT 65
C-107	4	2-U	1	17	7	48 x 48	SIGNAL AHEAD
C-108	1	2-U	1	17	7	48 x 48	BRIDGE SIGNAL
C-109	1	2-U	1	17	7	48 x 48	AUXILIARY/BALANCE EXCES
						42 x 30	500 FEET
C-111	3	2-U	1	17	7	36 x 36	STOP
						36 x 36	MINNESOTA 65
C-112	2	2-U	1	17	7	30 x 15	SOUTH
						36 x 36	MINNESOTA 65
C-113	1	2-U	1	16	7	60 x 36	ARM RICHARD
C-114	1	2-U	1	16	7	60 x 36	ARM RICHARD
C-116	1	2-U	1	16	7	60 x 36	ARM ROBERT PETERS
C-116	5	2-U	1	17	7	48 x 18	ONEWAY RIGHT
						36 x 36	STOP
C-117	5	2-U	1	14	7	48 x 18	ONEWAY RIGHT (2)
						48 EQUAL	YIELD
C-118	2	2-U	1	16	7	48 x 18	ONEWAY RIGHT (3)
						48 EQUAL	YIELD
						48 EQUAL	YIELD
C-119	2	2-U	1	16	7	48 x 18	ONEWAY LEFT
						48 x 18	ONEWAY RIGHT (3)
						36 x 36	STOP
						36 x 36	DIVIDED HIGHWAY
C-120	6	2-U	1	16	7	48 x 18	ONEWAY LEFT
						48 x 18	ONEWAY RIGHT (3)
						36 x 36	STOP
						30 x 24	DIVIDED HIGHWAY
TOTAL	96						

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM. SEE SHEET 24 FOR TYPICAL MOUNTING.
(2) MOUNT BACK TO BACK WITH ONEWAY ABOVE YIELD.
(3) MOUNT BACK TO BACK.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEETS 23-25 FOR STRUCTURAL DETAILS.
3. SEE STANDARD SIGNS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS OF TYPE C SIGN PANELS.

SIGNING - TABULATIONS
DRAWN BY: CHECKED BY: CERTIFIED BY: LIC. NO. DATE 4/23/2012 STATE PROJ. NO. EXAMPLE PLAN SHEET NO. 3 OF 25 SHEETS



D SALVAGE SIGN TYPE C

SIGN NO.	QUANT.	POSTS NO. & TYPE	POSTS PANEL QUANT.	PANEL SIZE (IN.)	PANEL LEGEND
C-110	2	2-U	1	48 x 18	ONEWAY LEFT (1)
				48 x 18	ONEWAY RIGHT
C-121	1	2-U	1	48 x 18	ONEWAY RIGHT (1)
				48 EQUAL	YIELD
TOTAL	3				

SPECIFIC NOTE:
(1) REMOVE SIGN PANEL.

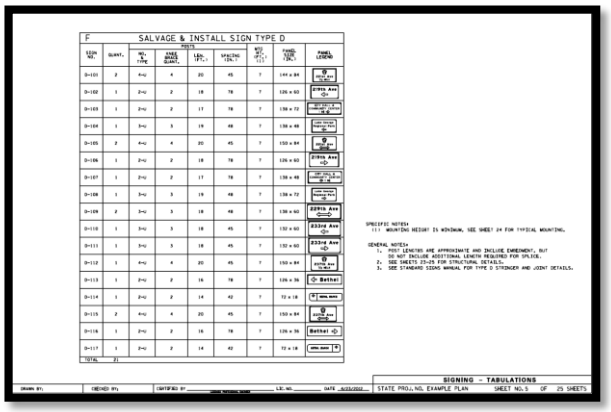
E SIGN PANELS TYPE D

SIGN NO.	QUANT.	POSTS NO. & TYPE	POSTS PANEL QUANT.	POSTS LEN. (FT.)	POSTS SPACING (IN.)	POSTS WT. (LB./FT.)	PANEL SIZE (IN.)	PANEL AREA (SQ. FT.)	TOTAL PANEL (SQ. FT.)	PANEL LEGEND
D-1	1	3-U	3	19	45	7	108 x 78	58.50	58.50	Stop Ahead
TOTAL									58.50	

SPECIFIC NOTE:
(1) MOUNTING HEIGHT IS MINIMUM. SEE SHEET 24 FOR TYPICAL MOUNTING.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEETS 23-25 FOR STRUCTURAL DETAILS.
3. SEE STANDARD SIGNS MANUAL FOR TYPE D STRINGER AND JOINT DETAILS.
4. SEE SHEET 19 FOR SIGN PANELS.

SIGNING - TABULATIONS
DRAWN BY: CHECKED BY: CERTIFIED BY: LIC. NO. DATE 4/23/2012 STATE PROJ. NO. EXAMPLE PLAN SHEET NO. 4 OF 25 SHEETS



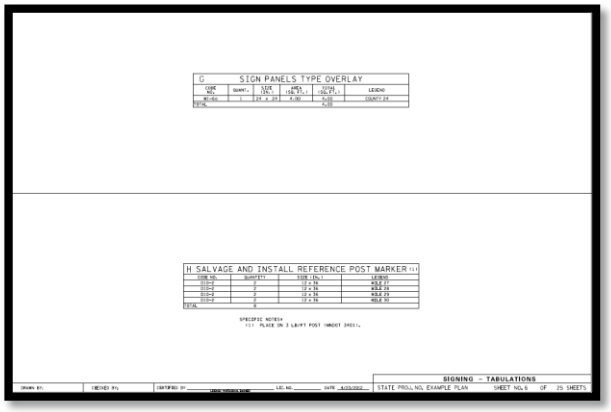
F SALVAGE & INSTALL SIGN TYPE D

SIGN NO.	QUANT.	POSTS NO. & TYPE	POSTS PANEL QUANT.	POSTS LEN. (FT.)	POSTS SPACING (IN.)	POSTS WT. (LB./FT.)	PANEL SIZE (IN.)	PANEL LEGEND
D-101	2	4-U	4	20	45	7	144 x 84	Stop Ahead
D-102	1	2-U	2	18	78	7	126 x 60	23rd Ave
D-103	1	2-U	2	17	78	7	138 x 72	Right Lane Must Turn Left
D-104	1	3-U	3	19	48	7	138 x 48	Left Lane Must Turn Right
D-105	2	4-U	4	20	45	7	150 x 84	Stop Ahead
D-106	1	2-U	2	18	78	7	126 x 60	23rd Ave
D-107	1	2-U	2	17	78	7	138 x 48	Left Lane Must Turn Left
D-108	1	3-U	3	19	48	7	138 x 72	Right Lane Must Turn Right
D-109	2	3-U	3	18	48	7	138 x 60	22nd Ave
D-110	1	3-U	3	18	45	7	132 x 60	23rd Ave
D-111	1	3-U	3	18	45	7	132 x 60	23rd Ave
D-112	1	4-U	4	20	45	7	150 x 84	Stop Ahead
D-113	1	2-U	2	16	78	7	126 x 36	Bethel
D-114	1	2-U	2	14	42	7	72 x 18	MN 65
D-115	2	4-U	4	20	45	7	150 x 84	Stop Ahead
D-116	1	2-U	2	16	78	7	126 x 36	Bethel
D-117	1	2-U	2	14	42	7	72 x 18	MN 65
TOTAL	21							

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM. SEE SHEET 24 FOR TYPICAL MOUNTING.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEETS 23-25 FOR STRUCTURAL DETAILS.
3. SEE STANDARD SIGNS MANUAL FOR TYPE D STRINGER AND JOINT DETAILS.

SIGNING - TABULATIONS
DRAWN BY: CHECKED BY: CERTIFIED BY: LIC. NO. DATE 4/23/2012 STATE PROJ. NO. EXAMPLE PLAN SHEET NO. 5 OF 25 SHEETS



G SIGN PANELS TYPE OVERLAY

CODE NO.	QUANT.	SIZE (IN.)	AREA (SQ. FT.)	TOTAL (SQ. FT.)	LEGEND
W1-6G	1	23 x 23	4.00	4.00	COUNTY 23
TOTAL				4.00	

H SALVAGE AND INSTALL REFERENCE POST MARKER (1)

CODE NO.	QUANTITY	SIZE (IN.)	LEGEND
D10-2	2	12 x 36	MILE 27
D10-2	2	12 x 36	MILE 28
D10-2	2	12 x 36	MILE 29
D10-2	2	12 x 36	MILE 30
TOTAL	8		

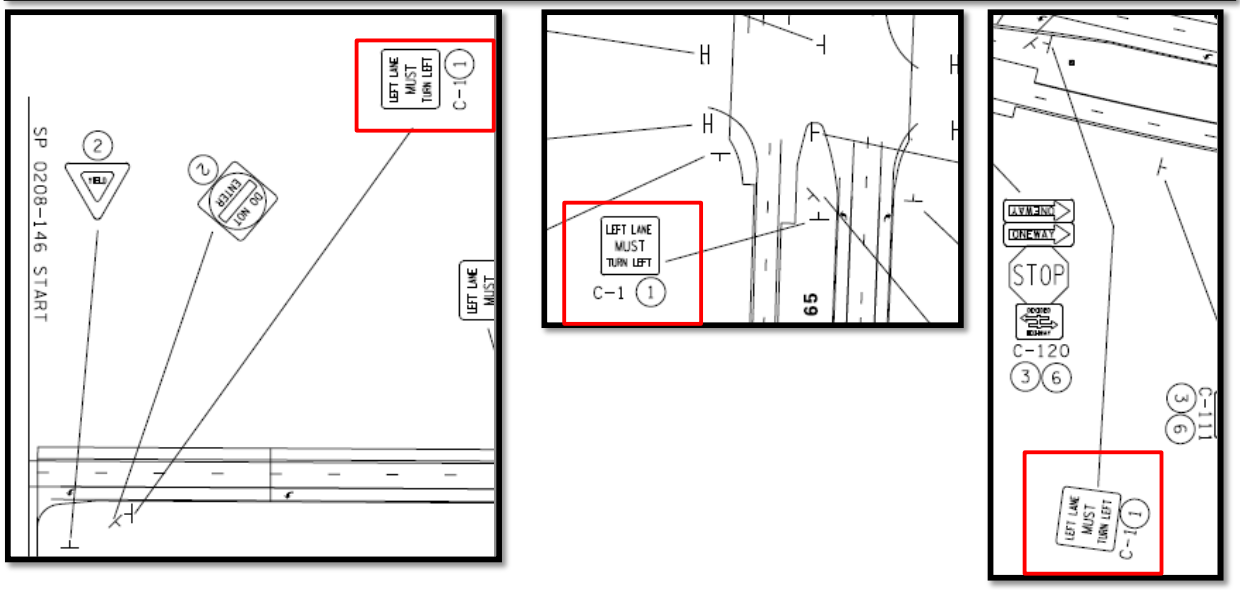
SPECIFIC NOTES:
(1) PLACE ON 3 LB/FT POST (WHOOT SHEET).

