Sign Plan Design for At-Grade Intersections

Course Manual

June 2017

Office of
Traffic,
Safety
and Technology

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LIST OF EXHIBITS

1. INTRODUCTION

1.1 Background

This Sign Plan Design for At-Grade Intersection Manual has been developed to provide training to traffic personnel to acquire basic design skills in assembling at-grade signing plans. This one-day course is designed for persons who need to acquire signing plan design skills. Sample signing plan sets are provided as a reference.

This manual has been divided into nine (9) chapters that contain the following information:

- ✓ Chapter 1 – Introduction
- ✓ Chapter 2 – General Principals of Traffic Signing
- ✓ Chapter 3 – Regulatory Signs, Warning & Guide Signs
- ✓ Chapter 4 – Traffic Engineering Manual (TEM) Chapter 6
- ✓ Chapter 5– MN MUTCD Part 2
    - Note: Some of the MN MUTCD and TEM pages are not included in this manual. If the content of the page is not covered in this class, the page will not be included in the Manual.
- ✓ Chapter 6 – Signing Plan Sets
- ✓ Chapter 7 – At-Grade Sample Plan
- ✓ Chapter 8 – Specifications and Special Provisions
- ✓ Chapter 9 – Appendix

IMPORTANT: The material used to develop this course is current at the time of print. The holder of this Manual should refer to the original reference materials to check for updates. Many of the updated materials can be found at the MnDOT Office of Traffic, Safety and Technology website. The website is: http://www.dot.state.mn.us/trafficeng/.

1.2 Goals of Course

In this Sign Plan Design for At-Grade Intersection Course, participants will obtain the basic skills in assembling signing plans for at-grade intersections. The Traffic Engineering Manual (TEM) Chapter 6 and the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) Chapter 2 will be referenced.

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

- ✓ Describe the general principles of traffic signing
- ✓ Identify the various types and classification for signs
- ✓ Locate the applicable information in the MN MUTCD and TEM
- ✓ Layout signing elements on a signing plan set
- ✓ Determine the appropriate support type for signs

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 Sign Plan Design for At-Grade Intersection Course 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 and Brian Barrett are gratefully acknowledged.

1.5 Contact Information

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

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1.6 Written Communications Policy

To request this document in an alternative format, please contact the Affirmative Action Office at 651-366-4723 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). You may also send an e-mail to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

1.7 MnDOT OTST Website

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

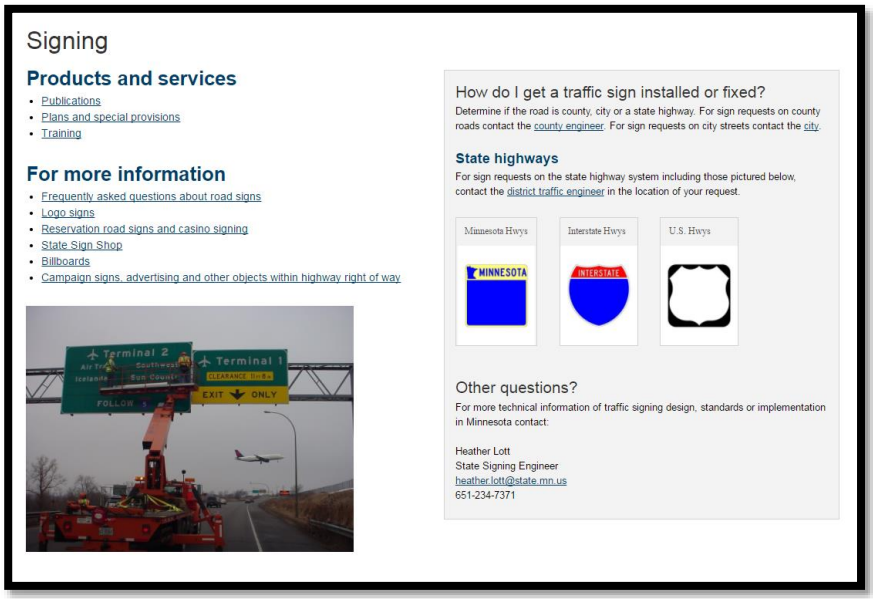
http://www.dot.state.mn.us/trafficeng/.

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

Exhibit 1-1 MnDOT OTST Website

Click on the link to Signing to go to the Signing home page show in **Exhibit 1-2**.

Exhibit 1-2 MnDOT Signing Website



The Signing page includes links to publications, plans and special provisions, training along with other important information. By clicking on the link to Plans and special provisions (www.dot.state.mn.us/trafficeng/signing/plans.html), you can download the following:

- ✓ Special provisions
- ✓ Signing sample plans
- ✓ Documents, checklists and worksheets
- ✓ Guide sign panel designs examples
- ✓ Plan sheets
- ✓ Sign cell library
- ✓ Tabulation Sheet Templates
- ✓ Placement details
- ✓ Structural details

Note: Throughout this manual are numerous URLs to specific website with valuable information. Overtime, these links may change. A web search will often lead to the proper location. For instance, a search on "MnDOT plans and special provisions" will lead you to the website listed on the top of this page.

1.8 Glossary

A glossary of terms related to signing is included in the TEM handout found in Chapter **4**.

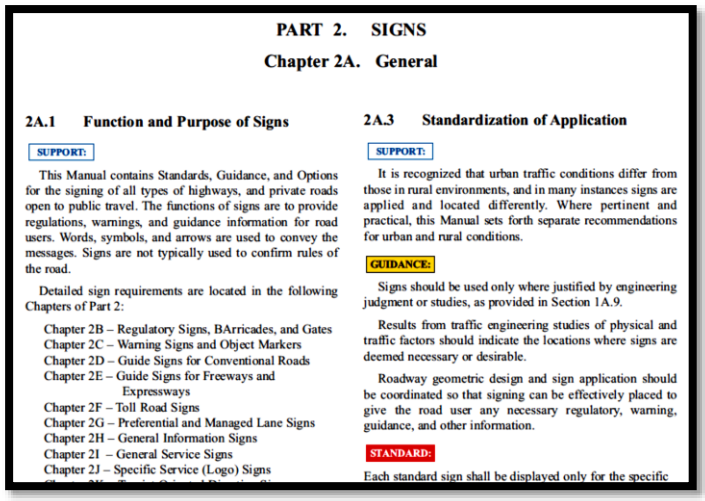
2. GENERAL PRINCIPALS OF TRAFFIC SIGNING

2.1 Minnesota Manual on Uniform Traffic Control Devices

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 February 2015. Chapter 2 of the MN MUTCD is dedicated to traffic signs.

Exhibit 2-1 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
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

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

Pertinent sections/pages of the MN MUTCD are included as a handout in Chapter **5** of this manual.

2.1.1 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.

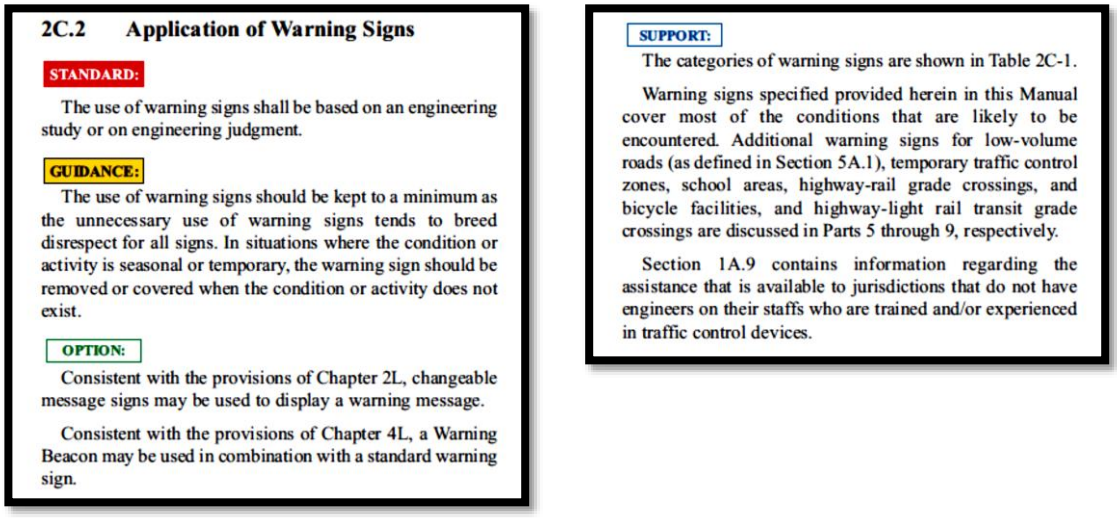
GUIDANCE: A statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. The verb "should" is typically used. Guidance statements are sometimes modified by Options.

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

Exhibit 2-2 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.

2.2 Traffic Engineering Manual

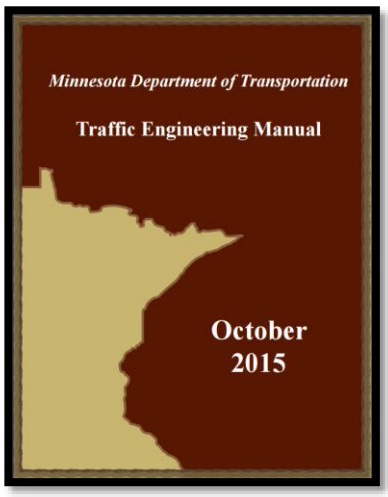
The Traffic Engineering Manual (TEM) is issued and updated by the MnDOT Office of Traffic, Safety and Technology (OTST). The purpose of the TEM is to establish uniform guidelines and procedures, primarily for use by personnel at MnDOT. Counties, cities, and local units of government will also find this 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 2-3**). The most current version of the TEM can be found at:

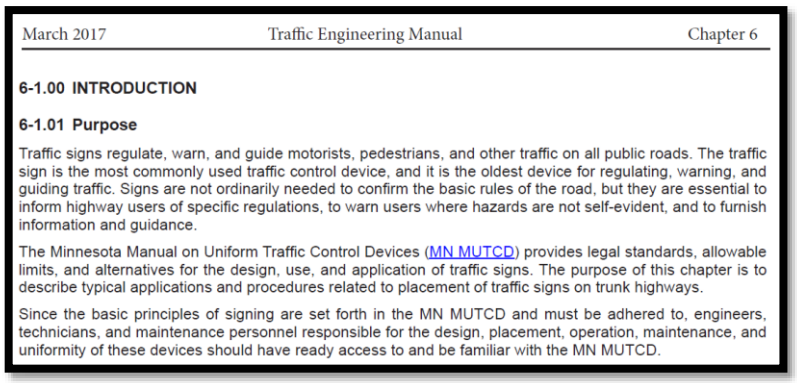
http://www.dot.state.mn.us/trafficeng/publ/tem/index.html

NOTE: Chapter 6 of the TEM was recently updated in March of 2017. The TEM serves as a supplement to the MN MUTCD, and designers for MnDOT projects should use both.

Exhibit 2-3 MnDOT Traffic Engineering Manual (TEM)



Chapter 6 of the TEM related to Traffic Signs


March 2017 Traffic Engineering Manual Chapter 6

6-1.00 INTRODUCTION

6-1.01 Purpose

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 regulating, warning, and guiding 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 trunk highways.

Since the basic principles of signing are set forth in the MN MUTCD and must be adhered to, engineers, technicians, and maintenance personnel responsible for the design, placement, operation, maintenance, and uniformity of these devices should have ready access to and be familiar with the MN MUTCD.

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
- ✓ Appendix A – MnDOT Supplemental Guide Signs

Pertinent section/pages of the TEM are included in Chapter 4 of this manual.

2.3 Additional Signing Publications

Beyond the MN MUTCD and TEM described previously, additional publications are avaialable regarding signing. These can be found at, www.dot.state.mn.us/trafficeng/signing/publications.html and include, but are not limited to the following:

- ✓ MnDOT Standard Signs Summary
- ✓ MnDOT Standard Signs and Markings Manual
- ✓ Freeway Signing Plan Design Course Manual
- ✓ Guide Sign Design Course Manual
- ✓ Signs 101 Course Manual
- ✓ A variety of reports and technical memorandums

2.4 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.

2.5 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.

2.6 Department Classification by Sign Design Type

Refer to Section 6-4.04 of the TEM. This is included as a handout in Chapter **4** of this manual.

2.7 Plan Set Sign Symbols

Typical technical symbols used for plan sets are shown in the Appendix, Section **9.3**.

2.8 Dimensions

Dimensions are discussed in Section 2A.11 of the MN MUTCD. Larger sizes are designed for use on freeways and expressways, and can also be used to enhance road user safety and convenience on other facilities, especially on multi-lane divided highways and on undivided highways having five or more lanes of traffic and/or high speeds.

2.9 Word Messages

Word Messages are discussed in Section 2A.13 of the MN MUTCD. Word messages should be as brief as possible and the lettering should be large enough to provide the necessary legibility distance. A minimum ratio of 1 inch of letter height per 30 feet of legibility distance should be used.

2.10 Sign Lighting

Generally, sign lighting is not needed. Each district/division shall conduct a field review to determine if it is necessary to light overhead signs. During the review,

- ✓ Sign viewing should be made with low-beam headlights
- ✓ Personnel unfamiliar with sign message should be part of review team

By turning off or not installing overhead lighting, MnDOT benefits by reducing energy and maintenance costs.

Additional details are included in the TEM Section 6-4.05.06. This is included in as a handout in the manual as Chapter **4**. In addition, see Chapter 10 of the TEM for information on Roadway Lighting (not included in this manual).

2.11 Support for Type C and D Signs

2.11.1 Type C signs

1. Support system - ground-mounted signs are spliced or single U-posts driven into subsoil, attached to a bridge railing utilizing O-posts, or banded to traffic signal pedestals or mast arm poles. Unsupported length and sign panel area determines number of U-posts and need for stringers and/or knee bracing.

2. Sign panel - sheet aluminum with direct applied retroreflectorized or screen processed legend. Punching is specified in the Standard Signs and Pavement Markings Manual.

2.11.2 Type D signs

1. Support system - same as Type C signs but generally supporting greater sign panel area. They may be affixed to a bridge railing, traffic signal mast arm, etc.

2. Sign panel - same as for Type C signs but splice plates may be required as specified in the Standard Signs and Pavement Markings Manual.