SIGNING - TABULATIONS
DRAWN BY: CHECKED BY: CERTIFIED BY: LIC. NO. DATE 4/23/2012 STATE PROJ. NO. EXAMPLE PLAN SHEET NO. 6 OF 25 SHEETS

A

SIGN PANELS TYPE C

SIGN NO.	TOTAL QUANTITY	POSTS NO. & TYPE	POSTS KNEE BRACES QUANT.	POSTS LEN. (FT.)	MTG HT. (1) (FT.)	PANEL SIZE (IN.)	PANEL AREA (SQ. FT.)	PANEL TOTAL AREA (SQ. FT.)	CODE NO.	PANEL LEGEND	
C-1	10	2-U		15	7	30 x 30	6.25	62.50	R3-7	LEFT LANE MUST TURN LEFT	
C-2	5	2-U		15	7	30 x 30	6.25	31.25	R3-7	RIGHT LANE MUST TURN RIGHT	
C-3	1	2-U	1	17	7	30 x 15	3.13	3.13	M3-3A	SOUTH	(2)
						36 x 36	9.00	9.00	M1-5a	MINNESOTA 65	(2)
TOTAL								105.88			

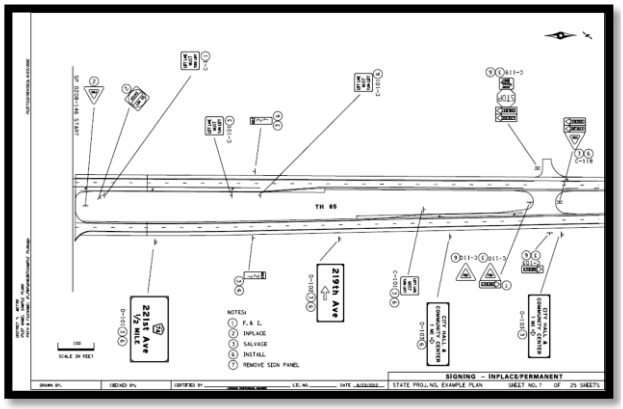


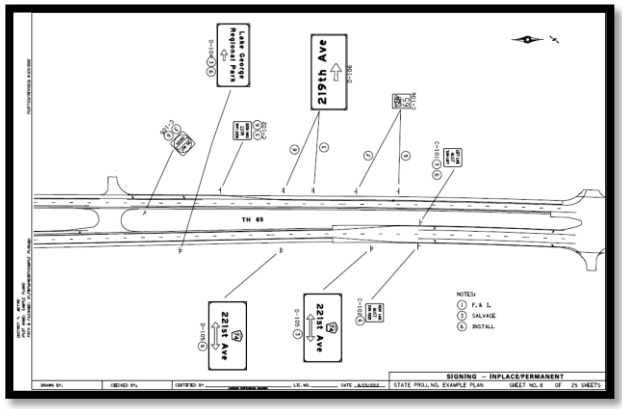
In the above image, the sign C-1 is boxed out on the Sign Panels Type C summary table and in three examples from the layout sheets. In the table, the following headings are used:

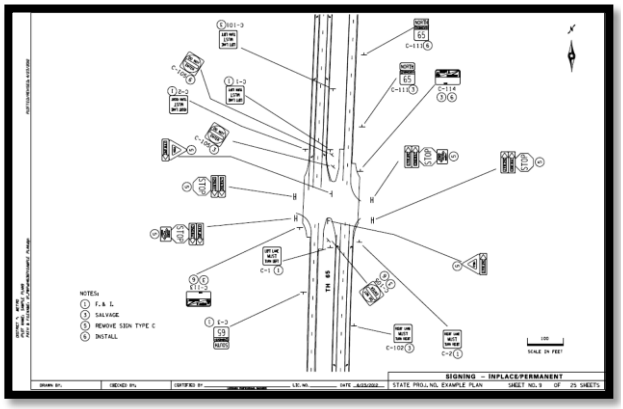
- ✓ SIGN NO. is the number of the sign
- ✓ TOTAL QUANTITY is the total number of signs found in the plan set
- ✓ POST: NO. & TYPE is the number of posts and type (2- U-Posts)
- ✓ POST: KNEE BRACES QUANT. Is the quantity of knee braces used (none in this example but sign C-3 has 1 knee brace.
- ✓ POST: LEN. (FT.) is the length of the U-post
- ✓ PANEL: SIZE (IN.) is the sign of the panel in length and height
- ✓ PANEL: AREA (SQ. FT.) is the area of the sign
- ✓ PANEL: TOTAL AREA (SQ. FT.) is the total area of the sign group
- ✓ CODE NO. is the nomenclature name of the sign
- ✓ PANEL LEGEND is the legend text found on the sign

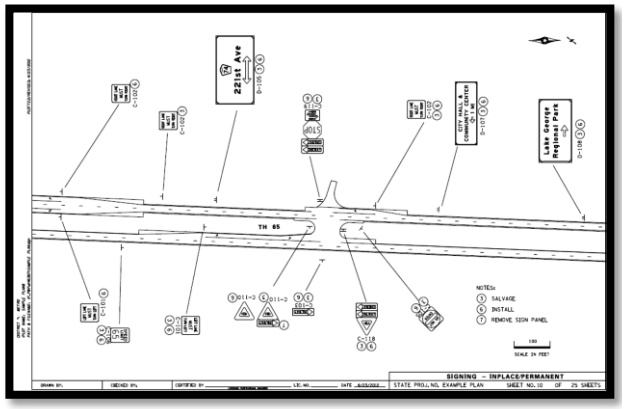
7.4 General Layout Sheets

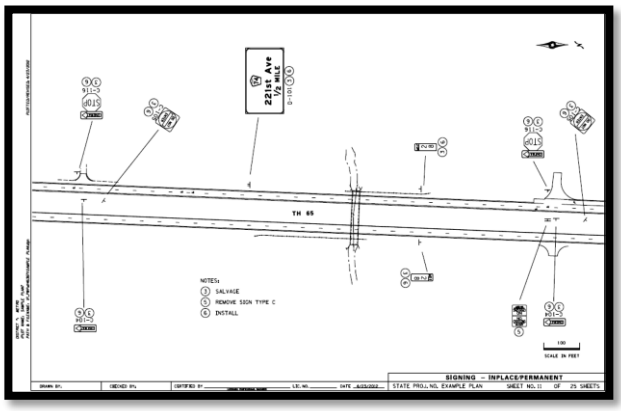
The general layout sheets show the layout of the signs within the project area. Refer to the sample plan set in the appendix for a larger image to show the detail.