2.12 Lateral Offset

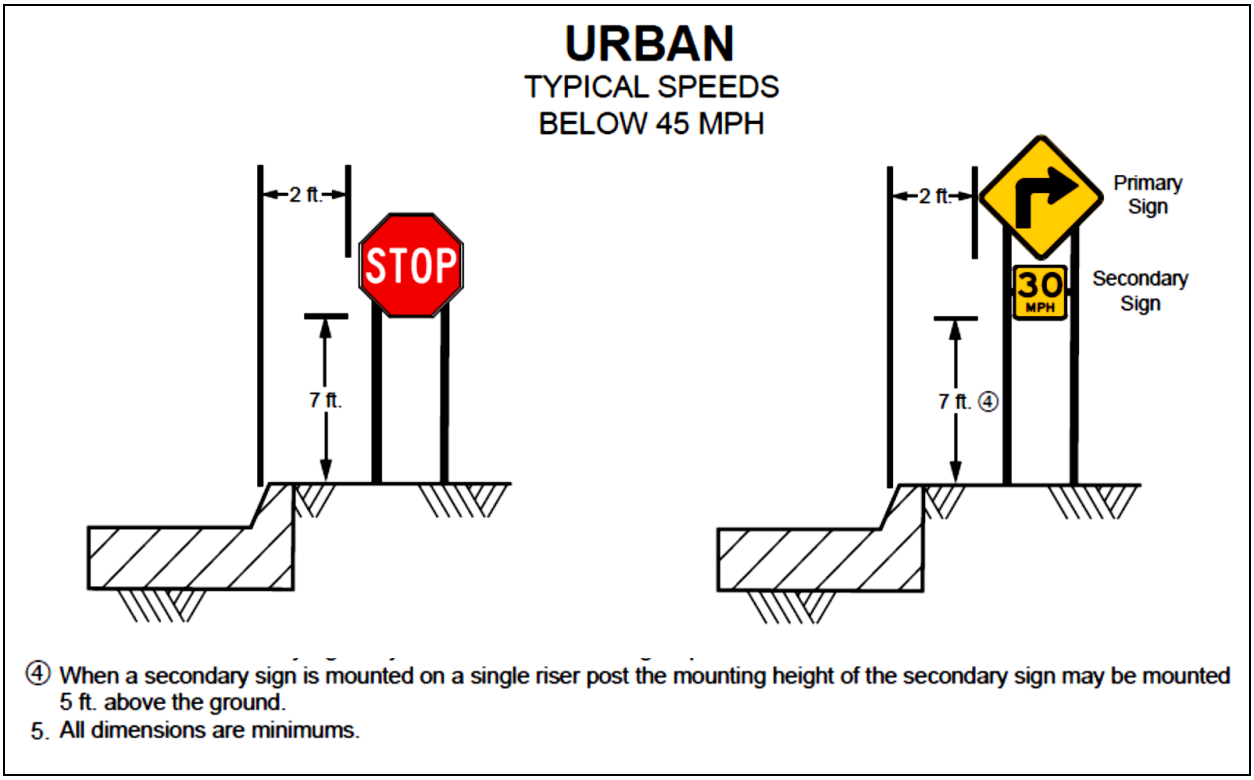
2.12.1 General

Information on lateral clearance can be found in the MN MUTCD 2A.19 and the TEM Chapter 6. In general, all supports should be located as far as practical from the edge of the shoulder. Advantage should be taken to place signs behind existing roadside barriers, on over-crossing structures, or other locations that minimize exposure to traffic.

2.12.2 Type C and D Signs

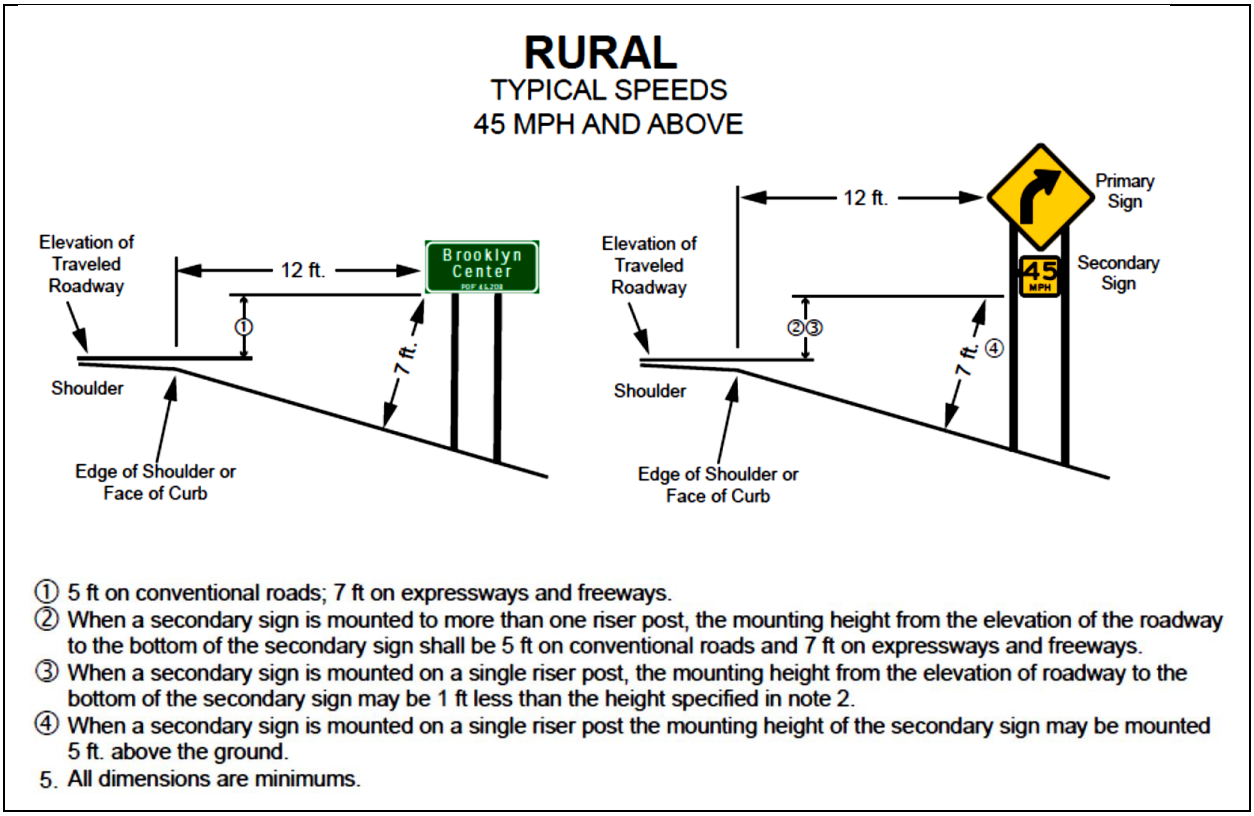
Figure 6.1 of the TEM includes information on the lateral spacing for Type C and D signs. This figure is included in Chapter 6 of this manual. A portion of this is shown in **Exhibit 2-4** and **Exhibit 2-5**.

Exhibit 2-4 Type C and D Lateral Offset Example (Urban Areas)



④ When a secondary sign is mounted on a single riser post the mounting height of the secondary sign may be mounted 5 ft. above the ground.
5. All dimensions are minimums.

Exhibit 2-5 Type C and D Lateral Offset Example (Rural Areas)



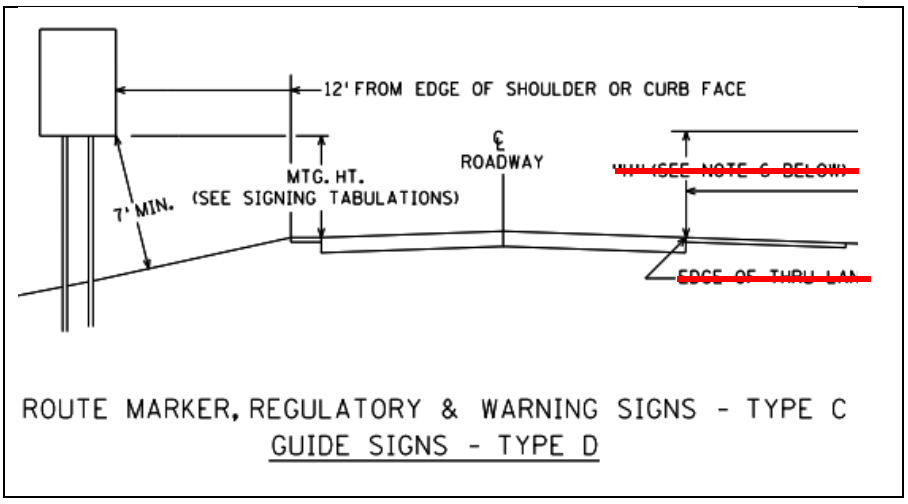
① 5 ft on conventional roads; 7 ft on expressways and freeways.
② When a secondary sign is mounted to more than one riser post, the mounting height from the elevation of the roadway to the bottom of the secondary sign shall be 5 ft on conventional roads and 7 ft on expressways and freeways.
③ When a secondary sign is mounted on a single riser post, the mounting height from the elevation of roadway to the bottom of the secondary sign may be 1 ft less than the height specified in note 2.
④ When a secondary sign is mounted on a single riser post the mounting height of the secondary sign may be mounted 5 ft. above the ground.
5. All dimensions are minimums.

2.12.3 OTST Placement Details on Website

Information on the lateral offset can be found at the following link,

http://www.dot.state.mn.us/trafficeng/signing/doc/placementstd.pdf. A sample is included in **Exhibit 2-6**.

Exhibit 2-6 Type C & D Sign Lateral Offset



2.13 Mounting Height and Vertical Clearance

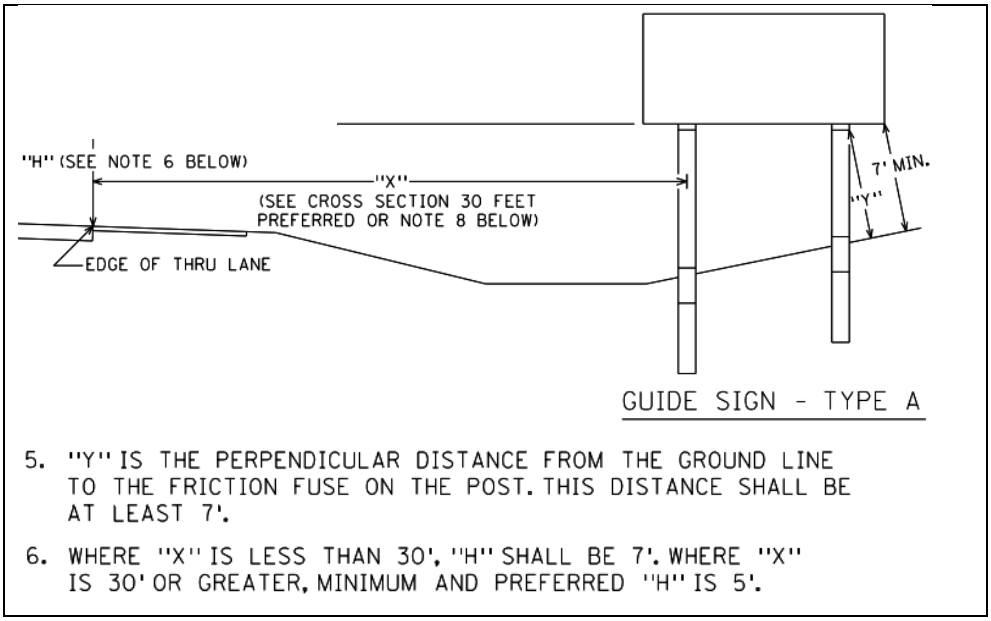
2.13.1 Type C and D Signs

Figure 6.1 of the TEM includes information on the vertical clearance for Type C and D signs. This figure is included in Chapter 6 of this manual. A portion of this is shown in **Exhibit 2-4** and **Exhibit 2-5**.

2.13.2 Type A Signs

Information on the vertical clearance can be found at the following link, http://www.dot.state.mn.us/trafficeng/signing/doc/placementstd.pdf. A sample is included in **Exhibit 2-7**.

Exhibit 2-7 Type A Sign Vertical Clearance



2.14 Sign Installation Practice

2.14.1 Sign Groupings

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.

2.14.2 Sign Spacing

General

Signs in a series must be uniformly spaced so that a driver traveling at normal speed has adequate time for the proper response. Since one of the primary objectives of traffic signing is to convey a needed message to motorists, care should be taken to provide compatible and effective sign spacing and to avoid reliance strictly on minimum distances unless absolutely necessary. As a rule of thumb for guide signs, every one inch of capital letter text height is equivalent to 30 feet of legibility distance.

Rural Areas

Sign spacing in rural areas should not be less than the distance required to read each sign at the upper range of anticipated vehicle approach speeds. For minimum recommended distances between signs of different purposes on rural highways see Figures 6.24A, 6.24B, 6.25, and 6.26 in the TEM (Chapter **4**).

Urban Areas

In urban areas with speed limits of 35 mph or less, the minimum distance between signs is 100 feet. For 40 mph or greater, this distance is 150 feet.

Double Signing

If sign spacing approaches the minimum desirable distance, double signing (right and left shoulder) may be utilized. Double signing should be used if the number of traffic conflicts is high.

2.14.3 Windloading

AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (current edition), governs the design of all permanent signing installations prepared for construction contract letting. Briefly, AASHTO specifies iso-tacs and corresponding wind pressures on sign panels as follows:

All ground-mounted and overhead signs shall be designed for a 50-year mean occurrence interval, which results in 90 mph wind speeds for Minnesota.

2.14.4 A-Frame and U-Post Mountings

MnDOT uses 3 lb/ft stub posts with 2.5 lb/ft posts for the remainder of the structure. Assuming an average distance of 10 feet from the bottom of the sign panel to the ground line, the correct sign structure design and post spacing shall be determined by using Chart 6.2 and Chart 6.3 in the TEM (see Chapter **4**).

To use these charts:

1. First, determine the total length of the sign panel.
2. Then, determine the height of the sign panel or add the heights of all of the individual sign panels to be mounted on the same sign structure.
3. Based upon these dimensions (in inches), determine the correct number of vertical U-Posts (riser posts) and knee braces from Chart 6.2.
4. After determining the correct number of riser posts to be used for the sign structure, refer to http://www.dot.state.mn.us/trafficeng/signing/doc/canddsignground.pdf and the punch codes in the MnDOT Standard Signs and Markings Manual for the spacing from center to center of posts.
5. If there is no punch code or the sign structure is unique, then refer to Chart 6.3 in the TEM to determine riser post (center to center) spacing.

In lieu of using two riser posts (in accordance with Chart 6.2 of the TEM) for a sign panel, one riser post may be used for any of the following conditions:

a) Rocky soils where holes are drilled for sign posts.
b) Concrete sidewalk or median.
c) Protected area experiencing low wind speeds.
d) Urban location.

e) Other locations where the placement of two riser posts is impractical.

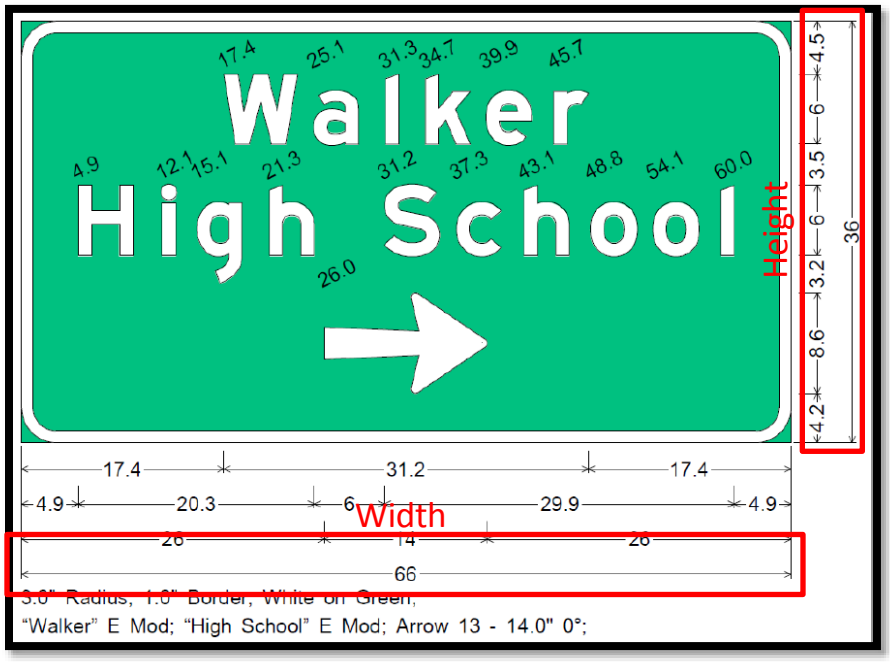
On a sign assembly with three or more riser posts, the posts and knee braces shall be spaced at least 45 inches on centers.