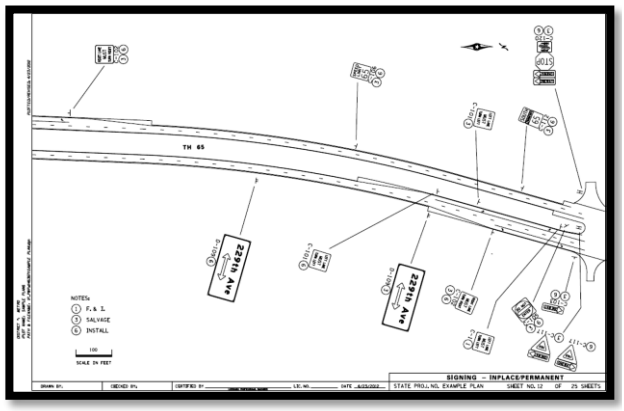


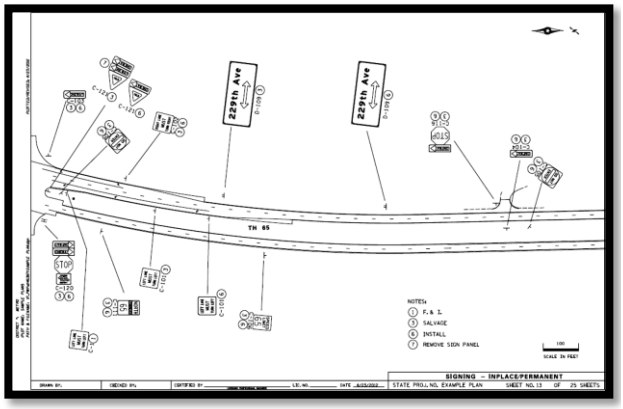


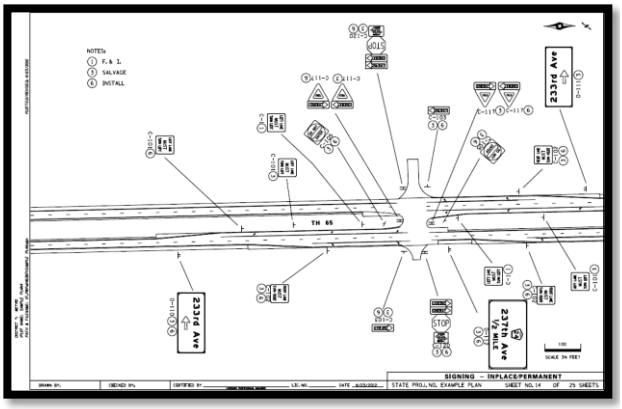


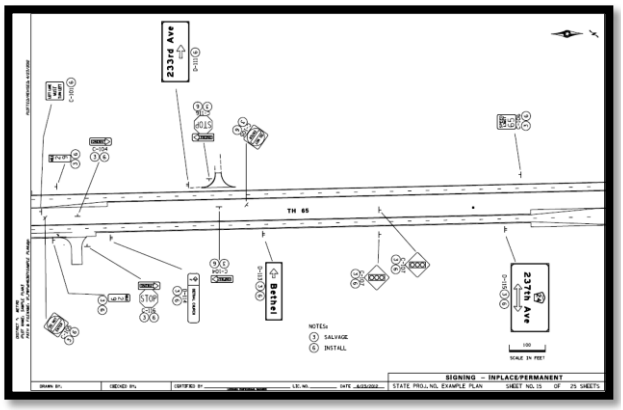


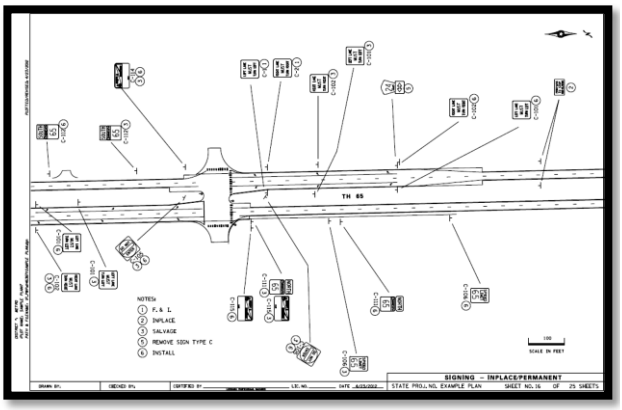


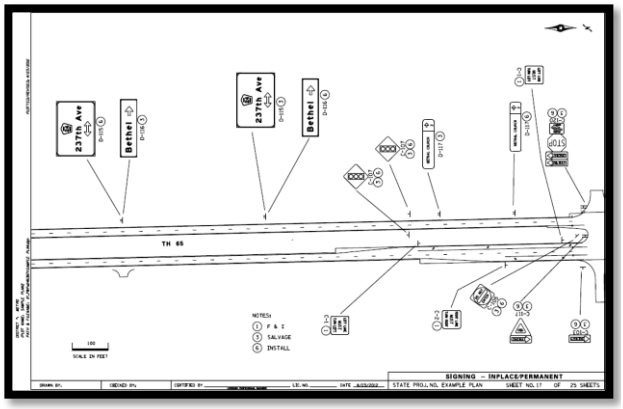


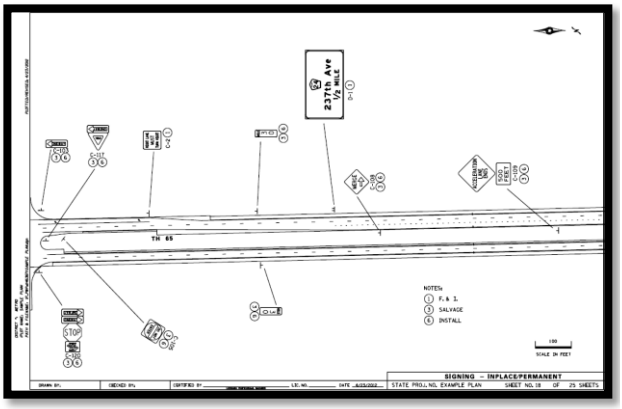

229th Ave
229th Ave
TH 65
STOP
NOTES:
1 F. & I.
5 SALVAGE
6 INSTALL
7 REMOVE SIGN PANEL
SCALE IN FEET
SIGNING - INPLACE/PERMANENT
STATE PROJ. NO. EXAMPLE PLAN
SHEET NO. 13 OF 25 SHEETS

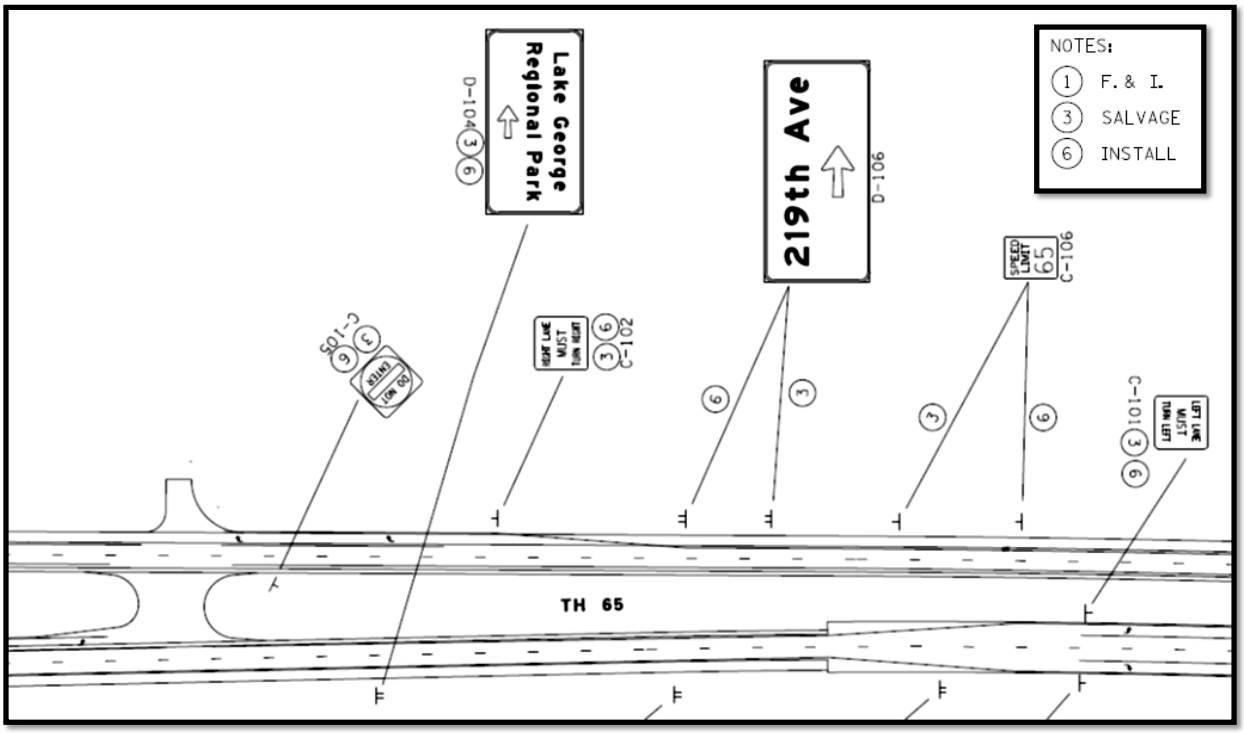

NOTES:
1 F. & I.
5 SALVAGE
6 INSTALL
233rd Ave
233rd Ave
TH 65
STOP
237th Ave
SCALE IN FEET
SIGNING - INPLACE/PERMANENT
STATE PROJ. NO. EXAMPLE PLAN
SHEET NO. 14 OF 25 SHEETS


Ave 233rd
TH 65
STOP
Bethel
237th Ave
NOTES:
5 SALVAGE
6 INSTALL
SCALE IN FEET
SIGNING - INPLACE/PERMANENT
STATE PROJ. NO. EXAMPLE PLAN
SHEET NO. 15 OF 25 SHEETS


TH 65
NOTES:
1 F. & I.
4 INPLACE
5 SALVAGE
6 REMOVE SIGN TYPE C
7 INSTALL
SCALE IN FEET
SIGNING - INPLACE/PERMANENT
STATE PROJ. NO. EXAMPLE PLAN
SHEET NO. 16 OF 25 SHEETS


237th Ave
Bethel
Ave 233rd
Bethel
TH 65
STOP
NOTES:
1 F. & I.
5 SALVAGE
6 INSTALL
SCALE IN FEET
SIGNING - INPLACE/PERMANENT
STATE PROJ. NO. EXAMPLE PLAN
SHEET NO. 17 OF 25 SHEETS


237th Ave
TH 65
STOP
NOTES:
1 F. & I.
5 SALVAGE
6 INSTALL
SCALE IN FEET
SIGNING - INPLACE/PERMANENT
STATE PROJ. NO. EXAMPLE PLAN
SHEET NO. 18 OF 25 SHEETS



The layout sheets show the detailed layout and location of the signs. The circles numbers are the notes that indicate the action. For instance, in the above image, the circled 1 is for Furnish and Install (F&I), the 3 is to Salvage the sign and the 6 is to install.

The notes on this sample plan are:

1 F & I for Furnish and Install

2 INPLACE – to indicate an inplace sign

3 SALVAGE – for signs that will be salvaged

4 REMOVE

5 REMOVE SIGN TYPE C – for type C signs removed

6 INSTALL – for signs that will be installed

7.4.1 Clear Zone Requirements

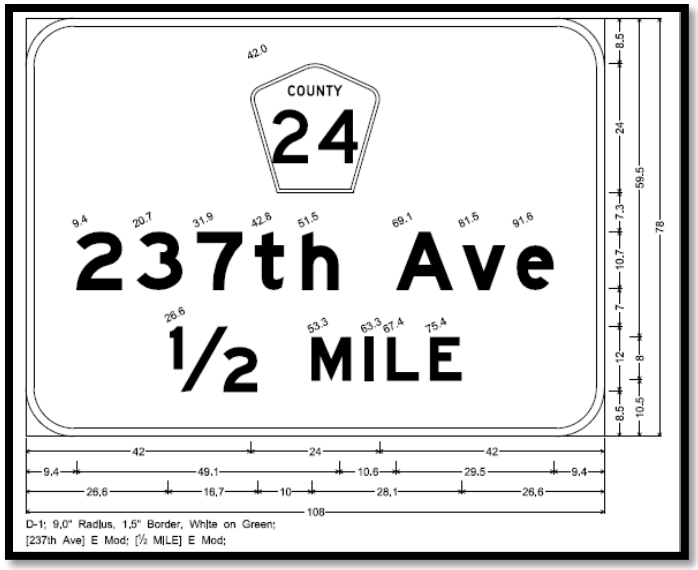
Clear Zones (from the Road Design Manual)

The roadside clear zone is the distance from the edge of the travel lane which should be free of any non-traversable hazard such as steep slopes or fixed objects. The clear zone distances are targeted towards allowing approximately 80 to 85 percent of all run-off-the-road vehicles to recover or come to a safe stop. The width of a clear zone along the horizontal alignment is dependent on roadside geometry, design speed, radius of horizontal curve, and the ADT. Higher speeds mean vehicles will travel farther before recovering. Horizontal curvature increases the likelihood of a vehicle leaving the highway and increases the distance it will travel off the highway, as will steeper fill slopes. In general, hazards within the clear zone which cannot be removed, relocated, or made breakaway will warrant guardrail.

The designer should not apply rigid adherence to the calculated clear zone distance. If a formidable hazard lies just beyond the clear zone, it should be removed or shielded if costs are reasonable. Conversely, the designer should not have the philosophy that the clear zone should be achieved at all costs. Limited right of way or unacceptable construction costs may lead to installation of a barrier or, perhaps, no protection at all if there are many hazards along the entire length of the roadway inside the calculated clear zone.

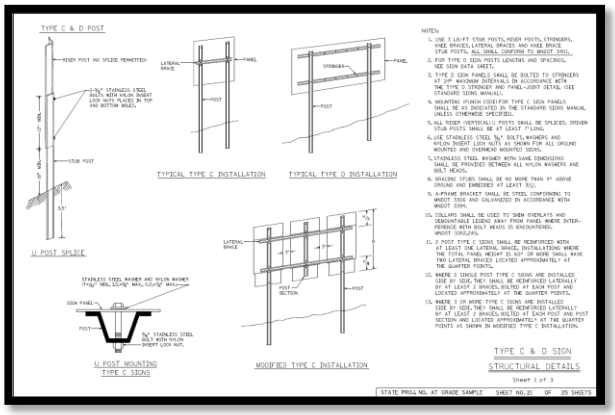
The designer should not use the clear zone distances as boundaries for introducing roadside hazards such as bridge piers, non-breakaway sign supports, or trees. These should be placed as far from the roadway as practical.

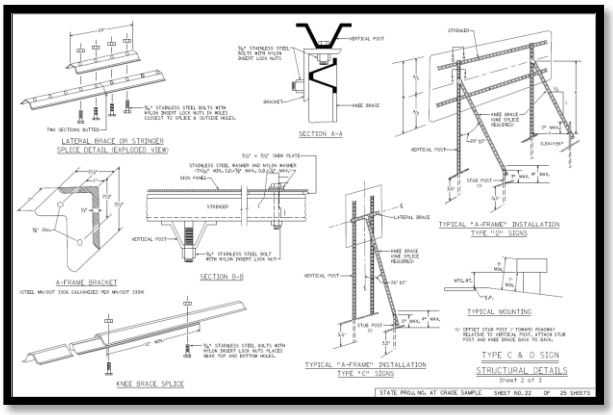
7.5 Sign Panel Layout Sheet

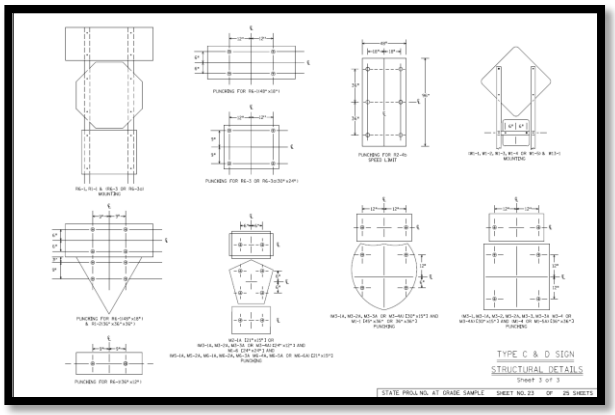


When sign panels exist, the layout details will be shown on these sheets. MnDOT uses the software SignCad® to layout guide signs.

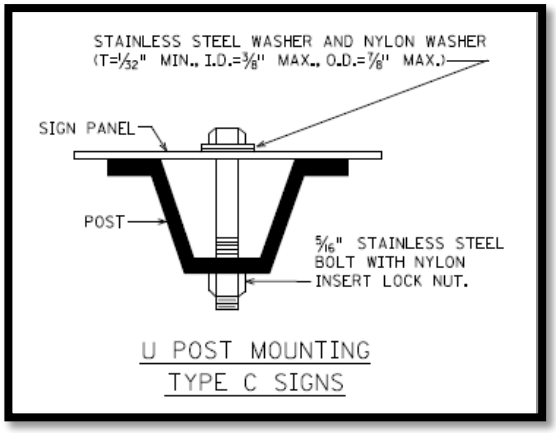
7.6 Structural Details

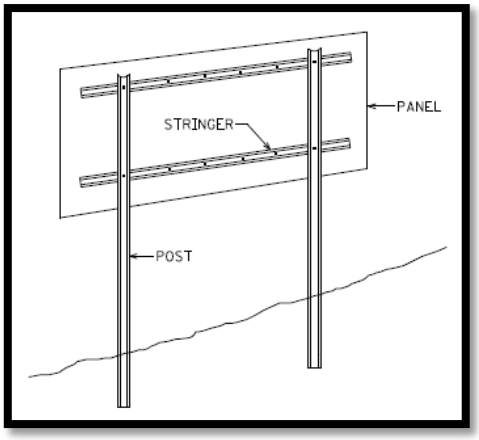


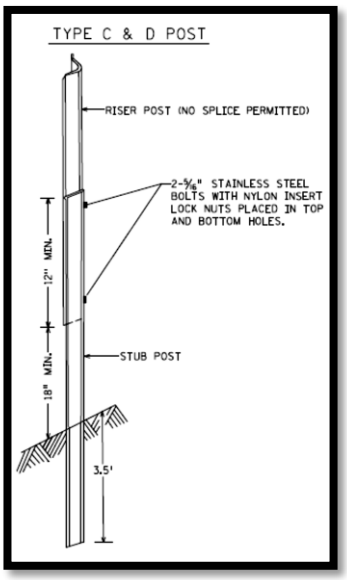


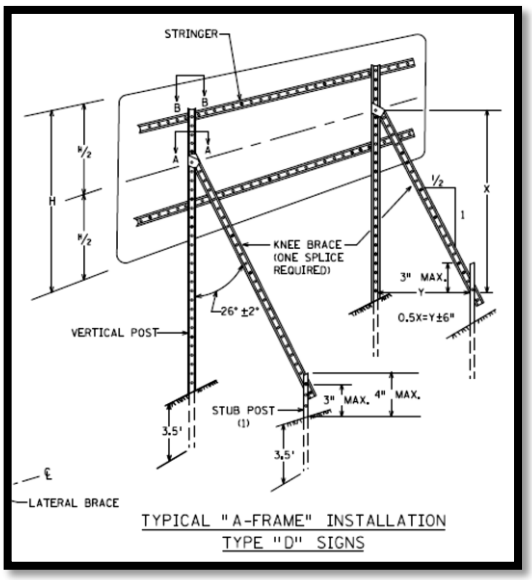


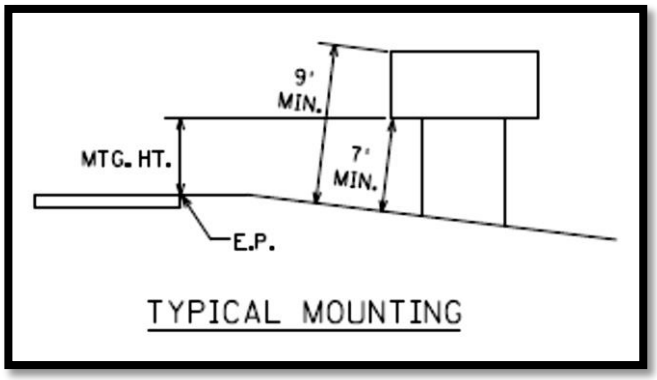
The Structure Detail Sheets show a variety of details on the structural support system for signs. Below are some close-up images of a sample of these details.

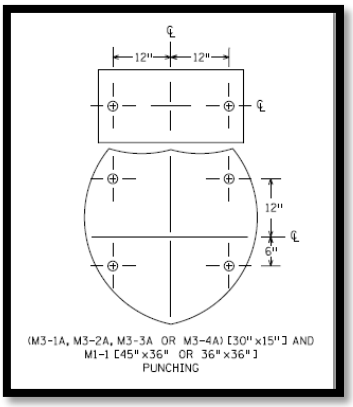












8. MAINTENANCE OF SIGNS

8.1 Signing Responsibilities

Effective sign maintenance is important from a customer satisfaction perspective, and from a safety aspect in reducing crashes. Therefore, careful management of sign maintenance at all levels throughout the state is essential.

Altogether many organizations within the state are involved in signing and each has their necessary function and area of responsibility. The flow line of information and direction starts with state regulations and policies and ends with the actual installation and maintenance of the signs.