Sign structures using U-posts shall be assembled according to the details shown in http://www.dot.state.mn.us/trafficeng/signing/doc/canddsignground.pdf. These details were designed based on crash tests conducted at Texas Transportation Institute in 1988 and 1989.

Example

1. First, determine the total length (width) of the sign panel (refer to **Exhibit 2-8**). In this example, the width of the sign is 66".
2. Then, determine the height of the sign panel or add the heights of all of the individual sign panels to be mounted on the same sign structure (refer to **Exhibit 2-8**). There is one sign in this example that is 36" high.

Exhibit 2-8 Example Sign Width and Height



3. Based upon these dimensions (in inches), determine the correct number of vertical U-Posts (riser posts) and knee braces from Chart 6.2 (refer to **Exhibit 2-9**). In this example, using the length of 66" and height of 36" falls into the "2U-2A" portion of the chart. The 2U indicates the use of 2 U-posts and the 2A indicates to use 2 Knee Braces. See **Exhibit 2-10** for an example installation.
4. After determining the correct number of riser posts to be used for the sign structure, refer to http://www.dot.state.mn.us/trafficeng/signing/doc/canddsignground.pdf and the punch codes in the MnDOT Standard Signs and Marking Manual for the spacing from center to center of posts. For this example, there is not a punch code available since this is a non-standard sign.

5. If there is no punch code or the sign structure is unique, then refer to Chart 6.3 in the TEM to determine riser post (center to center) spacing (see **Exhibit 2-11**). Since the panel width is 66", the post spacing is 42". Also note from this same exhibit that a 72" sign also has post spacing of 42". In other words, this same structure could be used for a 66" or 72" sign.

Exhibit 2-9 Example use of Chart 6.2 from TEM

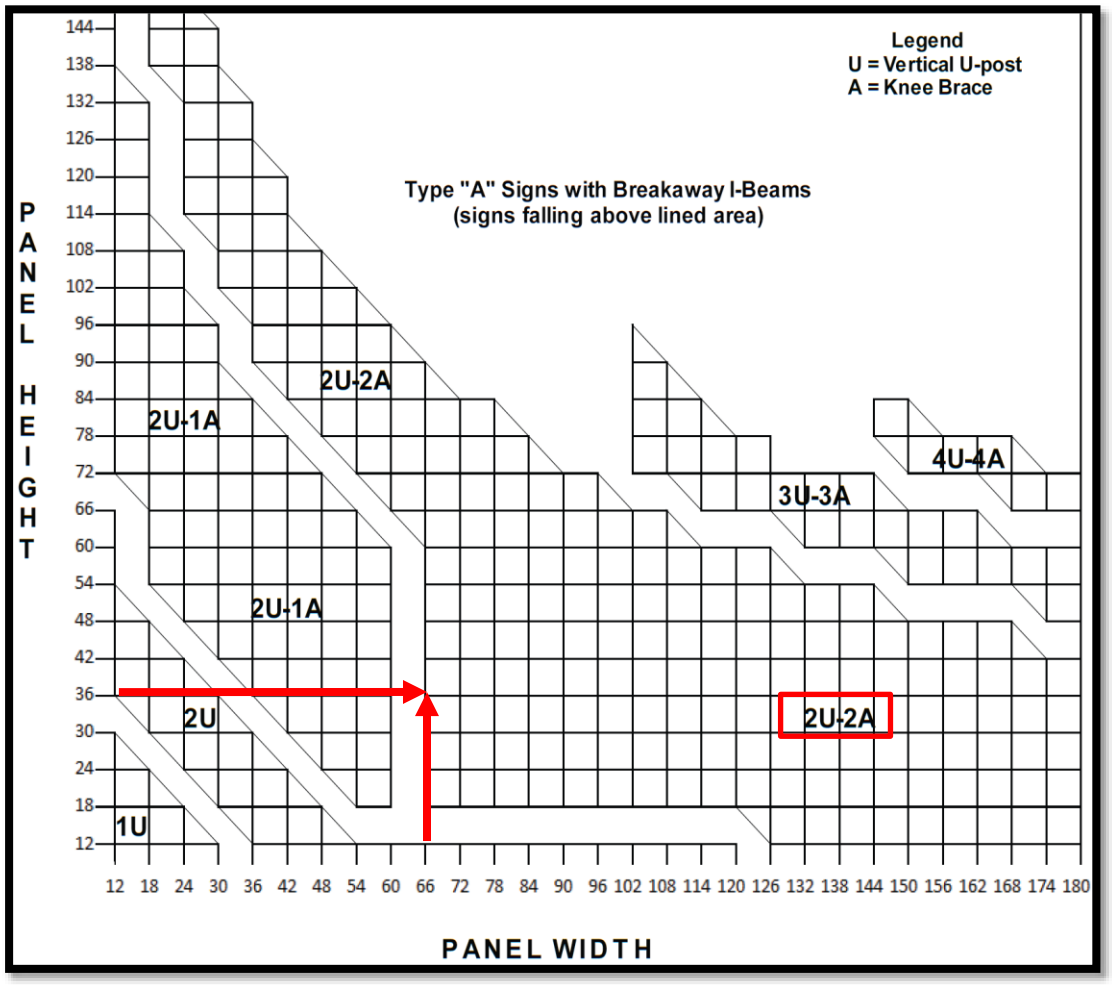


Exhibit 2-10 Example of 2 Vertical Posts and 2 Knee Braces (including Stringers)

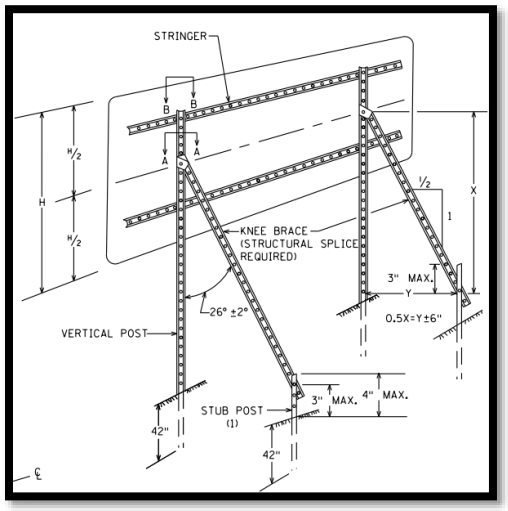


Exhibit 2-11 Example from Chart 6.3 of the TEM

PANEL WIDTH (inches)	POST SPACING		
	2 POSTS (inches)	3 POSTS (inches)	4 POSTS (inches)
36	24	---	---
42	30	---	---
48	30	---	---
54	30	---	---
60	36	---	---
66	42	---	---
72	42	---	---
78	54	---	---
84	54	---	---
90	54	---	---
96	54	---	---
102	60	45	---
108	66	45	---
114	66	45	---
120	72	45	---
126	78	45	---
132	78	45	---
138	78	48	---
144	90	51	45
150	90	54	45
156	90	54	45
162	96	57	48
168	96	60	48
174	102	63	54
180	108	63	54

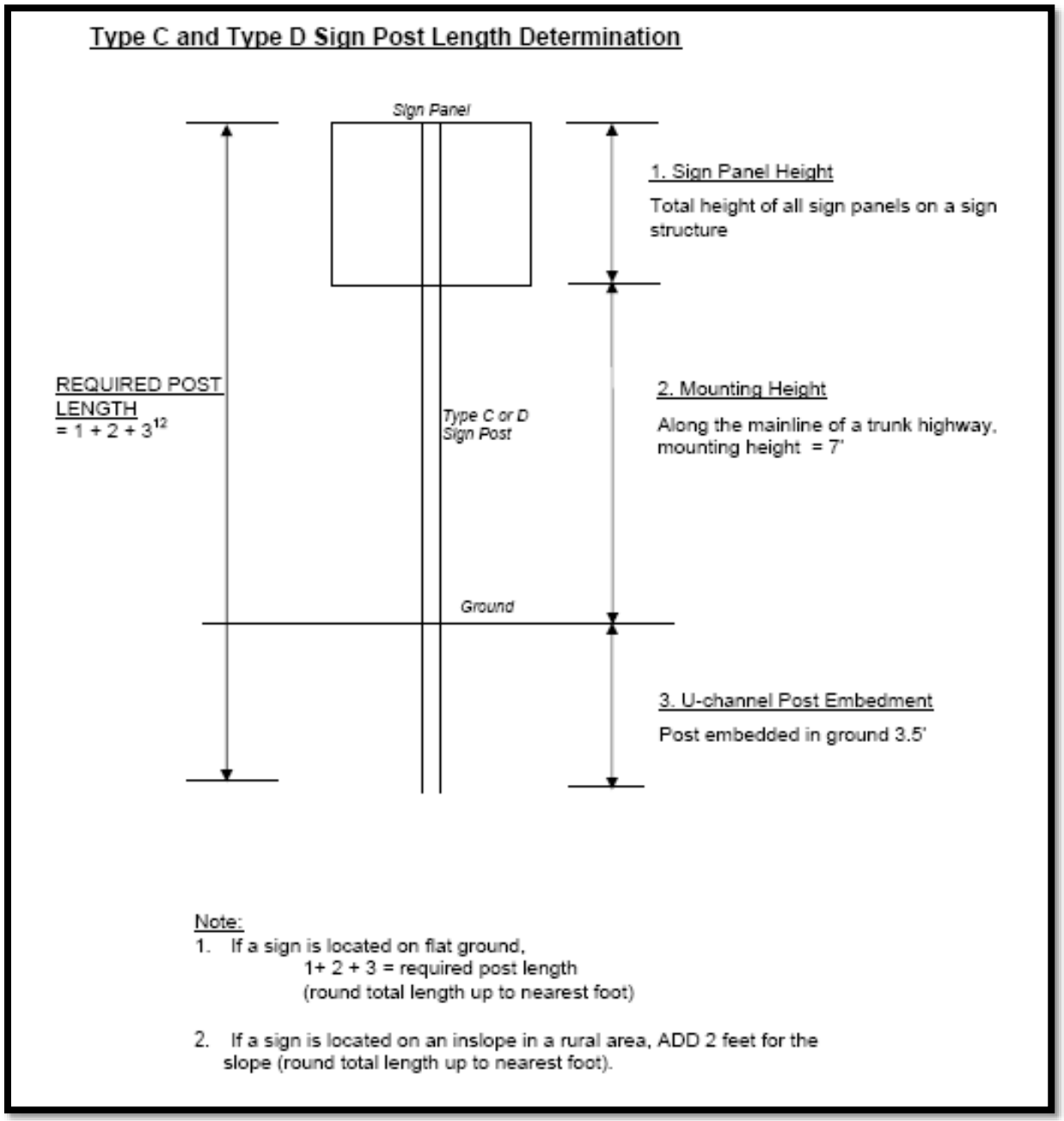
Use this chart if punch codes cannot be found in the Standard Signs Manual.

2.14.5 Post Length Determination

The post length determination is show in **Exhibit 2-12**. The length of the post is equal to the (1) Sign Panel Height, plus (2) the Mounting Height, plus (3), the U-channel Post Embedment. Item (1) is determine by the actual height of the sign. Item (2) is 7' along the mainline of a trunk highway. Item (3) is 3.5' in the ground.

If the sign is on the flat ground, the height is items (1) + (2) + (3) and round to the nearest foot. If the sign is on a slope, add 2' and round to the nearest foot.

Exhibit 2-12 Post Length Determination



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3. REGULATORY, WARNING & GUIDE SIGNS OVERVIEW

In this chapter, an overview of regulatory, warning and guide signs is presented. Additional detailed information is included in the TEM and MN MUTCD included as handouts in Section **4** and **5** of this manual.

3.1 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 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.

3.1.1 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.

3.1.2 Size of Regulatory Size

The size of regulatory signs is discussed in Section 2B.3 of the MN MUTCD. Relevant details include:

- ✓ The sizes for regulatory signs shall be as shown in Table 2B-1 and in Appendix C in the MN MUTCD (see page 5-18 of this manual).
- ✓ Also refer to the Standard Signs Summary as a guide for signs that are beyond the requirements listed in the MN MUTCD.
- ✓ The minimum sizes for regulatory signs facing traffic on exit and entrance ramps should be as shown in the column of Table 2B-1 (of the MN MUTCD) 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.

3.1.3 Stop Control

From the MN MUTCD, Section 2B.5 through 2B.7:

- ✓ 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.
- ✓ 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.
- ✓ Multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist.

R1-1

3.1.4 Yield Control

From the MUTCD, Section 2B.8 through 2B.9:

R1-2

- ✓ 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.
- ✓ YIELD signs may be installed:
  - On the approaches to a through street or highway where conditions are such that a full stop is not always required.
  - 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.
  - 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.
  - 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.
  - 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

3.1.5 Speed Limit Sign

Speed limit information can be found in the TEM section 6-5.13 (refer to Chapter **4** of this manual). Highlights from the section include:

R2-1

- ✓ A Speed Limit sign shall be installed at the terminal points of each speed zone. Installed signs shall follow the appropriate roadway size as shown in the MnDOT Standard Sign Summary.
- ✓ The first Speed Limit sign in a lower speed zone shall be one size larger than the size designated for that type of roadway.
- ✓ Signs should be posted near junctions that are major traffic generators. Closer spacing may be used in urban areas due to numerous access points. Signs may be spaced further apart in rural areas where the character of the roadway remains constant.

3.1.6 DO NOT PASS Sign

MnDOT policy is to use the NO PASSING ZONE (W14-3) pennant sign (48” x 64” x 64”). This does not preclude use of the DO NOT PASS sign where it is deemed necessary based on engineering judgment.

R4-1

3.1.7 ONE WAY Signs

From the MN MUTCD, Section 2B.40 (Also refer to the TEM Figure 6.12):

- ✓ The ONE WAY sign shall be used to indicate streets or roadways upon which vehicular traffic is allowed to travel in one direction only.
- ✓ ONE WAY signs shall be placed parallel to the one-way street at all alleys and roadways that intersect one-way roadways.
- ✓ At unsignalized intersections, 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.
- ✓ At signalized intersections, ONE WAY signs shall be placed either 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.
- ✓ Where divided highways are separated by median widths of 30 feet or more, ONE WAY signs, or a combination of ONE WAY, DO NOT ENTER, and Divided Highway Crossing signs shall be placed so that at least one sign is plainly visible to each crossroad approach on the near right and far left corners of each intersection with the directional roadways.
- ✓ ONE WAY Signs may be omitted:
    - Where the design of interchanges indicates the direction of traffic on the separate roadways.
    - At intersections with divided highways that have medians of less than 30'.
    - From the medians at intersections with divided highways that have median widths of greater than 30' when an engineering study has demonstrated the signs may confuse motorists.

3.1.8 DO NOT ENTER Sign

From the MN MUTCD, Section 2B.37:

- ✓ Use where traffic is prohibited from entering a restricted roadway
- ✓ If used, this sign should be placed directly in view of a road user at the point where a road user could wrongly enter a restricted roadway
- ✓ If the sign would be visible to traffic to which it does not apply, the sign should be turned or shielded from the view of that traffic.
- ✓ A second sign on the left side of the roadway may be used, particularly where traffic approaches from an intersecting roadway.

Various Figures can be found in the TEM.

3.1.9 WRONG WAY Sign

From the MUTCD Section 2B.38:

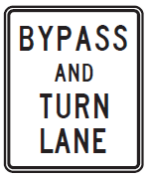
- ✓ The WRONG WAY Sign may be used as a supplement to the DO NOT ENTER sign.
- ✓ If used, it should be placed at a location farther from the crossroad than the DO NOT ENTER sign.

3.1.10 BYPASS LANE sign

Refer to Figure 6.16 in the TEM for the typical signing of bypass lanes.

Sign bypass lanes in accordance with the following guidelines:

1. T-intersections - the 30" x 30" BYPASS LANE sign shall be installed adjacent to the bypass lane taper area.
2. Four-legged intersections - the 30" x 36" BYPASS AND TURN LANE sign shall be installed adjacent to the bypass/turn lane taper area. Use this sign in areas where right turning traffic may be present, including but not limited to roadways, high volume entrances, low volume entrances, driveways, and farm or field entrances.



3.2 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.

3.2.1 Size of Warning Signs

Information can be found in Section 2C.4 of the MN MUTCD:

- ✓ 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 (of the MN MUTCD) 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.
- ✓ Also refer to the Standard Signs Summary as a guide for signs that are beyond the requirements listed in the MN MUTCD.

3.2.2 Placement of Warning Signs

Information can be found in Section 2C.5 of the MN MUTCD:

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

3.2.3 Horizontal Alignment Warning Sign

A Standard in the MN MUTCD Section 2C.6 states:

- ✓ In advance of horizontal curves on freeways, or 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 (page 5-43 in this manual) 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.

3.2.4 Advisory Speed Plaque

Information can be found in the MN MUTCD Section 2C.8. In addition, the information regarding the Advisory Speed Plaque can be found in the TEM Section 6-6.05. Highlights from the TEM are:

W13-1P

- ✓ The Advisory Speed Plaque shall be installed below horizontal curve warning signs in accordance with MN MUTCD Table 2C-5.
- ✓ If horizontal curve warning signs are installed on curves which have a speed differential of 5 mph then the Advisory Speed Plaque shall be installed below the horizontal curve warning sign.
- ✓ Advisory speeds will be determined by the established engineering practice using a ball bank indicator using the following criteria (Chart 6.5 from the TEM):
  - 16 degrees of ball-bank for speeds of 20 mph or less.
  - 14 degrees of ball-bank for speeds of 25 to 30 mph.
  - 12 degrees of ball-bank for speeds of 35 mph and higher.

3.2.5 Chevron Alignment

Information on Chevron signs can be found in the MN MUTCD Section 2C.9 and the TEM Section 6-6.08. Some of the details include:


W1-8

- ✓ MN MUTCD Table 2C-5, states that the use of Chevrons and/or One Direction Large Arrow (W1-6) signs should be used on curves when the difference between the speed limit and advisory speed is 10 mph, but shall be used when this difference is 15 mph or greater.
- ✓ Generally, these signs are used for curves of over six degrees (a curve radius less than 900 feet).
- ✓ The use of Chevrons on curves is preferred over the use of the One Direction Large Arrow.
- ✓ The exception is on conventional roadways when the speed of the turn/curve is 30 mph or less or there is a visual trap.
- ✓ Spacing of the Chevron is shown in MN MUTCD Table 2C-6.
- ✓ An example of Advisory Speed Signs for an Exit Ramp can be found in Figure 2C-3 of the MN MUTCD.

3.2.6 Combination Horizontal Alignment/Advisory Speed Signs

Information on these signs are in MN MUTCD Section 2C.15. These signs are used under engineering judgement when additional emphasis is required. Due to this, they are used sparingly.

3.2.7 Advance Traffic Control Signs

Information on Advance Traffic Control signs can be found in the MN MUTCD Section 2C.36 and the TEM Section 6-6.03. Some of the details include:

- ✓ 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 in the MN MUTCD).
- ✓ Although MnDOT maintains STOP and YIELD signs on local roads intersecting the trunk highway, maintenance of the advance warning signs on all local road approaches to trunk highway intersections is the responsibility of the road authority.

3.2.8 Non-Vehicular and Vehicular Traffic Warning Signs

Information on these signs are in the TEM Section 6-6.09.

- ✓ Non-Vehicular and Vehicular Traffic Warning signs should only be used at locations where the condition, crossing activity, or shared use of the roadway is unexpected or where a sight restriction or other geometric constraint exists.
- ✓ If used, Non-Vehicular or Vehicular Traffic Warning signs placed in advance of a crossing should be placed in accordance with the MN MUTCD Table 2C-4 or Chart 6.4 of the TEM.

3.2.9 No Passing Zones

Information on No Passing zone signing can be found in the TEM Section 6-6.11.

- ✓ It is MnDOT's practice to use the NO PASSING ZONE (W14-3) pennant signs. This does not preclude use of the DO NOT PASS sign where it is deemed necessary based on engineering judgment.
- ✓ NO PASSING ZONE pennant signs used on conventional highways shall be 64" x 64" x 48".

3.2.10 Speed Reduction Sign

Information on Speed Reduction signing can be found in the TEM Section 6-6.16.

- ✓ The Speed Reduction sign shall be used if the reduction in speed limits between two zones is 15 mph or greater.
- ✓ This sign may be used if the difference between two zones is 10 mph or less, based on engineering judgment. In transition zones, engineering judgment should determine if placement of a speed reduction sign is necessary for the second reduction in speed.

3.3 Guide Signs

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.

In general, signs that require agreements would be supplemental guide sign programs.

3.3.1 Route Signs

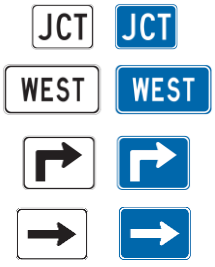
Route signs include the following:

- ✓ Interstate
- ✓ US Route
- ✓ Minnesota Route
- ✓ County Route
- ✓ Township Route
- ✓ Park & Forest Roads
- ✓ Memorial Highways
- ✓ Trails

3.3.2 Auxiliary Signs

Auxiliary signs include the following:

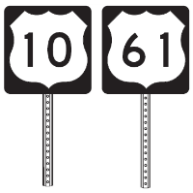
- ✓ Junction
- ✓ Cardinal Direction
- ✓ Advance Turn Arrow
- ✓ Directional Arrow
- ✓ Others:
  - ALTERNATE, BYPASS, BUSINESS, TRUCK
  - TO, BEGIN, END, TEMPORARY



3.3.3 Route Sign Assemblies

Information on route sign assemblies can be found in the MN MUTCD Section 2D.29.

- ✓ Route Sign Assemblies shall consist of a route sign and auxiliary signs that 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.

Refer to the MN MUTCD for additional details.

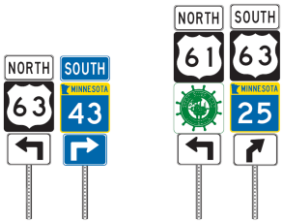
3.3.4 Junction Assembly

Information on junction assemblies can be found in the MN MUTCD Section 2D.30.

- ✓ A junction assembly shall consist of a junction auxiliary sign and route sign
- ✓ This sign shall be installed in advance of every intersection where a signed numbered route is intersected or joined by another signed numbered route

Refer to the MN MUTCD for additional details.

3.3.5 Advance Route Turn Assembly

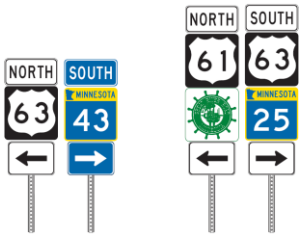


Information on junction assemblies can be found in the MN MUTCD Section 2D.31.

- ✓ This assembly shall consist of
  - Route sign
  - Advance turn arrow (or word message) auxiliary
  - Cardinal direction auxiliary, if needed
- ✓ Shall be installed in advance of the intersection, unless there is an intersection between it and the designated turn

Refer to the MN MUTCD for additional details.

3.3.6 Directional Assembly



Information on junction assemblies can be found in the MN MUTCD Section 2D.32.

- ✓ This assembly shall consist of
  - Route sign
  - Directional arrow auxiliary
  - Cardinal direction auxiliary, if needed

Refer to the MN MUTCD for additional details.

3.3.7 Confirmation Assembly

Information on junction assemblies can be found in the MN MUTCD Section 2D.34.

- ✓ This assembly consists of
  - Route sign
  - Cardinal direction auxiliary
- ✓ Placement
  - Should be installed just beyond the intersections of numbered routes (25 ft to 200 ft)
  - Should be installed between intersection in urban districts as needed, and beyond built-up area of any incorporated city or town

Refer to the MN MUTCD for additional details.

3.3.8 Trailblazer Assembly

Information on junction assemblies can be found in the MN MUTCD Section 2D.35.

- ✓ These provides directional guidance to a particular road from other highways in the vicinity
- ✓ This assembly consists of
  - Route sign
  - "TO" and single-head dir. arrow auxiliary
  - Cardinal direction, if needed
- ✓ May be installed with other Route Sign assemblies or alone

Refer to the MN MUTCD for additional details.

3.3.9 Destination and Distance

Information on destination and distances signs can be found in the MN MUTCD Section 2D.36 through 2D.42. These:

- ✓ Supply road user information concerning destinations that can be reached by way of numbered or unnumbered routes
- ✓ Route signs & cardinal directions may be included

Refer to the MN MUTCD for additional details.

3.3.10 Advance Street Name Signs

Information on advance street name signs can be found in the MN MUTCD Section 2D.44. The purpose:

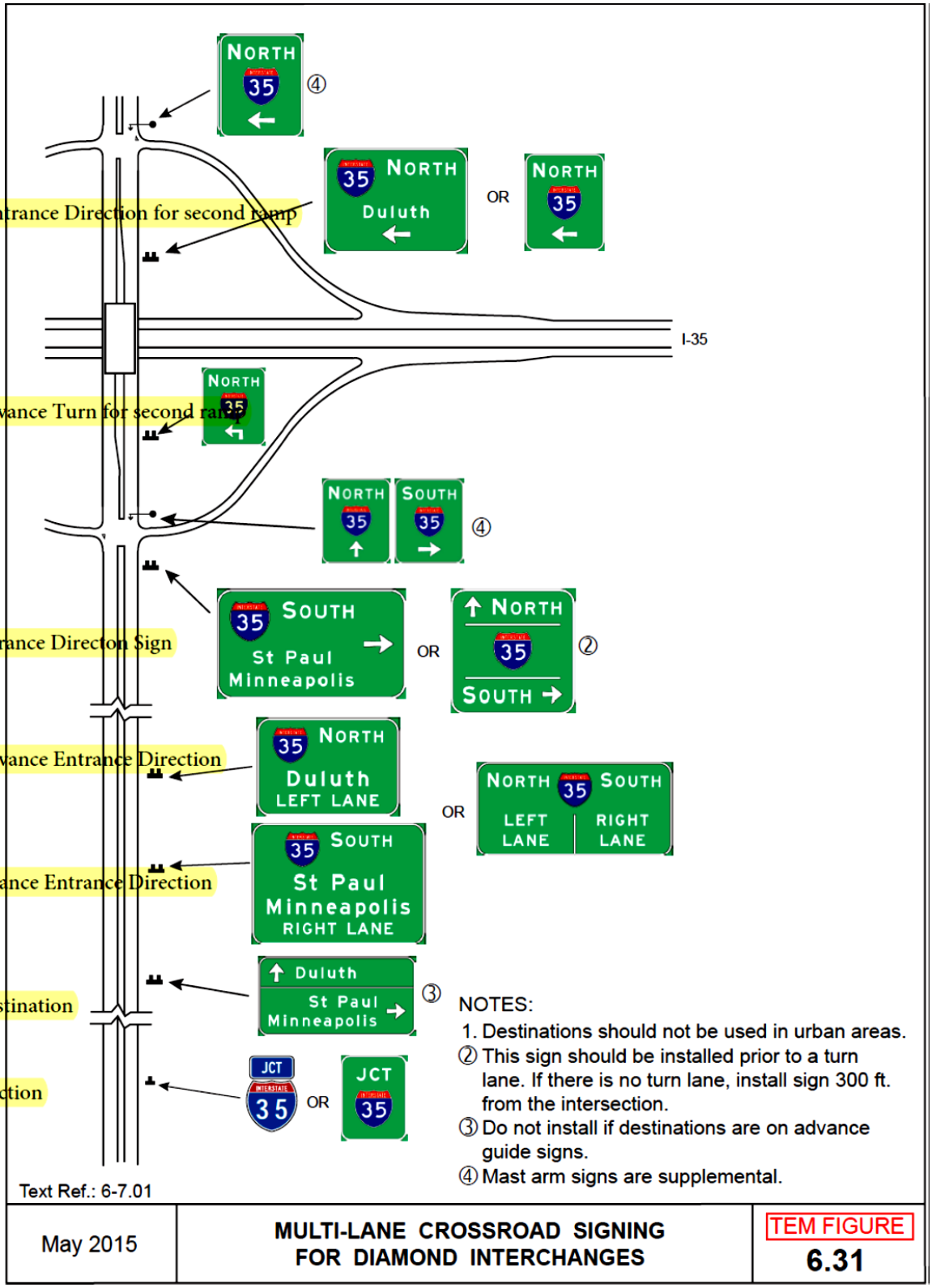
- ✓ Provide users with advance information to identify the name of the next intersecting street (or signal), prepare for crossing traffic, and to facilitate timely deceleration and/or lane changing in preparation for a turn.
- ✓ Shall supplement (not replace) street name signs.

Refer to the MN MUTCD for additional details.

3.3.11 Signing on Conventional Roads on Approaches to Interchanges

Signing on Conventional Roads on Approaches to Interchanges information can be found in the MN MUTCD Section 2D.45. The figures in the MN MUTCD should not be used, but use the figures in the TEM (Figure 6.30 through 6.33). **Exhibit 3-1** includes text tags (highlighted) on TEM Figure 6.31 pointing out which signs are which under the MNMUTCD language in Section 2D.45.

Exhibit 3-1 TEM to MN MUTCD Sign Type Cross Reference



3.3.12 Supplemental Signs

Information on MnDOT's supplemental signs program can be found in the TEM, Section 6-7.09. In order for a facility to receive supplemental guide signing, the sign location must meet engineering standards and the facility must meet MnDOT policy.