8.2 Maintenance Handout

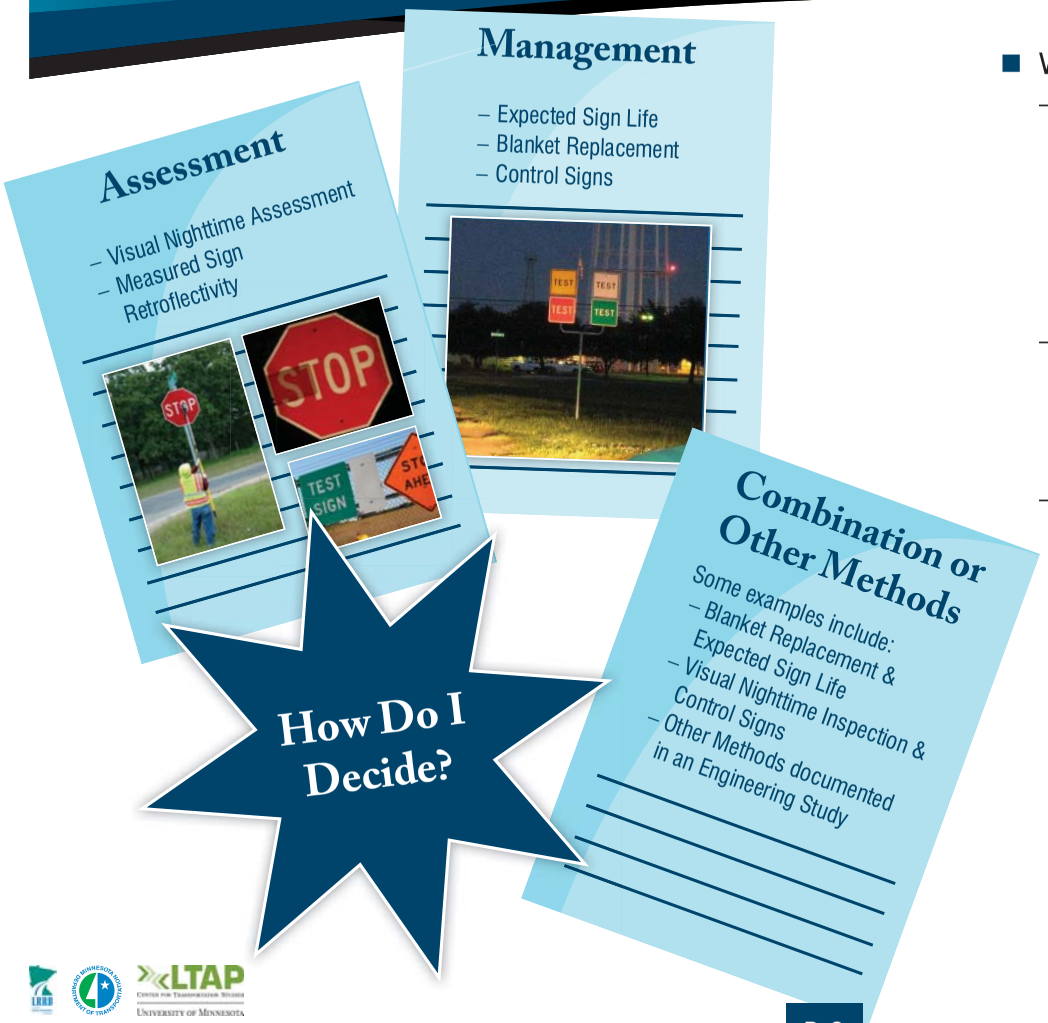
The information on the following pages is a handout related to sign maintenance and inventory from "Minnesota's Best Practices for Traffic Sign Maintenance / Management Handbook" which can be found at www.mnltap.umn.edu/publications/handbooks/.

What's wrong with this picture?
(See page G-3 for answer.)

Part B – Maintenance Methods

Maintenance Methods B-2
Assessment Methods ..... B-3 to B-4
Management Methods B-5
What Method is Best for Your Agency? ..... B-6 to B-7

Maintenance Methods



- What Are The Choices?
  - Assessment Methods
    - Visual Nighttime Assessment
      - Calibration Signs Procedure
      - Comparison Panels Procedure
      - Consistent Parameters Procedure
    - Measured Sign Retroreflectivity
  - Management Methods
    - Expected Sign Life
    - Blanket Replacement
    - Control Signs
  - Combination or Other Methods
    - Blanket Replacement & Expected Sign Life
    - Visual Nighttime Inspection & Control Signs
    - Other Methods documented in an Engineering Study

Assessment Methods (1/2)

1. Visual Nighttime Assessment

This is an in the field assessment of retroreflectivity made by trained inspectors during nighttime conditions. The inspection should be conducted at normal speed from the travel lane, using the low-beam headlights and at typical viewing distances (180 feet for street name blades, 300 feet for stop signs and up to 1,100 feet for symbol type warning signs based on a 30 feet per inch legibility distance). One or more of the following procedures should be used to support the visual nighttime inspections.

Calibration Signs Procedure*

- An inspector views a calibration sign each time prior to conducting a nighttime field review. The calibration signs have known retroreflectivity levels at or above the specified minimums. The calibration signs are set up in a maintenance yard where the inspector can view the signs in a manner similar to nighttime field inspections. The inspector uses the visual appearance of the calibration sign to establish the evaluation threshold for that night's inspection activities.

Comparison Panels Procedure*

- This procedure involves assembling a set of comparison panels that represent retroreflectivity levels above the specified minimums. Inspectors then conduct a nighttime field review and when a marginal sign is found, a comparison panel is attached and the sign/panel combination is viewed. The signs found to be less bright than the panel would then be scheduled for replacement.

Consistent Parameters Procedure

- The nighttime inspections would be conducted under similar factors that were used in the research to develop the minimum retroreflectivity levels. These factors include:
  - Using a sport utility vehicle or pick-up truck to conduct the inspection.
  - Using a model year 2000 or newer vehicle for the inspection.
  - Using an inspector who is at least 60 years old with 20/40 normal or corrected and 105 degrees of peripheral vision.

1 *Inspectors must be trained. Training courses are available through many Local Technical Assistance Programs (LTAP); check http://www.ltap.org*

* *A kit with samples of sheeting material at the thresholds currently available from Avery Dennison® www.averydennison.com*

Assessment Methods (2/2)

Source: FHWA Sign Retroreflectivity Guidebook, September 2009

2. Measured Sign Retroreflectivity

- The retroreflectivity of every sign in your system is measured with a retroreflectometer* and the results are compared to the threshold levels documented in Table 2A-3 of the MN MUTCD. Signs with actual retroreflectivity levels below the specified minimums would be scheduled for replacement.

* *Purchases or rentals are currently available from pppcatalog.com*

Management Methods

1. Expected Sign Life

- When signs are installed, the installation date would be recorded so that the age of the sign is known. The age of the sign is compared to the expected sign life – based on the documented retroreflectivity degradation for a specific geographic area compared to the minimum levels. Signs older than the expected sign life would be scheduled for replacement.

2. Blanket Replacement

- All signs in an area/corridor would be replaced at specified intervals. The replacement interval would be based on the expected sign life or warranty period. This method eliminates the need to assess retroreflectivity or track the life of individual signs. If the warranty period is 12 years, replacing 1/12 of the signs each year would demonstrate compliance with the specified minimum retroreflectivity levels.

Source: FHWA Sign Retroreflectivity Toolkit

3. Control Signs

- Replacement of signs in your system would be based on the performance of a small sample of control signs. For convenience and safety, the small sample of signs (all of the basic colors, oriented in the most adverse direction) would be located in a maintenance yard and these signs would then be monitored to determine when they are at the end of their retroreflective life. All field signs, represented by the control sample would then be replaced just before the control samples reach the minimum specified levels. New signs would have to be added to the control sample every year.

What Method is Best for Your Agency? (1/2)

Source: FHWA Sign Retroreflectivity Guidebook, September 2009

Assessment Methods (Visual Assessment, Measured Sign Retroreflectivity)

- Requires training and lots of staff hours on the road. Your inspectors will have to view every one of your signs in the field (at 20 signs/hour, 10,000 signs [typical county] ≈ 500 hours per year).
- May require the purchase of technology—a retroflectometer or reflective sheeting samples—and an investment of training your staff.
- The primary advantage of using one of the Assessment Methods is that your agency will get the most years of service from each sign in your inventory as is practically possible.

Management Methods (Expected Sign Life, Blanket Replacement, Control Signs)

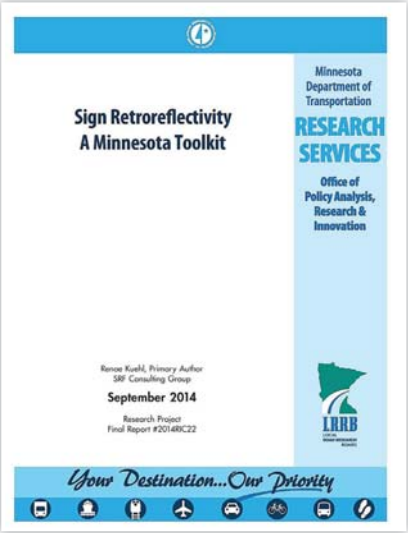
- Reduces staff time in the field versus possibly replacing some signs before they meet the minimum thresholds.
- It has been suggested that if you are concerned about replacing signs with some life left in the sheeting material, you could go through the effort of measuring for retroreflectivity of salvaged signs after they are delivered to your maintenance yard for use as replacements for signs damaged by vandalism or knockdowns.

Maintenance Methods	Types	Staff Hours	Technology	Service Life Lost From Each Sign
Assessment	Visual Nighttime Inspection Measured Sign Retroreflectivity	$$$	$$$	$
Management	Expected Sign Life Blanket Replacement Control Signs	$	$	$$$

What Method is Best for Your Agency? (2/2)

So which Method is Best?