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 3-2** for some examples.

Exhibit 3-2 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:

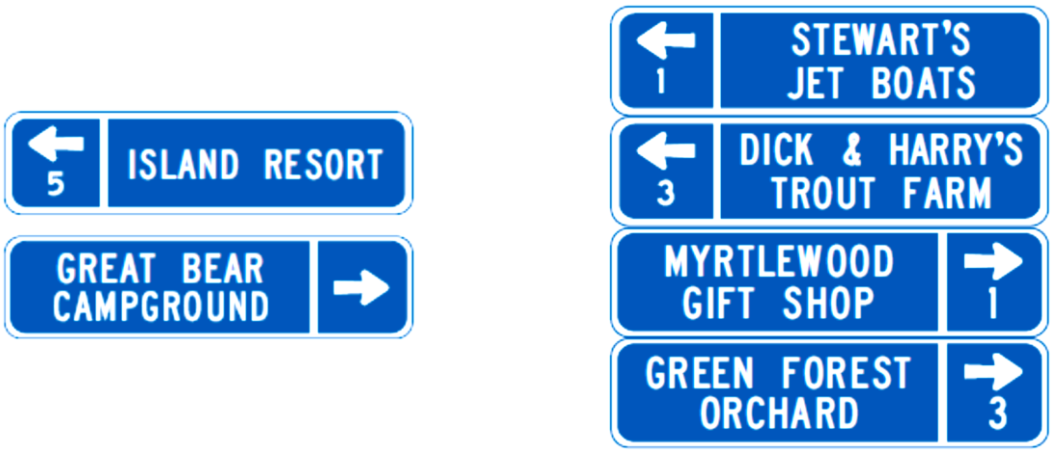
1. Geographical features, such as county lines, incorporated city limits, major river and stream crossings, highways and streets crossed by the freeway, and similar features which provide orientation for the driver.
2. A city in each direction along the intersected route.
3. National parks.
4. National 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.

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, Section 6-7.04.04. In addition, they are included in Chapter 2K of the MN MUTCD.

Exhibit 3-3 Sample Tourist-Oriented Directional Signs



General Motorist Service

General Motorist Service Signs are those that lead to the following locations (as long as they met the requirements of Section 6-7.09.03 of the TEM):

- ✓ Gas, Diesel, and/or alternative fuels (LP Gas, E85)
- ✓ Food
- ✓ Lodging
- ✓ Camping
- ✓ Hospitals

Generally, these signs are provided at no cost.

Exhibit 3-4 Sample General Motorist Service Sign

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 3-5 Sample Logo (Specific Service) Sign

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 3-6 Sample Major Traffic Generator Sign

Other major generators may include the following:

- ✓ Airports
- ✓ Universities
- ✓ National Parks, National Monuments
- ✓ State Parks
- ✓ Regional Shopping Centers
- ✓ Casinos

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 6.07.09.11 for additional details.

Exhibit 3-7 Sample Minor Traffic Generator Sign

3.3.13 Supplemental Sign in TEM Appendix A

Appendix A, of the TEM Chapter 6 includes Criteria for supplemental guide signing (not included in this training manual). The information can be downloaded from, www.dot.state.mn.us/trafficeng/publ/tem/index.html.

4. TRAFFIC ENGINEERING MANUAL – SIGNING

The information on the following pages are a handout from the 2015 Traffic Engineering Manual (TEM) Chapter 6. The entire TEM chapter is not included, but only pages of interest for this manual. For full details on the TEM, refer to the OTST publications website found at, www.dot.state.mn.us/trafficeng/publ/index.html.

NOTE: Chapter 6 of the TEM was recently updated in March of 2017. The TEM serves as a supplement to the MN MUTCD, and designers for MnDOT projects should use both.

CHAPTER 6 - TRAFFIC SIGNS AND DELINEATION

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HANDOUT

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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.

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.

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.

6-3.00 LEGALITY - LEGAL AUTHORITY FOR PLACEMENT OF TRAFFIC SIGNS

6-3.01 Traffic Signs Installed by MnDOT Maintenance Forces

Minnesota Statute (Minn. Stat. Sec.) 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.

6-3.02 Traffic Signs Installed by Contract

Under the provisions of Minn. Stat. Sec. 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.

6-3.03 Traffic Signs Installed by Others by Maintenance Permit

Under the provision of Minn. Stat. Sec. 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 permit. District Traffic Engineers should approve all sign installations and ensure that all applicable standards and practices are followed (Traffic Engineering Manual, MN MUTCD, MnDOT Standard Specifications for Construction, statutes, etc.

6-3.04 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.

6-4.00 GENERAL PRINCIPLES OF TRAFFIC SIGNING

6-4.01 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.

6-4.02 Basic Considerations for Installation of Traffic Signs

As stated in the MN MUTCD, and summarized in the Transportation and Traffic Engineering Handbook (published by the Institute of Transportation Engineers), five basic considerations are employed to ensure that the above basic requirements are met. These considerations are:

1. Design: the combination of physical features such as size, color, and shape needed to command attention and convey a clear message.
2. Placement: the installation of devices should be within the viewer's cone of vision, so that they will command attention and allow time for response.

   A 20-degree cone of vision should be used for placement of signs. Signs must remain within this cone

of vision to be read. Care should be taken when placing signs near intersections so that they do not restrict intersection sight distance.

3. Operation: the application of devices so that they meet traffic requirements in a uniform and consistent manner. Devices should fulfill a need, command respect, and allow time for proper response.
4. Maintenance: the upkeep of devices to retain legibility and visibility, the removal of devices if not needed, and to aid in commanding respect and attention while fulfilling the needs of users.
5. Uniformity: the uniform application of similar devices for similar situations so that they fulfill the needs of users and command their respect. The importance of uniformity in signing cannot be overemphasized.

6-4.03 Functional Classifications of Traffic Signs

The MN MUTCD, Section 2A.5, classifies signs by their functional usage as follows:

1. **Regulatory signs** inform highway 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 hazardous conditions, actual or potential, on or adjacent to a highway or street 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 geographical, recreational, or cultural sites.

   Further, guide signs for expressways and freeways have two sub classifications:

   a. Primary guide signs consist of advance junction signing, exit directional signs, exit gore signs, destination, and distance signs.

   b. Supplemental guide signs further provide the driver geographic orientation and secondary destinations at certain interchanges. Destinations include cities, motorist services, or state parks. Exit numbers are included on freeway signs.

6-4.04 Department Classification by Sign Design Type

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

Type A

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

1. Support system - poured concrete footings or driven structural steel H-piles to support breakaway wide-flange steel posts.
2. Sign panel - bolted extruded aluminum sections covered with sheet aluminum and direct applied retroreflective legend. The sign panel is attached with post clips to wide flange steel posts.

Type C

Type C signs are primarily regulatory, warning, route marker assemblies as found in the MnDOT Standard Signs and Markings Manual. They are the most common sign type and are typically installed on driven U posts or driven square tube posts or attached to signal mast arms and poles.

1. Support system - ground mounted signs are spliced or single U-posts driven into subsoil, attached to a bridge railing utilizing O-posts, or banded to traffic signal pedestals or mast arm poles. Unsupported length and sign panel area determines the number of U-posts and need for stringers and/or knee bracing.
2. Sign panel - sheet aluminum with direct applied retroreflectorized or screen processed legend. Punching is specified in the MnDOT Standard Signs and Markings Manual.
3. Light Poles - Manufacturers have indicated that signs should not be placed on any breakaway light pole. Installation of signs on breakaway light poles is strongly discouraged but in some cases may be necessary only after standard installation methods are explored and rejected. Using the following criteria, signs may be placed on poles that are installed on a steel 6 bolt median foundation: 40 foot mounting height poles can have a sign with a maximum of 12 sq ft at 7 feet up from the roadway; 49 foot mounting height poles may have a sign with a maximum of 6 sq ft at a 7 feet up from the roadway.

Type A Sign (with EA Panel)

Type C Sign

Type D

Type D signs are the smaller guide, destination, or informational signs. They are supported on driven U posts or mounted on overhead structures (traffic signal arms, sign supports, bridges, etc) with punching and stringer spacing as indicated in the MnDOT Standard Signs and Markings Manual.

1. Support system - same as Type C signs but generally supporting greater sign panel area. They may be affixed to a bridge railing, traffic signal mast arm, etc.
2. Sign panel - same as for Type C signs but splice plates may be required as specified in the MnDOT Standard Signs and Markings Manual.

Type D Sign
Ground Mounted

Type D Sign
Bridge Mounted

Type D Sign
Mast Arm Mounted

Type OH

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 types of Type OH sign support systems: (1) sign supports which include no walkway or sign lighting, (2) trusses which may or may not include walkway and sign lighting, and (3) bridge-mounted structures which may or may not include walkway and sign lighting.

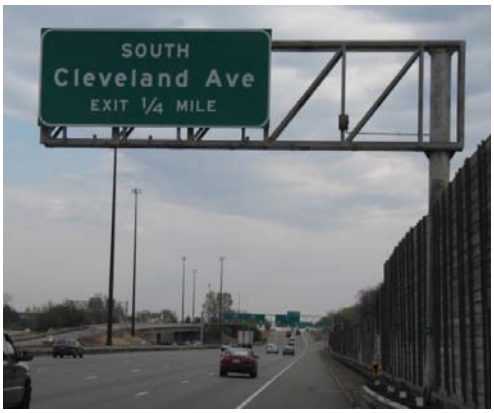
Type OH signs are necessary where ground-mounted signs are not deemed effective. Applications include, but are not limited to the following:

- Freeway and expressway signing (distance, advance guide, and exit signs) where space is not available for ground mounted signs or where there are three or more lanes of travel.
- Guide and/or lane use control signing approaching intersections in urban areas.
- Approach warning sign/flasher for mid-block pedestrian crosswalks.
- Locations with restricted sight distance (may be coupled with other factors cited).
- Exit ramp or roundabout guide and/or lane use control signing where overhead signing for proper lane assignment is necessary and cannot be accomplished by ground mounted signs.

1. Support systems
    a. Sign support - poured concrete shaft footing(s) supporting a sign bridge or cantilever structure with a single horizontal support for attaching sign panels.
    b. Truss type - poured concrete spread, shaft, or median barrier footings supporting a sign bridge or cantilever structure. The horizontal truss supports panel-mounting posts for attaching sign panels. The horizontal truss may incorporate a walkway and sign lighting system.
    c. Bridge mounted - truss system attached to a bridge which includes sign panel supports for attaching sign panels. The truss may incorporate a walkway and sign lighting system.

Overhead signs can generally be mounted to bridges with less than a 30 degree angle of skew (10 degree angle for changeable message signs). The overhead sign panel or changeable message sign should be mounted at right angles to the direction of, and facing, the traffic that they are intended to serve. Each situation is unique and the District Traffic Office should contact the Bridge Design Office for consultation. It is not recommended to mount overhead signs to pedestrian bridges; especially the truss supported or prefabricated pedestrian bridges. Except for clearance signs and other Type D signs, overhead signs shall not be mounted to railroad bridges. Review existing overhead signs mounted to railroad bridges through attrition.

2. Sign panels
   a. Sign support - sheet aluminum with direct applied retroreflective legend. The sign panel is bolted to a sign bracket assembly.
   b. Truss type and bridge mounted - bolted extruded aluminum sections covered with sheet aluminum and direct applied retroreflective legend. The sign panel is attached with post clips to the panel mounting posts.



Type OH Sign - Cantilever (Design A)

Type OH Sign - Cantilever (Design B) with EO Panels

Type OH Sign - Sign Bridge (Design C)

Type OH Sign - Sign Support

Type OH Sign - Bridge Mounted with EO Panel

Type EA and Type EO

Type EA and Type EO signs are extruded sign panels attached with U-posts or S4x7.7 panel mounting posts above Type A or Type OH sign panels, respectively. These panels are used to designate exit numbers.

Traffic Signal Mast Arm Signs

These signs are designed specifically to be mounted on traffic signal mast arms. Signs are limited in size due to wind loading factors considered in the design of these structures.

Guide signs mounted on mast arms are supplemental to those mounted on the ground with the same message and therefore should be limited in use. The number of signs, size, and location of the signs on the mast arm will impact the wind loading. Before placement of signs on mast arms, a wind load analysis is required. For more information on wind load analysis contact the OTST Signals Unit.

Figure 6.23A through 6.23F show example mast arm signing and placement.

Changeable Message Signs (CMS)

Changeable Message Signs (CMS) may be used to inform the road user of special conditions about advisory situations, traffic congestion, or safety messages as determined by the District Traffic Engineer.

6-4.05 Elements of Traffic Sign Design

Elements of sign design include shape, color, size, legend, border, retroreflective properties, illumination, and uniformity. These elements are discussed in the MN MUTCD, Part 2; 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 should be replaced on all of the sign panels.

6-4.05.01 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.

6-4.05.02 Color

The color of signs, legends, and borders are specified in the MN MUTCD. For standard signs, see the MnDOT Standard Signs and Markings Manual.

a. At least 650 foot legibility distance.
b. At least 1000 foot detection distance.
c. Roadway and interchange geometrics.
d. High weaving traffic volumes.
e. Three or more overhead mounted sign panels on the same sign structure facing one direction of traffic (sign message overload).
f. Number of lanes (horizontal and vertical alignment).
g. Major forks.
h. Skewed bridge crossings.
i. Horizontal curves.

3. High density fog areas.
4. Roadway lighting located in close proximity to overhead signs causing glare from the sign panels.
5. Regulatory and diagrammatic signs.

Sign lighting shall be provided for all sign panels if one sign panel on a sign structure requires lighting. The details of sign lighting are discussed in Chapter 10 of this manual.

6-4.06 Lateral Offset and Vertical Clearance Requirements

6-4.06.01 Type A Signs

See http://www.dot.state.mn.us/trafficeng/signing/doc/placementstd.pdf for normal lateral offsets and vertical clearances.

The typical placement for Exit signs (E5-1 and E5-1a), Merge signs (W4-1), and Added Lane sign (W4-3) is also shown on http://www.dot.state.mn.us/trafficeng/signing/doc/placementstd.pdf.

6-4.06.02 Type C and Type D Signs

See Figure 6.1 for normal lateral offsets and vertical clearances.

6-4.06.03 Type OH Signs

1. The lateral placement of sign panels is the relationship of the sign panel to the lane. This is to ensure that the sign message will be correctly interpreted by motorists and proper lane assignment is achieved. Even a small error in placement can have a detrimental effect on traffic operation and sign message clarity.

   The lateral offset of sign posts is normally 7.5 feet from the edge of shoulder or the face of curb to the center of the post. Post locations and guardrail requirements will be in accordance with the current edition of the Road Design Manual.

2. The minimum vertical clearance over the high point of the roadway or mountable curb shall be 17.33 feet. See Technical Memorandum No. 11-16-B-07 for additional information regarding MnDOT Vertical Clearance Standards for New Bridges and for projects where the pavement is to be constructed under existing bridges.