- No one can tell you which method is best. Sign Retroreflectivity A Minnesota Toolkit can provide some assistance, but you know the characteristics of your system and your organization better than anyone else. Think about three primary factors:
  - Inventory
    - If the number of signs on your system is small (<500), conducting an annual inspection would be relatively easy.
    - If the number of signs on your system is large (>10,000), conducting an annual inspection could require 500 or more staff hours per year; so you should consider one of the management methods.
  - Staff
    - If your professional staff is trained and has experience conducting nighttime inspections, it would be easy to continue.
    - If you don't have trained staff, the choices would include adding staff and training them or using one of the management methods.
  - Technology
    - If you already own or are willing to purchase a retroreflectometer* or buy a kit with samples of sheeting material at the thresholds**, the measurement method may be best.
    - If you are not willing to make these investments, the visual assessment, consistent parameters or one of the management methods would be a better choice.



www.lrrb.org

Make a decision, move forward, evaluate, and make changes if you have to.

* Purchases or rentals are currently available from pppcatalog.com
**A kit with samples of sheeting material at the thresholds currently available from Avery Dennison® www.averydennison.com

What's wrong with this picture?
(See page G-3 for answer.)

Part E – Implementation

Process Chart – Implementation....E-2
Sign Inventory....E-3
Sign Inventory – Pencil & Paper....E-4
Sign Inventory – Software....E-5
Engineering Study Process....E-6 to E-7
Engineering Study / MN MUTCD Guidance....E-8 to E-10
Engineering Study / System Consideration Example - Rural Curves....E-11 to E-12
Engineering Study / System Consideration Example - Urban & Rural Low Volume....E-13
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Which Signs are Required by the 2014 MN MUTCD?....E-30
Case Study #2: Ireland vs. Lengsfeld and Carver County....E-31 to E-33

HANDOUT

Process Chart – Implementation

** A key premise underlying all of the guidance in the MN MUTCD is the exercise of Engineering Judgment! **

E-2

Minnesota's Best Practices for Traffic Sign Maintenance/Management Handbook

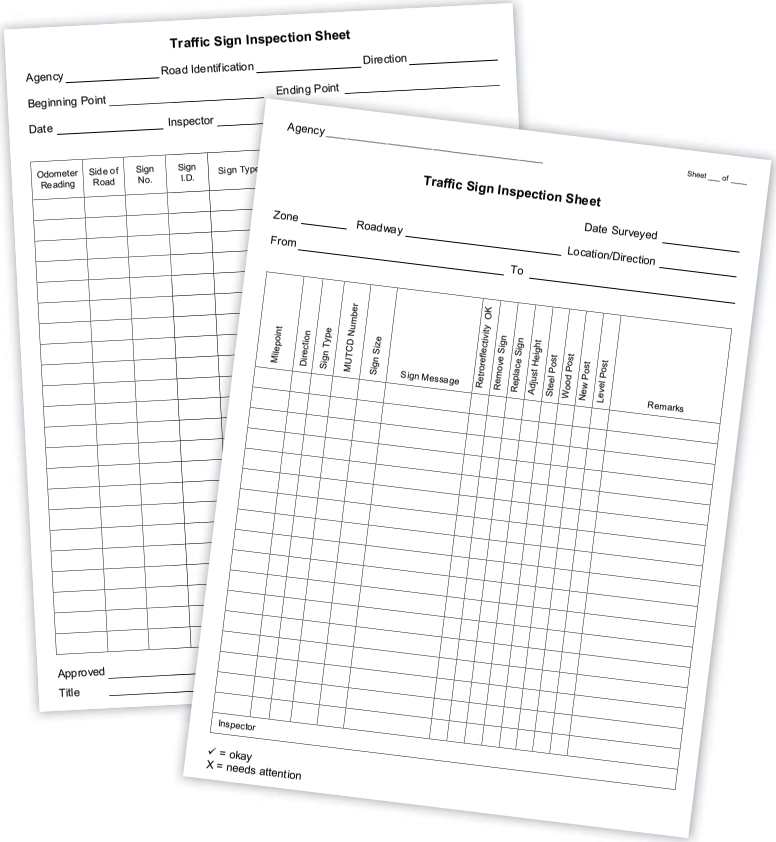
October 2014

HANDOUT

Sign Inventory

- The first step in the Implementation process involves documenting the location, type, installation date, sheeting type, direction facing, sign post type, and condition of all the signs along your system – conduct a Sign Inventory.
  - There are 2 basic approaches:
    - Pencil & Paper
    - Commercially available software
- Both approaches require investing time and resources:
  - Time in the field collecting data
  - Time in the office analyzing data
- Which approach is best for your agency?
  - Probably depends on how many signs are in your system – if you only manage a small system with relatively few signs, it probably wouldn't be worth the expense associated with buying software, attending training, and spending time in the field.

Sign Inventory – Pencil & Paper



Traffic Sign Inspection Sheet

Agency _____ Road Identification _____ Direction _____

Beginning Point _____ Ending Point _____

Date _____ Inspector _____

Odometer Reading	Side of Road	Sign No.	Sign I.D.	Sign Type

Approved _____

Title _____

Agency _____ Sheet ___ of ___

Traffic Sign Inspection Sheet

Zone _____ Roadway _____ Date Surveyed _____

From _____ To _____ Location/Direction _____

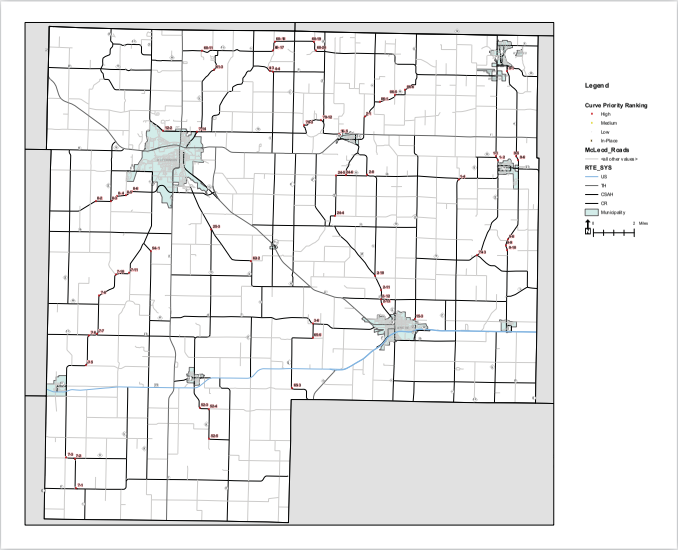
Milepoint	Direction	Sign Type	MUTCD Number	Sign Size	Sign Message	Retroreflectivity OK	Remove Sign	Replace Sign	Adjust Height	Steel Post	Wood Post	New Post	Level Post	Remarks

Inspector _____

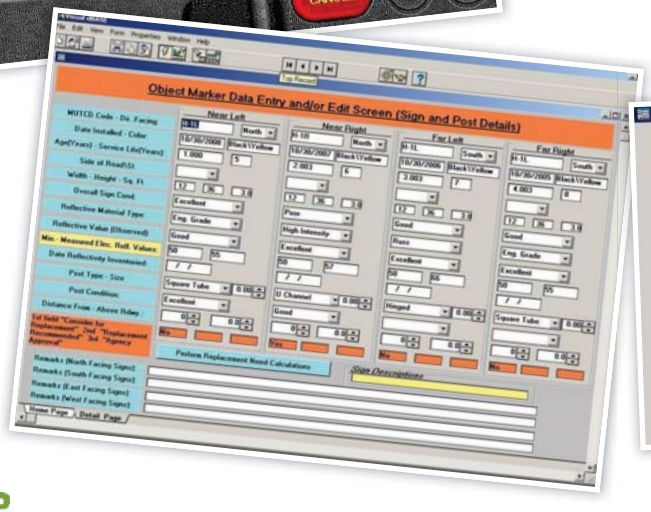
✓ = okay

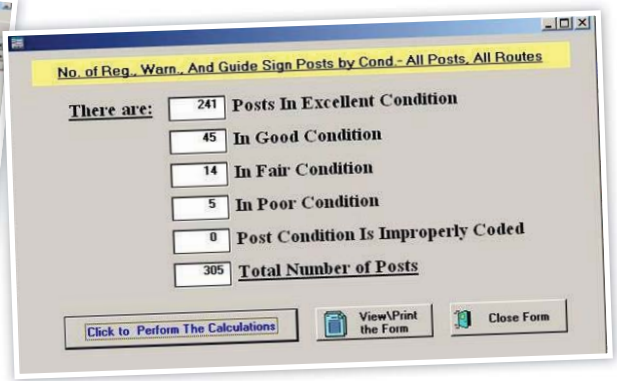
X = needs attention

- These are examples of traffic sign inspection sheets that would be used to conduct the field inventory of sign location, type and condition.
- The inventory sheets can be linked with GIS to create system sign maps.
- Data can be entered directly into spreadsheets in the field or back at the office



Sign Inventory – Software





- There are many sign management software options available
- A free version can be found at:
  - Signs Plugin offered by Utah LTAP www.utahltap.org/software

HANDOUT

Engineering Study Process (1/2)

The MN MUTCD defines an Engineering Study as:

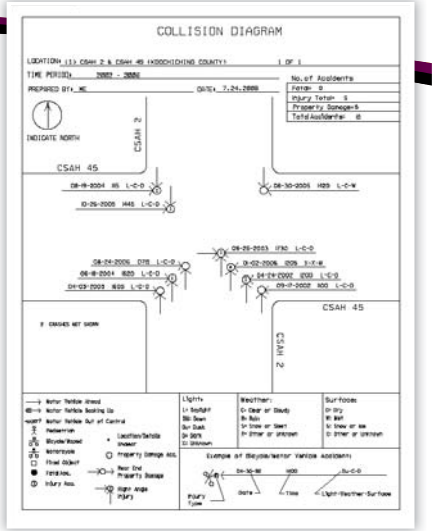
- The comprehensive analysis and evaluation of available information.
- The application of Principles, Standards and Guidance and practices contained in this Manual.
- For the purpose of making a decision about the application, design, operation or installation of a traffic control device.

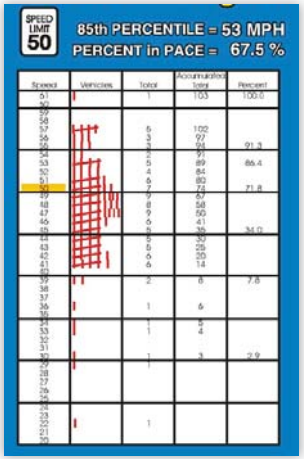
The MN MUTCD also defines the requirements for individuals that are assigned the task of conducting the Engineering Study as:

- An engineer or staff working under the supervision of an engineer.
- Having knowledge of the procedures, policies and criteria established by the engineer.

These definitions clearly indicate:

- Trained professional staff should be making the decisions about the application and design of traffic control devices (as opposed to elected officials).
- The key steps in the study process include: understanding MN MUTCD basics, location/system characteristics, agency policies, and obtaining and evaluating information.





HANDOUT

HANDOUT

Engineering Study Process (2/2)

Understand Basic MN MUTCD Guidance:

- Objective's of Traffic Control Devices
- Requirements to be Effective
- Engineering Study Process Usage
- Effectiveness

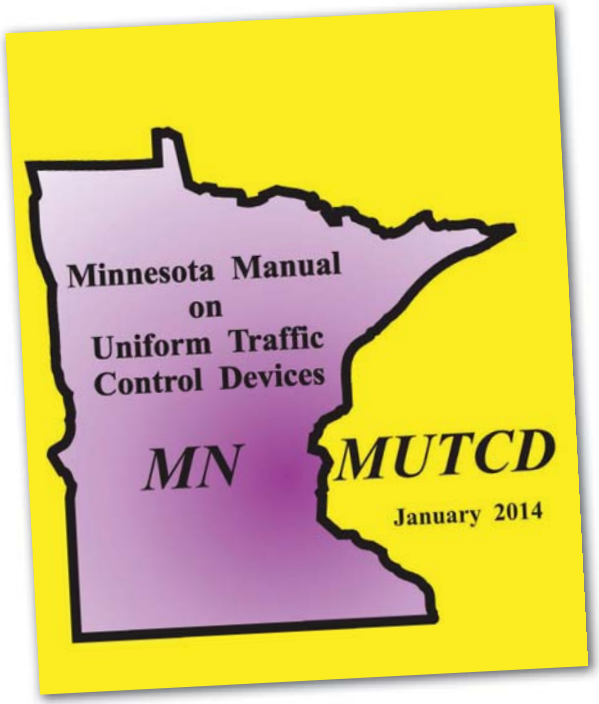
Understand:

- Specific Location Characteristics
- System Characteristics
- Agency Policies

Decide/Document:

- What is the Problem/Issue to be addressed?
  - Safety
  - Speed
  - Congestion
- Identify the applicable Guidelines
  - MN MUTCD
  - AASHTO
  - MnDOT
  - Local Agency
- Identify possible Alternatives
  - In virtually ALL cases there will be multiple choices
- Identify the evaluating Criteria
  - Effectiveness
  - Cost (first and ongoing maintenance)
  - Potential Impacts
  - Consistency
- Implementation

Engineering Study / MN MUTCD Guidance (1/3)



- STANDARD: The MN MUTCD describes the application of traffic control devices, but is not a legal requirement for their installation.
- The MN MUTCD provides Standards, Guidance, Options and Support for the design and application of traffic control devices. – It is NOT a substitute for engineering judgment.
- The MN MUTCD previously recommended that agencies **should** establish a process to provide and maintain reasonable nighttime sign visibility and legibility.
  1. STANDARD - a statement of required practice and the verb **SHALL** is used.
  2. GUIDANCE - a statement of recommended practice with deviations allowed based on engineering judgement. The verb **SHOULD** is used.
  3. OPTION - a statement of practice that is permissive. The verb **MAY** is used.

Engineering Study / MN MUTCD Guidance (2/3)

- Purpose of Traffic Control Devices:
  - Notify road users of regulations
  - Provide warning and guidance needed for safe, uniform and efficient operation
  - Any message not related to traffic control is prohibited
- Basic Requirements of Effective Traffic Control Devices:
  - Fulfill a need
  - Command attention
  - Convey a clear, simple message
  - Command respect
  - Give adequate time to respond

Engineering Study / MN MUTCD Guidance (3/3)

- Use only standard signs and place signs only when judgment or studies indicate a need for the signs.
- REGULATORY signs give notice of traffic laws or regulations.
- WARNING signs give notice of situations that are not self-evident
- GUIDE signs provide information as to highway routes, directions, destinations, distances, services and points of interest.
- Signs are ordinarily not needed to confirm rules of the road or laws.
- Signs should not be installed that are not consistent with the rules (for example, Speed Limit 20 MPH).

9. NEW TECHNOLOGIES

Below are summaries of a number of new technologies. Further details can be found on the MnDOT ITS website, http://www.dot.state.mn.us/guidestar/projects.html.

9.1 Wildlife Detection and Warning System

The goal of this project is to reduce the number of large wildlife vehicle crashes on instrumented roadway sections by detecting large wildlife (deer, moose, etc.) and activating a flashing beacon on a standard deer sign, warning motorists of the presence of deer.

Exhibit 9-1 Wildlife Detection Warning System

Additional details on this project can be found at the ITS website:

www.dot.state.mn.us/guidestar/2006_2010/deer_detection_and_warning_system.html.

9.2 Intersection Collision Avoidance

The systems, installed on non-signalized rural intersections, reduce the number and severity of crashes. Signs and flashing lights warn drivers approaching an intersection to stop for cross traffic. All test locations were chosen based on crash data.

Exhibit 9-2 Intersection Collision Avoidance Signs

Stop Sign Warning Systems

Intersection Warning Systems

Cooperative Intersection Collision Avoidance – Stop Sign Assist

9.3 Dynamic Speed Display Signs

Dynamic speed display signs (DSDS) is a device that detects and display a vehicle's current speed back to the driver. DSDs have been shown to have a significant speed-reducing effect in temporary applications such as work zones or neighborhood speed watch programs.

Exhibit 9-3 Dynamic Speed Display Signs

9.4 Curve Warning System

The Curve Warning System provides a programmable active warning based on the speed of the vehicle as it approaches the curve and provides a warning message to the driver to reduce speed if it is excessive.

A dynamic curve warning sign (DCWS) is a low-cost technology that may help drivers select an appropriate speed when approaching a horizontal curve. A DCWS generally consists of a warning sign combined with a speed measuring device (e.g., radar) that activates a variable message (e.g., slow down) when vehicles are traveling above a set threshold. The technologies used to create a DCWS are currently available and the devices have been implemented at various locations.

Exhibit 9-4 Curve Warning System Signs

9.5 Variable Speed Limit (VSL) Signs

VSL is a sign capable of displaying different speed limits to travelers (in which the speed limit is either a recommended or mandatory limit) that are either manually activated or controlled by a combination of detectors and algorithms to select appropriate speeds.

Exhibit 9-54 shows MnDOT's VSL that is part of the Smart Lane System. The system is an algorithm that warns of congestion ahead and is deployed on I-35W and I-94.

Exhibit 9-5 Variable Speed Limit (VSL) Signs

Variable Speed Limit (VSL) signs are used across the country to lower posted speed limits in certain areas. They allow for operators to adjust the posted speed limit without changing the sign. They are used in conjunction with Intelligent Transportation Systems to lower speed limits for several reasons including congestion, construction, accidents, fog, snow, and ice. VSL signs have been successfully tested by several state departments of transportation.

9.6 Overheight Warning System

This type of system detects overheight vehicles moving toward obstacles such as bridges, tunnels and other overhead structures and individually warns drivers. A sign is activated when an over height vehicle is detected by the system.

The purpose of this system is to detect over-height vehicles and warn the drivers of the impending problem. This will enable them to exit the freeway and avoid the possibility of contact with the bridge.

An infrared light beam and a remote lighted message sign will be included in the components of this system.

9.7 Water on Road System

This type of system is a highway sensor that measures the presence of water on the roadway and is linked to traveler information systems. The purpose is to warn drivers of water on a roadway advising them not to pass.

9.8 Fog Warning System

This type of system is a highway visibility sensor that measures the density of roadway fog and is linked to traveler information systems. The need for a highway fog warning system has long been internationally recognized. With such a system, motorists can avoid tragic pile-up accidents caused by dense or patchy fog, which are often fatal.

10. APPENDIX

10.1 Frequently Asked Question

Source is from the MnDOT OTST Signing website

http://www.dot.state.mn.us/trafficeng/faq/faq-signing.html.

10.1.1 Business Signing Questions

Is my business or facility eligible to receive guide signing?

In order for a facility or business to receive supplemental guide signing, the sign location must meet engineering standards and the facility or business must meet MnDOT policy.

Engineering standards

Furthermore, different types of signs (regulatory, warning, and guide) cannot be combined. For example, mixing a golf course sign with a speed limit sign is not allowed. This leaves limited space for supplemental guide signs.

MnDOT policy

There is tremendous demand for signing along our highway system; many businesses, organizations and agencies feel that they need and deserve signing to advertise, inform and/or aid the motorist in locating their establishment. As discussed under engineering standards, it is necessary to limit all signing to only that which is sufficient to aid drivers in safely arriving at their destination. As such, MnDOT policy and state law set out criteria that a facility must meet in order to be eligible for signing.

What types of business signing does MnDOT allow on state highways?

Logo

- ✓ Gas, food, lodging, and camping.
- ✓ Signs may be installed on interstates and certain other controlled-access (freeway) highways.
- ✓ Each facility must meet certain criteria related to hours of operation, licensing, distance from interchange, etc.
- ✓ The cost of fabrication, installation, and maintenance are paid by the business.
- ✓ This program is managed by Minnesota Logos, Inc. under an agreement with MnDOT.