6-4.07 Sign Installation and Maintenance Practices

6-4.07.01 Sign Installation Practice

1. Utilities and underground traffic control components

   Care should be exercised in the installation of signs with respect to underground and overhead inplace public service utilities. In addition, care should be taken when working around traffic control devices and communication installations such as signal system cables, signal interconnection conduit systems, surveillance cables, roadway lighting electric cables, and traffic counting cables.

   Minn. Stat. Chap. 216D requires anyone who engages in any type of excavation to provide advance notice of at least 48 hours to underground facility operators who may be affected by the excavation. Excavation means an activity that moves, removes, or otherwise disturbs the soil by use of a motor, engine, hydraulic or pneumatically-powered tool, or machine-powered equipment of any kind, or by explosives.

   Gopher State One Call is a statewide one-call/web notification system which was established as a result of Minnesota law to inform all Minnesota underground facility operators of intended excavation. See their web page for hours of operation and to submit an electronic ticket. Gopher State One Call is available for emergency calls 24 hours a day, seven days a week. An emergency is defined by state law as "A condition that poses a clear and immediate danger to life or health or a significant loss of property."

   PHONE NUMBERS
   Twin Cities Metro (651) 454-0002
   In or Out State-Toll Free (800) 252-1166
   WEBSITE: http://www.gopherstateonecall.org/

   A free brochure is available and should be obtained by personnel responsible for installing sign structures in the ground.

2. Sign groupings

   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. Spacing of signs

   General - Signs in a series must be uniformly spaced so that a driver traveling at normal speed has adequate time for the proper response. Since one of the primary objectives of traffic signing is to convey a needed message to motorists, care should be taken to provide compatible and effective sign spacing and to avoid reliance strictly on minimum distances unless absolutely necessary. As a rule of thumb for guide signs, every one inch of capital letter text height is equivalent to 30 feet of legibility distance.

   Rural Areas - Sign spacing in rural areas should not be less than the distance required to read each sign at the upper range of anticipated vehicle approach speeds. For minimum recommended distances between signs of different purposes on rural highways see Figures 6.24A, 6.24B, 6.25, and 6.26.

   Urban Areas - In urban areas with speed limits of 35 mph or less, the minimum distance between signs is 100 feet. For 40 mph or greater, this distance is 150 feet.

   Freeways - Although conditions may exist where lesser sign spacing 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.

Double Signing - If sign spacing approaches the minimum distance, double signing (right and left shoulder) may be utilized. Double signing should be used if the number of traffic conflicts is high.

4. Specular glare

   Care should be exercised in the placement of ground-mounted and overhead signs to reduce the problem of mirror reflection. This reflection is known as specular glare and is caused by motor vehicle headlights at night. Specular glare renders the sign useless by making the message impossible to read.

   Normally, signs should be mounted approximately at right angles to the direction of, and facing, the traffic that they are intended to serve.

   Where mirror reflection from the sign face is encountered in such degree as to reduce legibility, the sign should be turned slightly away from the road. At curve alignments, the angle of placement should be determined by the course of approaching traffic rather than by the roadway edge at the point where the sign is located. Sign faces normally are vertical, but on grades tilt the sign forward or back from the vertical to improve the viewing angle.

5. Wind Loading

   AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (current edition), governs the design of all permanent signing installations prepared for construction contract letting. Briefly, AASHTO specifies iso-tacs and corresponding wind pressures on sign panels as follows:

   All ground-mounted and overhead signs should be designed for a 50-year mean occurrence interval, which results in 90 mph wind speeds for Minnesota.

6. A-Frame and U-Post mountings

   MnDOT uses 3 lb/ft stub posts with 2.5 lb/ft posts for the remainder of the structure. Assuming an average distance of 10 feet from the bottom of the sign panel to the ground line, the correct sign structure design and post spacing should be determined by using Chart 6.2 and Chart 6.4.

   To use these charts, first determine the total length of the sign panel. Then, determine the height of the sign panel or add the heights of all of the individual sign panels to be mounted on the same sign structure. Based upon these dimensions (in inches), determine the correct number of vertical U-Posts (riser posts) and knee braces from Chart 6.2. After determining the correct number of riser posts to be used for the sign structure, refer to http://www.dot.state.mn.us/trafficeng/signing/doc/canddsignground.pdf and the punch codes in the MnDOT Standard Signs and Markings Manual for the spacing from center to center of posts. If there is no punch code or the sign structure is unique, then refer to Chart 6.3 to determine riser post (center to center) spacing.

   In lieu of using two riser posts (in accordance with Chart 6.2) for a sign panel, one riser post may be used for any of the following conditions:

   a. Rocky soils where holes are drilled for sign posts.
   b. Concrete sidewalk or median.
   c. Protected area experiencing low wind speeds.
   d. Urban location.
   e. Other locations where the placement of two riser posts is impractical.

   On a sign assembly with three or more riser posts, the posts and knee braces shall be spaced at least 45 inches on centers.

   Sign structures using U-posts shall be assembled according to the details shown in http://www.dot.state.mn.us/trafficeng/signing/doc/canddsignground.pdf. These details were designed based on crash tests conducted at Texas Transportation Institute in 1988 and 1989.

6-4.07.02 Sign Maintenance Practice

1. Traffic sign management system

   Each District is charged with developing and maintaining a sign inventory in accordance with the statewide sign management system. A comprehensive record of all signs is vital to sound sign management and budgeting.

2. Missing or damaged signs

   Unless otherwise stated in this manual, agreement, or other document, MnDOT is responsible for replacing all damaged or missing signs, except Logo signs, on the trunk highway system. Generally, STOP, YIELD, and DO NOT ENTER signs have the highest priority for replacement. These signs warrant weekend or overtime work for repair or replacement. Other signs should be evaluated on a case by case basis to determine relative priority. However, each District should develop a procedure for dealing with reports of damaged or missing signs to assure the prompt replacement of critical signs.

3. Sign Replacement Schedule

   Each District is charged with implementing recurring sign maintenance. A sign replacement schedule should be developed using the following guidelines:

Minimum Expected Sign Life:	15 years
Maximum Expected Sign Life:	
Type IV Sheeting	20 years
Type IX or XI Sheeting	30 years

   A sign can remain in service until its maximum expected sign life if a visual inspection indicates that the sign meets minimum retroreflectivity levels, including contrast. The visual inspection should be used at the following sign ages:

Type IV Sheeting	15 and 18 years
Type IX or XI Sheeting	15, 18, and 20 years, and yearly thereafter

   Non-prismatic sheeting should be inventoried and evaluated for action.

   Each District should develop a method or process for completing the visual inspection and appropriate documentation. Visual inspection should consist of nighttime and/or daytime reviews. As a sign ages, the nighttime inspection becomes increasingly important. The visual inspection should also consider structural integrity, contrast, vegetation or other visibility issues, and/or engineering issues. The FHWA provides guidance that may be incorporated into the nighttime inspection.

   Engineering judgment may be used to replace signs with specific characteristics outside of the above guidelines (such as color, type, facing direction, mandates, etc.) through blanket replacement.

6-4.08 Implementation of Signing

Each District decides whether signs should be installed by maintenance personnel or by contract. The following reasons usually justify the installation of signs by contract:

1. Need for breakaway supports.
2. Overhead or Type A guide sign installations.
3. Scope of work beyond capability of District forces.
4. Safety reasons.
5. Extensive need for refurbishment.

Installation of signs by maintenance personnel is generally authorized by a District Traffic Work Order (DTWO).

6-4.08.01 Work Programming

Each District decides to program any work to be done by contract.

6-4.08.02 Preliminary Design

1. Work authorization

   The District requests a charge identifier.

2. Preliminary plan

   The District prepares a preliminary signing plan for new roadway construction. The preliminary plan should be transmitted to the OTST Signing Unit for review and comment. The District shall also transmit a copy of the plan to any involved municipalities.

6-4.08.03 Detailed Design

Standard detail sheets for signing plans can be found on the OTST website: http://www.dot.state.mn.us/trafficeng/signing/plans.html. 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

6-4.08.04 Signing Special Provisions (DIV ST)

DIV ST templates for signing plan special provisions can be found on the OTST website:

http://www.dot.state.mn.us/trafficeng/signing/plans.html.

The District or OTST, if requested, is responsible for writing the special provisions for items which are not fully covered in the Standard Specifications, including description of work, material requirements, construction requirements, method of measurement, and basis of payment. OTST may provide technical assistance.

6-4.08.05 Cost Estimating

If requested, OTST will provide guidance on preliminary cost estimates based on average bid prices.

6-4.08.06 Construction Activities

1. Inspection

   Generally, all materials designated for use on state projects are subject to requirements covered by MnDOT Standard Specifications for Construction, the plan, and the special provisions included in the contract proposal.

2. Technical assistance

   OTST provides technical assistance to District personnel when requested.

3. Placement of signs

   Type OH and Type A signs are located at plan stationing unless field conditions require relocation. Dimensioned elevation drawings of each sign and roadway cross section are included in the plan.

   The importance of the positioning of overhead sign panels cannot be overemphasized. Project personnel shall notify the District Traffic Engineer if panel placement cannot be as intended or if the overhead sign location is to be changed.

   Type A signs, excluding the exit direction sign (placed at the beginning of the deceleration taper) may be moved longitudinally up to 100 feet without generally affecting the sign system requirements.

4. Project critique

   Prior to job acceptance, the District Traffic Engineer, project engineer, and designer should critique the project. This critique should include construction problems and improving methods or procedures, condition of materials incorporated in the project, and workmanship.

6-5.00 APPLICATION GUIDELINES-REGULATORY SIGNS

6-5.01 Purpose

Regulatory sign applications that are discussed in this section are those which:

1. Are not specifically addressed in the MN MUTCD.
2. Provide additional guidance to that given in the MN MUTCD on application, location, and usage of certain types of regulatory signs.
3. Establish procedures relating to engineering and traffic investigation requirements for certain regulatory signs.

6-5.02 Typical Sign Placement

The MN MUTCD Section 2B, illustrates typical positions for a number of regulatory signs. Figures later in this chapter supplement the MN MUTCD in showing typical positions for regulatory signs at various intersections and interchanges on MnDOT trunk highways.

Appropriate signing for private and low volume entrances is the responsibility of each District. Therefore, each location needs to be reviewed on a case by case basis. This allows the flexibility to deny or install signing depending on the entrance specifics.

In order to clarify and ensure uniform application for installation and maintenance of signing at entrances with trunk highways, the following guidelines are provided:

1. Private driveway

   Stop signs and/or other signing should not normally be installed. If installed, maintenance will be performed by MnDOT.

2. Low volume entrance

a. If the entrance serves a single business, stop signs and/or other signing should not be installed unless engineering judgment determines signing is warranted. If warranted, signing is installed by the District or the business itself through permit in accordance with State standards. Maintenance will be performed by MnDOT.

b. If the entrance serves several small businesses (e.g., a small strip mall), a field investigation should be conducted to determine if a stop sign or other signing is warranted based upon high traffic volumes, restricted sight distance, crash experience, intersection geometrics, pedestrian activity, etc.

1) Signing at an entrance for existing businesses, if warranted, is installed by the District or the business itself through permit in accordance with State standards. Maintenance will be performed by MnDOT.

2) Signing at an entrance to a proposed new development, if warranted, is installed by the developer in accordance with state standards. Maintenance will be performed by MnDOT.

3. High volume entrance

Stop signs are required at each entrance. Other regulatory signs may be required depending on the highway type. A field investigation may be necessary to determine if any additional signing is warranted.

a. Signing at an entrance for an existing high volume business is installed by the District or the business itself through permit in accordance with State standards. Maintenance will be performed by MnDOT.

b. Signing at an entrance to a proposed new high volume business is installed by the developer in accordance with state standards. Maintenance will be performed by MnDOT.

6-5.03 Bridge Speed and Load Restrictions

Posting requirements for bridges on trunk highways are determined by MnDOT's Office of Bridges and Structures.

1. Bridge Weight Limit Signs (R12-1a, R12-5a)

Additional Information on load posting is stated in the LRFD (Load and Resistance Factor Design) Bridge Design Manual, Section 15.13. Use and application of the R12-1a sign is stated in the MN MUTCD Section 2B.59.1.

The R12-5a sign may be used when only the single unit truck (SHV) needs posting. When a bridge load rating is controlled by SHVs, the typical posting sign (R12-5) creates a problem with unregulated permit timber trucks from the "Timber Haulers Bill". The timber trucks are associated with the two combinations vehicles, represented by the M 3S2 and M 3S3 posting sign figures. Our current MnDOT posting guidelines require that if the SHV governs the load rating and requires posting, then M 3S2 and M 3S3 will automatically be set at 40 tons maximum. This means that timber trucks are not allowed to cross the bridge, even though the rating for timber trucks may show its okay. With the new single unit posting sign (R12-5a), this will give the bridge owner an option to just post the bridge for the single unit truck.

Bridge Weight Limit signs shall be installed either on or immediately in advance of the bridge or structure that is restricted. On state highways, the posting notification is sent by memo from the State Bridge Engineer to the District Engineer. The District office must inform the Bridge Management Unit when the posting signs are in place. When a rating is completed and indicates a bridge is to be posted, the posting signs must be erected within 30 days after notification of their requirement. If there are significant changes in the bridge condition or in the posted weight, temporary signs should be erected in the interim.

6-5.04 Bus Shoulder Sign (R4-X7)

According to Minn. Stat. Sec. 169.306, USE OF SHOULDER BY BUSES, authorized buses are allowed to drive on designated shoulders on freeways and expressways in the Metro District. Typical signs and locations are shown in Figure 6.15.

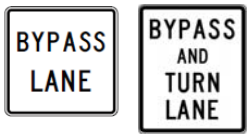
The SHOULDER AUTHORIZED BUSES ONLY (R4-X7) sign shall be used to designate shoulders for bus use. The BEGIN/END (R4-X7p) plaque shall be used at the beginning and end of each section.

Where the shoulder width is less than 10 feet (11.5 feet on bridges) for a distance less than 1000 feet, the merge sign for buses (W14-X10) should be installed at the beginning of this restricted width. In locations where there is insufficient shoulder width for 1000 feet or greater, the END and BEGIN plaques should be used with the SHOULDER AUTHORIZED BUSES ONLY sign.

6-5.05 BYPASS LANE Sign (R4-X8) and BYPASS AND TURN LANE Sign (R4-X8a)

See Figure 6.16 for the typical signing of bypass lanes.

Sign bypass lanes in accordance with the following guidelines:



1. T-intersections - the 30” x 30” BYPASS LANE sign shall be installed adjacent to the bypass lane taper area.
2. Four-legged intersections - the 30” x 36” BYPASS AND TURN LANE sign shall be installed adjacent to the bypass/turn lane taper area. Use this sign in areas where right turning traffic may be present, including but not limited to roadways, high volume entrances, low volume entrances, driveways, and farm or field entrances..

6-5.06 DO NOT PASS Sign (R4-1)

MnDOT policy is to use the NO PASSING ZONE (W14-3) pennant sign (48” x 64” x 64”). This does not preclude use of the DO NOT PASS sign where it is deemed necessary based on engineering judgment.