General motorists services

- ✓ Gas, food, lodging, camping and hospitals.
- ✓ Signs may be installed at rural freeway and expressway interchanges.
- ✓ Each facility must meet certain criteria related to hours of operation, licensing, distance from interchange, etc.
- ✓ The cost of fabrication, installation, and maintenance are paid by MnDOT. MnDOT provides trailblazing signs.

Major traffic generators

- ✓ Major regional attractions that attract persons or groups beyond the local area.
- ✓ Facilities must have parking for at least 1,000 vehicles, a minimum of 10 events per year, and average event attendance of at least 5,000 persons.
- ✓ Signs may be installed on any trunk highway.
- ✓ The cost of fabrication, installation, and maintenance of these signs are paid by the traffic generator. Trailblazing must be provided by the facility or local road authority.

Minor traffic generators

- ✓ Facilities that generally attract non-local persons or groups, but do not qualify as major generators. These facilities should have broad motorist appeal, serve non-familiar motorists, and are the type of facility for which a motorist normally expects highway signing.
- ✓ Facilities are typically cultural, recreational, or historic attractions.
- ✓ Facilities must meet certain criteria related to hours of operation, etc.
- ✓ These signs may be installed at at-grade intersections and some expressway interchanges.
- ✓ The cost of fabrication, installation, and maintenance of these signs are paid by the traffic generator. Trailblazing must be provided by the facility or local road authority.

Other traffic generators

- ✓ Include Airports, Casinos, Educational Institutions, National Parks, Regional Shopping Centers, and State Parks. Criteria vary.
- ✓ Signs may be installed on any trunk highway.
- ✓ The cost of fabrication, installation, and maintenance of these signs are paid by the traffic generator. Trailblazing must be provided by the facility or local road authority.

Specific services

- ✓ Gas, food, lodging, places of worship, rural agricultural businesses and tourist-oriented businesses.
- ✓ The criteria for installation of these signs (hours, types of businesses, etc.) are primarily defined in Minnesota Statutes 160.292 – 160.297.
- ✓ These signs can only be installed in rural areas at at-grade intersections or at rural bypasses that have interchanges on expressways.
- ✓ The cost of fabrication, installation, and maintenance of these signs are paid by the facility. Trailblazing must be provided by the facility or local road authority.

Who do I contact to see if my business qualifies for a sign?

To request signing for a facility on the state highway system, contact the appropriate District Traffic Engineer for your area.

In your request, please state the name and type of your business or facility, as well as its location.

What happens after I submit my request for signing (including costs)?

District staff will work with you to determine whether your facility qualifies for signs on the trunk highway. This decision takes into account the type of facility and whether it meets the requirements of MnDOT's

various signing programs. Additionally, a field check is performed to determine whether there is available space for the sign(s) along the trunk highway as well as at exit ramps or near the closest intersection.

If signing is approved for your facility, the MnDOT District Traffic Office will contact you with an application form as well as the estimated cost of the sign(s). This cost includes the fabrication of the sign panel, structural materials, equipment, and installation labor costs. This is a one-time fee that lasts for the life of the sign.

After the completed application and payment are received by MnDOT, it may take 1- 3 months to have signs installed depending on weather.

What if my request for signing is not approved?

MnDOT retains the authority to deny requests for signing where acceptable standards cannot be met, including locations where other supplemental guide signs are already in place. Requests denied based on Minnesota statutes or engineering standards (i.e. insufficient space and design standards) may not be appealed. At the discretion of the District Traffic Engineer, signing requests denied based on MnDOT policy may be appealed to the External Sign Variance Committee (ESVC).

For more information regarding making an appeal to the ESVC, contact Joani Nilan at 651-234-7384.

How do I get my business logo placed on the blue freeway signs?

This is the Logo Sign Program, which operates separately from other state signing programs. Logo signs provide road users with business identification and directional information for services and for eligible attractions. FHWA limits the eligible service categories to include gas, food, lodging, 24-hour pharmacies, camping, and attractions.

Read more about Minnesota's Logo Signing Program.

To request logo signing, contact Dave DeSutter, General Manager of Minnesota Logos, Inc. or go to http://www.minnesota.interstatelogos.com/state/home.aspx.

10.1.2 Non-Business Signing Questions

How do I go about getting a STOP sign installed at an intersection?

If the local road intersects a state highway, a field evaluation and engineering study needs to be conducted by MnDOT; refer to the State Traffic Engineer's Directory and contact the appropriate district traffic office to initiate this process. If a local road intersects with another local road, contact the local road authority (i.e. City of Minneapolis or Hennepin County, etc).

I would like to have a deer crossing sign installed. How do I go about getting this accomplished?

Data has shown that installing static deer warning signs has not been effective in reducing deer-vehicle crashes. As such, MnDOT policy is to no longer install static deer crossing signs. Existing signs are being removed after they reach the end of their useful lives.

View a summary of MnDOT's position regarding deer crossing signs and supporting research (PDF, 44 KB).

I would like to have a "deaf child/blind child/slow children at play" sign installed on my street/highway near my home. How do I get this accomplished?

MnDOT does not install this type of sign on state highways since it is not enforceable (it is a warning sign) and it can lead to a false sense of security. If you are requesting signing on a local road, contact the local road authority.

How do I go about having a bridge or highway section dedicated to a group (i.e. Vietnam Veterans Bridge or Highway)?

MnDOT does not memorialize highways. Memorialization of highways is done by an act of the Minnesota Legislature. If the legislature has memorialized a highway, MnDOT typically installs signs at specified location near the beginning of the route. On interstate routes, signs are placed in rest areas. Signs must meet the requirements of the Minnesota Manual on Uniform Traffic Control Devices. This document defines the size, color, shape, location, and allowable message on signs. This document is defined in both federal and state law and governs all traffic control devices on a roadway. If a route is memorialized the organization or individuals requesting the designation pay for the design, fabrication, installation and maintenance of the signs.

If the bridge or highway section is not on a state highway, contact the local road authority.

How do I obtain a sign to use as a graphic display for a workshop/training class?

MnDOT does not fabricate signs to sell to the public. To find out sign costs and have a sign fabricated contact:

Earl F. Andersen at 952-884-7300

Gopher Sign at 651-698-5095

Lyle Signs at 952-934-7653

M&R Sign at 218-736-5681

10.1.3 Signing Specifications Questions

Why are some cities included on the large green guide signs at interstate highway intersections?

There is a national publication by the American Association of State Highway and Transportation Officials (AASHTO) that lists what are referred to as control cities. Control cities are "cities which have been determined by each state to be major destinations and population centers located on or near the Interstate Highway System."

These cities are listed sequentially on guide signs along the Interstate, and remain on successive signs until that destination is reached.

What is the purpose of the numbers on signs every mile along state highways?

These are called reference location signs. They are installed every mile on all state highways. The beginning reference point is "0" at the western border of the state for east/west highways and "0" at the southern border of the state for north/south highways. If the highway does not extend to a western or southern border, then the beginning reference point is at the westernmost or southernmost limit of the highway.

How are EXIT Numbers determined?

Exit numbering in Minnesota is used on Interstate freeways. Exit numbering is based on the reference location signs as mentioned in the previous question (i.e.; an exit located between reference location sign 48 and 49 would be numbered Exit Number 48). If multiple exits are located within the same mile, the exit is numbered with a letter following, such as 48A and 48B. The lettering follows alphabetically from west to east and south to north. For more information, on the rules regarding the numbering system or the exit number for a specific interchange, contact Heather Lott at 651-234-7371 or Rick Sunstrom at 651-234-7381.

What manuals, standards, sample plans, specifications are available for review and guidance for roadway signing?

The most frequently used signing manuals are typically:

- ✓ Minnesota Manual on Uniform Traffic Control Devices – state standards for uniformity of sign design and placement, based upon federal standards
- ✓ Traffic Engineering Manual – Chapter 6 – supplements the Minnesota Manual on Traffic Control Devices by providing additional guidelines on use of standard signs, as well as MnDOT's guide and business signing policies.
- ✓ Minnesota Standard Signs Manual – listing of the standard signs used throughout Minnesota, including dimensioned drawings of sign panels for fabrication purposes
- ✓ Minnesota Standard Sign Summary – handbook used for identifying standard signs and appropriate panel size based upon roadway type
- ✓ Additional manuals can be found by checking the Signing - Manuals, Handbooks and Guidelines website and/or Traffic Engineering - Publications for a listing of available online documents.

What is the legal height for vehicles on highways and when does MnDOT install clearance signs?

The legal height for vehicles is 13 feet, 6 inches. The low clearance sign is used to warn road users of clearances less than 12 inches above this legal height. Clearance below bridges on freeways is typically 16 feet, 4 inches and for overhead mounted signs is 17 feet, 4 inches.

What is the proper mounting height for Disabled Parking signs?

If installed for a parallel parking spot on an urban street, the bottom of the sign needs to be 7 feet above the sidewalk. If installed in a parking lot, the sign must be visible to the driver when the vehicle is parked in the disabled parking space.

What does the 6% mean on a hill sign?

6% refers to the amount of slope of the highway from the top to the bottom of the hill - 6 percent means that for every 100 feet horizontally, the highway drops 6 feet. These signs are placed in advance of steep grades requiring special precaution on the part of road users.

Does MnDOT use plywood or plastic for its signs?

No. MnDOT only uses aluminum as the base material for sign panels. Sheet aluminum is used for smaller signs; larger signs and overhead mounted signs are made with extruded aluminum panels.

What type of sheeting materials does MnDOT use for its signs?

MnDOT uses sheeting materials listed on our Approved Products List. Currently, the type of material used by MnDOT is Type XI retroreflective sheeting. For other specifics on MnDOT sign sheeting materials or the Approved Products List, contact Michelle Moser at 651-234-7380.

10.2 Sample Plan Set

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