6-5.07 Flashing LED STOP and YIELD Signs

Light Emitting Diode (LED) units may be used individually within the legend of a sign and/or in the border of a sign to improve the conspicuity or to increase the legibility of sign legends and borders. Flashing LED STOP and YIELD signs should only be considered for installation in situations necessitating enhanced visibility of the sign. When usage is limited to special circumstances, flashing LED STOP and YIELD signs may be effective safety countermeasures.

This guidance supplements the retroreflectivity and illumination information found in the MN MUTCD, Section 2A.7. It is intended for use in permanent installations of LED STOP and YIELD signs that flash continuously, but not for actuated systems.

Appropriate Usage

Flashing LED STOP and YIELD signs should only be considered for installation in situations necessitating enhanced visibility of the sign as determined by engineering study. These signs should be limited to locations with at least two of the following:

- Limited visibility on approach to the intersection, as determined by the sight distance criteria for Warrant 1 in Section 9-4.02.02 of this 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.

- A permanent replacement STOP or YIELD sign may be a regular, non-LED sign if the maintaining agency wishes not to continue operation of a flashing LED STOP or YIELD sign at that location. This decision should be documented by the permitted agency, and sent to the District Traffic Office within one week of replacing the damaged sign.

Discontinued operation of a flashing LED STOP or YIELD sign leading to replacement with a regular, non-LED STOP or YIELD sign for any reason other than damage should require that the District Traffic Office be notified 30 days prior to replacement. This decision should be documented by the permitted agency, and sent to the District Traffic Office at the time of notification.

6-5.08 In-Street Pedestrian Crossing signs (R1-6 series)

In-Street Pedestrian Crossing signs (R1-6 series) may be used to remind road users of the state law that requires the driver of a vehicle to stop and yield the right-of-way to a pedestrian crossing the roadway within a marked or unmarked crosswalk.

With exception of installation at roundabouts, guidelines for installation of In-Street Pedestrian Crossing signs on state highways are as follows:

a. The sign shall be installed only by permit through MnDOT District offices.

b. The sign shall only be used in 35 mph or lower speed zones.

c. Only one sign structure shall be used per approach near marked crosswalks.

d. The sign shall not be used at intersections controlled by traffic control signals or on approaches controlled by STOP signs.

e. The sign should only be used at key locations, such as high volume pedestrian crosswalks, to avoid overuse.

f. The sign shall only be used as an in-street sign, not on the outside shoulder or parking lane. When installed, the sign shall not impede or obstruct any traffic movement including through or turning movements.

g. When the sign is used at or in advance of a school crossing to supplement ground mounted school warning signs, the sign should include the SCHOOL plaque.

h. The sign shall have the same sign message on both sides or a retroreflective strip mounted on the backside the same color as the centerline or lane line. To avoid driver confusion, back-to-back signs should only be used on two-lane two-way roadways. See the MN MUTCD Figure 2B-2.

i. The sign may be used seasonally to prevent damage in winter due to plowing operations, and may be removed at night if pedestrian activity is minimal.

6-5.09 Intersection Stop Control

The MUTCD does not address methodology for revising traffic control at an intersection, such as the following:

- Reduction of Stop Signs
- Increase in Stop Signs
- Reversal of Through Route
- Change from Yield to Stop
- Change from Stop to Yield

These types of changes to traffic control require careful consideration of potential safety impacts. When making these changes in stop control conditions, consider the following list. This list is not all-inclusive, but a starting point to help the traffic engineer. All of the following listed below are optional using engineering judgment.

Consider:

- Coordinating with your district PAC to discuss the best way to notify the traveling public of the upcoming changes.
- Notifying law enforcement (city, county, state) of the changes.
- Deploying enhanced conspicuity strategies for a period of time determined by the engineer. See MN MUTCD 2A.15.
- Installing advanced warning signs, either temporarily or permanently.
  - STOP AHEAD (W3-1)
  - TRAFFIC CONTROL CHANGE AHEAD (W3-X5)
  - CROSS TRAFFIC DOES NOT STOP (W4-4P)
  - NEW TRAFFIC PATTERN AHEAD (W23-2)
  - NEW (W16-15P)
  - NOTICE (W16-18P)
- Installing either temporary or permanent transverse rumble strips.
- Adding or removing pavement markings as appropriate.
  - Stop Bar
  - Stop Message(s)
  - No Passing Zones

6-5.10 Lane Designations

Under Minn. Stat. Sec. 169.18, Subd. 7(c), MnDOT may erect signs on Trunk Highways (or authorize the erection of such signs on local highways) directing traffic to use specific lanes. Special lanes may be designated when certain vehicles (for example, trucks) cannot maintain the speed required to keep the speed differential within 15-20 mph and there is adequate space available. TRUCKS USE RIGHT LANE (R4-5) may be installed according to MN MUTCD Section 2B. In addition, special bus and HOV lanes, known as restricted lanes, are designated on certain freeway mainline and entrance ramps.

6-5.11 Passing Lane Sections

See Figures 6.21A, and 6.21B for typical passing lane section signing.

6-5.11.01 Advance Passing Lane Sign (R4-X6)

The Advance Passing Lane sign should be used to notify and prepare drivers of the upcoming passing opportunity so that they can make effective use of the passing lane. One sign should be placed 1/2 mile upstream and additional advance signs are desirable 2-5 miles in advance of a passing section.

6-5.11.02 SLOWER TRAFFIC KEEP RIGHT Sign (R4-3)

The SLOWER TRAFFIC KEEP RIGHT sign should be placed at the beginning of the lane addition.

6-5.12 RIGHT LANE MUST TURN RIGHT Sign (R3-7) and LEFT LANE MUST TURN LEFT Sign (R3-7)

RIGHT/LEFT TURN LANE signs shall be removed through attrition unless otherwise noted. If any one RIGHT/LEFT TURN sign requires replacement before the end of its useful life, replace all turn lane signs at the intersection or on the exit ramp with the appropriate R3-7 signs or Advanced Lane Control signs.

Sign turn lanes in accordance with the following guidelines:

1. Conventional Roads

   All turn lanes should be signed unless the turn lane(s) is(are) included on an Advanced Intersection Lane Control(R3-8) sign(s). Signs may be omitted in urban areas.

2. Interchange exit ramps

   a. All turn lanes should be signed unless the turn lane(s) is(are) included on an Advanced Intersection Lane Control (R3-8) sign(s).

   b. See Figures 6.17A and 6.17B for typical Advanced Intersection Lane Control signs on ramps.

3. Expressways

   Sign all turn lanes based on the District sign replacement cycle. Adjoining Districts should coordinate installing RIGHT/LEFT TURN LANE MUST TURN RIGHT/LEFT signs within the same time frame on those highways that cross District boundaries.

6-5.13 SLOWER TRAFFIC MOVE RIGHT Sign (R4-3a)

The SLOWER TRAFFIC MOVE RIGHT signs advise slower motorists to move into the right or slower lane on interstate roadways throughout the state.

These signs were installed to educate motorists of Minn. Stat. Sec. 169.18, Subd. 1 which states that vehicles should be driven on the right unless:

1. Passing another vehicle.
2. The right lane is closed to traffic during road construction or repair.
3. On three-lane or one-way roads.

Signs were installed in the year 2000 in coordination with the Minnesota State Legislature and State Patrol. In greater Minnesota, signs were installed at 50 mile intervals and in the Metro District locations were selected based on engineering judgment. Notify the State Signing Engineer before removing a SLOWER TRAFFIC MOVE RIGHT (R3-4a) sign.

6-5.14 Speed Zone Signing

Minn. Stat. Sec. 169.14 establishes statutory speed limits on most typical roadways under ideal conditions. All other speed limits are set by the DOT Commissioner based upon an engineering and traffic investigation. Speed zone signs should be installed in the most advantageous locations to promote driver compliance. Speed zone signs should be installed according to the following criteria.

6-5.14.01 Speed Limit Sign (R2-1)

A Speed Limit sign shall be installed at the terminal points of each speed zone.

The first Speed Limit sign in a lower speed zone should be one size larger than the size designated for that type of roadway except freeways.

In addition to sign locations required by the standard in MN MUTCD 2B.13, signs should be posted beyond intersections with major traffic generators. Installation of signs in urban areas may be more frequent due to numerous access points while rural areas may be less frequent when the character of the roadway remains consistent

6-5.14.02 Minimum Speed Limit Sign (R2-4b)

1. General

   The Minimum Speed Limit sign shall be used on all freeways designated as interstates. The minimum speed limit should be 40 mph unless a traffic investigation identifies a unique traffic pattern justifying a different value. The minimum speed shall be omitted whenever there are warning signs with advisory speeds advising motorists of a value lower than the minimum. The minimum speed limit should resume after the hazard is passed.

   Signs should be installed downstream of all entrance ramps. If sign spacing criteria cannot be met due to high sign density in urban areas, the Minimum Speed Limit sign should be placed at the first available location. The next smaller sign size may be used where proper lateral clearances cannot be achieved.

2. Rural interstates

   On rural interstates located outside the limits of urbanized areas (population greater than 50,000 as defined by the Commissioner) the R2-4b Minimum Speed Limit sign shall be used. The speed limit shall be 70 mph. The spacing between signs should not exceed ten miles. Signs should be installed downstream of all entrance ramps.

3. Urban interstates

   On urban interstates the R2-4b Minimum Speed Limit sign shall be used. A Speed Limit (R2-1) sign may be used if a traffic investigation determines that a minimum speed limit is not required.

6-5.14.03 Dynamic Speed Display Signs

Dynamic Speed Display signs may be installed on trunk highways in accordance with MnDOT Tech Memo 13-01-T-01.

6-5.15 TRUCK ROUTE (R14-1)

Based on Minn. Stat. Sec. 169.87, Subd. 1e, when a local authority petitions MnDOT to establish a truck route for travel into, through, or out of the territory under its jurisdiction, MnDOT shall investigate the matter. If the request is approved, MnDOT may designate certain highways under MnDOT's jurisdiction as "truck routes" and may restrict truck travel to those routes when signs are erected. However, except under conditions stated in Minn. Stat. Sec. 169.87, MnDOT is not authorized to prohibit truck travel on trunk highways. The designation of a truck route is based on the design of the roadway, the type and mass of trucks using the facility, load carried, and the weather conditions. Signs may be installed in accordance with MN MUTCD Section 2B.61.

6-5.16 TRUCK STOPPING LANE (R4-X4) at Railroad Crossings

See Figure 6.47 for typical sign placement approaching railroad crossings with truck stopping lanes. Install the TRUCK STOPPING LANE sign adjacent to the truck stopping lane taper area.

6-5.17 Two-Way Snowmobile Trail Signing

Signing of MnDOT permitted two-way snowmobile trails within trunk highway right-of-way is the responsibility of the Department of Natural Resources. Sign two-way snowmobile trails within the trunk highway right of way in accordance with the following:

1. Install 18" x 24" sign panels with black legend and border on orange background.
2. Install BEGIN and END plaques (18" x 6") in black legend and border on white background above the two-way sign panel, designating the beginning and end of the two-way trail.

6-6.00 APPLICATION GUIDELINES - WARNING SIGNS

6-6.01 Purpose

Warning sign applications that are discussed in this section are those which:

1. Are not specifically addressed in the MN MUTCD.
2. Provide additional guidance to that given in the MN MUTCD on application, location, and usage of certain types of warning signs.
3. Establish practices relating to engineering and traffic investigation requirements for certain warning signs.

6-6.02 Acceleration Lane Signing (W6-X1, W6-X2, and W20-X3)

The MERGE w/Arrow sign (W20-X3) sign may be used at the beginning of the taper for the following situations:

1. The MN MUTCD Section 2C.42, states "Lane ends signs should not be installed in advance of the downstream end of an acceleration lane." Many acceleration lanes exist on the MnDOT highway system. Such situations may include escape lanes on freeways and right or left acceleration lanes on two lane conventional roads or expressways.
2. Where two lanes are carried through a roundabout or signalized intersection and the right/left lane ends within a short distance after the intersection. In these situations there is not enough physical space on the roadway to install advance lane ends signs but a sign is needed to mark the merge point.

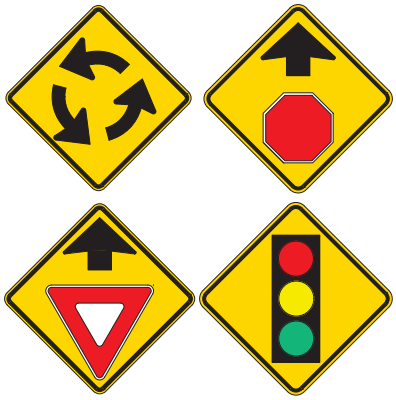
Acceleration lanes at rural unsignalized intersections should be signed in accordance with Figure 6.18.

6-6.03 Advance Warning Signs on Local Road Approaches (W2-6a, W3-1, W3-2, and W3-3)

This section details the installation and maintenance of advance warning signs on local road approaches to trunk highway intersections.

The advance warning signs on local road approaches include, but are not limited to, the following:

Roundabout Ahead (W2-6a), Stop Ahead (W3-1), Yield Ahead (W3-2), and Signal Ahead (W3-3).



1. Although MnDOT maintains STOP and YIELD signs on local roads intersecting the trunk highway, maintenance of the advance warning signs on all local road approaches to trunk highway intersections is the responsibility of the road authority.
2. At new intersections, or at intersections where traffic control is revised by MnDOT, MnDOT will investigate the need for advance warning signs on the local road approaches, furnish and install the appropriate sign, and notify in writing the road authority(s) of the sign installations. Maintenance of the advance warning signs will be the responsibility of the road authority.

6-6.04 Advisory Exit and Ramp Speed Signs (W13-2, W13-3) and Combination Horizontal Alignment/Advisory Exit and Ramp Speed Signs (W13-6, W13-7)

The Advisory Exit and Ramp signs shall be installed in accordance with MN MUTCD Table 2C-5. When used, the advisory speed posted on these signs should follow the established engineering practice for determining advisory speeds as discussed under Advisory Speed Plaques, 6-6.05 Advisory Speed Plaque (W13-1P) of this Chapter and Chapter 14 of this manual.

6-6.05 Advisory Speed Plaque (W13-1P)

The Advisory Speed Plaque shall be installed below horizontal curve warning signs in accordance with MN MUTCD Table 2C-5. If horizontal curve warning signs are installed on curves which have a speed differential of 5 mph or greater then the Advisory Speed Plaque shall be installed below the horizontal curve warning sign.

Advisory speeds will be determined by the established engineering practice using a ball bank indicator using the following criteria (Chart 6.5):

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.

More information on Advisory Curve Speed Studies is shown in Chapter 14 of this manual. An example form for taking field ball banking measurements is shown in Form 6.2 of this Chapter.

On a new roadway or alignment when the established engineering practice of using a ball bank indicator is not possible, the District Traffic office should work with the designer to determine advisory speed based on the curve design speed. The signing plans should include the required warning signs based on this information. After construction is completed, it is recommended that a field review be performed based on the above established engineering practice for determining the advisory speeds and changes made to installed warning signs as necessary.

6-6.06 BRIDGE ICES BEFORE ROAD Sign (W8-13)

On state maintained roadways, the state is not liable for losses caused by snow or ice on roadways unless the state affirmatively creates the condition on the roadways.

Minn. Stat. Sec. 3.736, Subd 3(d) provides immunity for "a(ny) loss caused by snow or ice on any highway or other public place, except when the condition is affirmatively caused by the negligent acts of a state employee."

An exception can be made if recent crash reports clearly define an unusual crash problem related to icing on a bridge. This situation is expected to occur only when a bridge is in an area of unique or unusual geometrics. If there are bridge locations which have a serious crash history related to icing, consideration should be given to correcting the situation rather than merely warning of it.

Application of these guidelines will best serve motorists by providing only those signs that are necessary to warn of an unusual situation.

Any existing warning sign for icy or frosty bridge conditions should not be replaced at the end of its useful life unless a crash problem exists, as stated above, and correction of the problem contributing to the crashes cannot be accomplished.

6-6.07 Channelized Intersections

Figures 6.19A and 6.19B indicate the signing required for channelized intersections.

6-6.08 Chevron Alignment Sign (W1-8)

The MN MUTCD provides Standards and Guidance regarding the use of the Chevron Alignment sign (W1-8). MN MUTCD Table 2C-5, states that the use of Chevrons and/or One Direction Large Arrow (W1-6) signs should be used on curves when the difference between the speed limit and advisory speed is 10 mph, but shall be used when this difference is 15 mph or greater. Generally, these signs are used for curves of over six degrees (a curve radius less than 900 feet).

The use of Chevrons on curves is preferred over the use of the One Direction Large Arrow. The exception is on conventional roadways when the speed of the turn/curve is 30 mph or less or there is a visual trap. Chevrons or delineators may supplement the One Direction Large Arrow if needed. A visual trap exists when a crest vertical curve is present before the beginning of the horizontal curve, or when a minor road, tree line, or line of utility poles continues on a tangent. In these situations the One Direction Large Arrow is used to help get the focus off of the visual trap.

Photo showing a Visual Trap

The MN MUTCD guidance states, “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.” MnDOT further clarifies this statement with the following:

> When used on conventional roadways, expressways, and freeway mainline curves, chevrons should be installed from the beginning to the end of the curve. When used on exit loops, a minimum of 5 chevrons should be installed. Fewer signs are necessary on exit loops because road users expect that a loop ramp will continue to curve until it joins a new roadway. When used on exit ramps, use engineering judgment on the number and placement of chevrons required per MN MUTCD Table 2C-5. If chevrons are not required per MN MUTCD Table 2C-5, guide delineators may be used on the outside of the curve based on engineering judgment.
>
> Chevrons shall be installed at a minimum height of five feet for flanged channel (U channel) sign structures measured vertically from the bottom of the sign panel to the elevation of the near edge of the traveled way. For other sign structures, a minimum mounting height of four feet from the bottom of the sign panel to the elevation of the near edge of the traveled way is allowed. Whenever practical, efforts should be made to place back to back chevrons on one structure rather than having a set of structures for each direction.
>
> When installation of the chevrons cannot meet requirements (such as field conditions do not allow for installation of chevrons on a median barrier) then an engineering study shall be used to determine the appropriate traffic devices to emphasize the curve.

The formula for calculating the degree of curvature from the radius is D = 5729.578/Radius.

6-6.09.02 Vehicular Traffic Warning Signs

Sight restriction determination

MnDOT provides the following clarification and guidance in determining the justification of installing Vehicular Traffic Warning Signs.

In order to determine whether or not a sight restriction exists for a crossing that cannot be relocated, a simple procedure is frequently used. This procedure is based on the standard height-of-eye of 3.5 feet and a standard traffic cone height of 28 inches. The visibility distance used in this procedure should be obtained from the AASHTO Policy on Geometric Design of Highways and Streets using either Exhibit 3-1, Stopping Sight Distance on Level Roadways, or Exhibit 3-2, Stopping Sight Distance on Grades. See Chart 6.7 for Exhibits.

Procedure:

Temporarily place the traffic cone at the passenger pickup or drop-off site. Using a vehicle or measuring device where the operator is using the correct height-of-eye, move to the visibility distance, as determined above, in advance of the cone. If the cone is not completely visible, then the site will need to have the appropriate crossing sign installed. The sign placement should be based on the values in Table 2C-4, Advance Placement Distance, of the MN MUTCD or Chart 6.4.

6-6.09.03 TRAIL CROSSING Sign (W11-15a)

A TRAIL CROSSING sign should only be installed for officially designated trails which cross the highway. To determine if the visibility distance is adequate, use the sight restriction determination procedure stated above.

6-6.09.04 Down Arrow Plaque (W16-7mP)

If a NON-VEHICULAR or VEHICULAR traffic sign is placed at a crossing, the supplemental DOWN ARROW plaque shall be installed below the crossing sign whether or not there are crosswalk markings at the crossing.

6-6.10 Low Clearance Sign (W12-2)

According to Minn. Stat. Sec. 169.81, Subd. 1, no vehicle loaded or unloaded shall exceed 13 feet 6 inches in height except double-deck buses with written authority from the Commissioner of Transportation. Per Minn. Stat. Sec. 169.801, implements of husbandry (farm equipment) are exempted from size, weight, and load provisions, but the operator must ensure that the operation does not damage a highway structure. In accordance with the MN MUTCD, Section 2C, the LOW CLEARANCE sign shall be installed to warn drivers that the clearance is less than the statutory maximum vehicle height of 13 feet, 6 inches clearance allowed plus one foot or 14 feet, 6 inches.

All structures with a clearance less than 14 feet 6 inches shall be signed. To allow for frost action, a reduction of 3 inches shall be reflected in the signing. For example, a clearance measurement of 14 feet, 3 inches will be signed as 14 feet, 0 inches.

Periodic checking of clearances needs to be done on bridges and other structures, especially when the roadway has been resurfaced.

6-6.11 No Passing Zones

6-6.11.01 NO PASSING ZONE Sign (W14-3)

It is MnDOT's practice to use the NO PASSING ZONE (W14-3) pennant signs. This does not preclude use of the DO NOT PASS sign where it is deemed necessary based on engineering judgment. NO PASSING ZONE pennant signs used on conventional highways shall be 64" x 64" x 48".

The purpose of this larger size on conventional highways is to provide added visibility of the sign for motorists.

6-6.11.02 Terminal Marker Posts

A yellow post may be used to mark each terminal end of a No Passing Zone. A yellow 360 degree visibility enhancer (or equivalent) should be mounted on the top of each marker post.

A 3 1/2" x 2" sticker stating "MnDOT NO PASSING ZONE TERMINAL MARKER" may be installed near the top of each visibility enhancer so that the sticker is visible from the roadway. The stickers are available from MnDOT's State Sign Shop in Oakdale.

6-6.12 Passing Lane Sections

Signs should be placed in advance of the lane drop transition area as shown on Figures 6.21A and 6.21B. See Section 6-5.10 Passing Lane Sections for guidance on regulatory signs for passing lane sections.

6-6.13 SCHOOL BUS STOP AHEAD Sign (S3-1)

The MN MUTCD Part 7 - Traffic Controls for School Areas, Section 7B.13, requires the installation of School Bus Stop Ahead signs where a school bus, when stopped to pick-up or drop-off passengers, is not visible for an adequate distance and where there is no opportunity to relocate the school bus stop to provide adequate sight distance. MnDOT provides the following clarification and guidance in determining the justification of installing these signs in rural areas.

In order to determine whether a pick-up or drop-off location meets the required visibility distance, a simple procedure is frequently used. This procedure is based on the standard height-of-eye of 3.5 feet and a standard traffic cone height of 28 inches. The visibility distance used in this procedure should be obtained from the AASHTO Policy on Geometric Design of Highways and Streets using either Exhibit 3-1, Stopping Sight Distance on Level Roadways, or Exhibit 3-2, Stopping Sight Distance on Grades. See Chart 6.7 for Exhibits.

Procedure:

Temporarily place the traffic cone at the passenger pickup or drop-off site. Using a vehicle or measuring device where the operator is using the correct height-of-eye, move to the visibility distance, as determined above, in advance of the cone. If the cone is not completely visible, then the site will need to have a School Bus Stop Ahead sign installed. The sign placement should be based on the values in Table 2C-4, Advance Placement Distance, of the MN MUTCD or Chart 6.4 of this chapter.

The District Traffic Offices should maintain an inventory of existing signs.

The District Traffic Offices should regularly contact each school district to determine whether students are still picked up by a bus at locations presently signed, to determine if any new locations need signs, and if any locations may present unusual safety problems for students. This contact will result in a more consistent application of School Bus Stop Ahead signs and ensure that the signs provide the intended level of safety.

The School Bus Stop Ahead sign shall not be used in advance of a school bus loading area. See MN MUTCD Section 7B.13.1 for requirements of signing for school bus loading areas.

6-6.14 SHARE THE ROAD Plaque (W16-1P) with BICYCLE WARNING Sign (W11-1)

This section provides guidance as when to add the SHARE THE ROAD plaque (W16-1P) beneath the BICYCLE WARNING sign (W11-1).

This sign combination is generally meant for short distances (less than 1 mile) of roadway where there are a significant number of bicyclists traveling to and from a bicycle path or facility. They also can be considered for a bicyclist "hot spot" just off the shared-use path or facility that attract bicyclists.

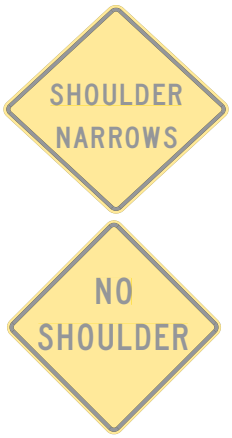
This sign combination may be used where there is no shared-use path or wide (at least four feet of paved, usable space) shoulder that bicyclists can safely ride on causing them to ride in the traveled lane of traffic. These signs are warning signs and are meant to inform drivers of an unexpected bicyclist in their lane.

Consider providing these signs after major intersections or street entrances.

For urban areas, consider using BICYCLES MAY USE FULL LANE sign (R4-11).

For more information about these signs refer to the MN MUTCD Section 2C.60, 9B.19, and 9B.06.

6-6.15 SHOULDER NARROWS Sign (W5-X1) and NO SHOULDER Sign (W8-23)



The SHOULDER NARROWS sign (W5-X1) and the NO SHOULDER sign (W8-23) are suitable for certain rural high-speed locations (posted at 45 mph or greater) that have an abrupt change in the right side shoulder width.

At high-speed locations where the right side shoulder width abruptly reduces by at least three feet and results in a usable width of less than six feet, a SHOULDER NARROWS sign may be installed.

A NO SHOULDER sign may be installed at rural, high speed locations where the right side shoulder width abruptly reduces from a width of three feet or greater to a width of less than one foot.

Examples of how to apply this guideline:

1. If a vehicle on a through roadway is not required to stop at an intersection and the right side shoulder width is narrower (as described above) on the downstream side of the intersecting road, a SHOULDER NARROWS or NO SHOULDER sign may be installed.
2. If a vehicle is required to stop at an intersection and the right side shoulder width is narrower (as described above) on the downstream side of the intersecting road, a SHOULDER NARROWS or NO SHOULDER sign should not be installed.
3. If a shoulder width is narrower on the downstream side of a bridge than on the approach side, and that reduction meets the criteria set forth in the above guidelines, a SHOULDER NARROWS sign may be installed.

These guidelines do not apply where auxiliary lanes are present.

6-6.16 Speed Reduction Sign (W3-5)

The Speed Reduction sign shall be used if the reduction in speed limits between two zones is 15 mph or greater. This sign may be used if the difference between two zones is 10 mph or less, based on engineering judgment. In transition zones, engineering judgment should determine if placement of a speed reduction sign is necessary for the second reduction in speed.

The Speed Reduction sign should be 48” x 48”.

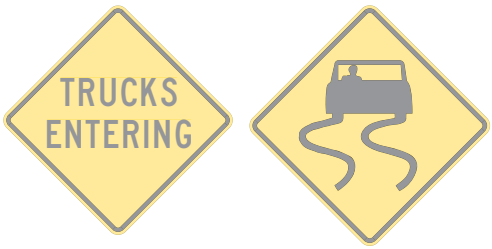
If used, the Speed Reduction sign should be installed at least 1000 feet in advance of the reduced speed zone. If geometrics, grade, or sign clutter may impact the motorist’s ability to reduce speed, the sign location may be as far as 1700 feet in advance of the reduced speed zone.

A two-line Distance (W20-100p) plaque may be installed on the left post directly below the speed reduction sign at the option of the District Traffic Engineer. Mounting height for a secondary sign mounted to one riser post is shown in Figure 6.1 of this chapter.

Inplace speed reduction signs (R2-5a, R2-5b, and R2-X1) shall be replaced through attrition.

6-6.17 Truck Hauling Signs

6-6.17.01 Sugar Beet Piling Station Signs



When a site is open to commercial trucks, the TRUCKS ENTERING sign (W11-X3) and the Slippery When Wet sign (W8-5) should be used on each approach to the access.

Both signs shall be: 48" x 48", provided by the requester, and delivered to MnDOT for installation and maintenance. If requested, a flasher may be installed above the TRUCKS ENTERING sign under MnDOT's permit process.

When the site is in operation, the signs shall be opened and closed by the requester.

Changeable message signs shall not be used.

6-6.17.02 Corn and other Harvest, Gravel Pits, and Logging Operations

The MN MUTCD Section 2C provides guidance on the use of permanent and seasonal VEHICULAR TRAFFIC signs.

6-6.18 Typical Signing for Transitions Between Divided Highway Section and Two-Lane, Two-Way Sections

Figure 6.22 indicates signing for transitions between divided highways and two-lane, two-way highways.

6-6.19 Truck Rollover Warning Sign (W1-13)

If used, the advisory speed posted on these signs will follow the established engineering practice for determining advisory speeds using a ball bank indicator using 10 degrees of ball-bank. More information on Advisory Curve Speed Studies is shown in Chapter 14 of this manual.

6-6.20 WATCH FOR BUSES ON SHOULDER Sign (W14-X9)

The WATCH FOR BUSES ON SHOULDER sign should be placed on all applicable freeway and expressway ramps, intersecting city, township, and county roads, and high volume entrances. These signs should not be installed for low volume entrances and private drives.

6-6.21 WATCH FOR FALLEN ROCK (W14-X1)

Although it may be appropriate to install the FALLEN ROCKS (W8-14) sign in some cases, it is preferred that the WATCH FOR FALLEN ROCK (W14-X1) sign be used on trunk highways.

6-6.22 WEIGHT RESTRICTION AHEAD Sign (W14-X3)

See Section 6-5.03 Bridge Speed and Load Restrictions for use and application of the WEIGHT RESTRICTION AHEAD sign.

6-7.00 APPLICATION GUIDELINES - GUIDE SIGNING

6-7.01 Purpose

Guide sign applications that are discussed in this section are those which:

1. Are not specifically addressed in the MN MUTCD.
2. Provide additional guidance to that given in the MN MUTCD on application, location, and usage of certain types of guide signs.
3. Must be addressed because MnDOT is charged with developing and implementing design, use, and application of certain guide signs in accordance with Minnesota Statutes.

The MN MUTCD Sections 2D and 2E provide standards on guide signing for conventional roads, expressways, and freeways. Figures later in this chapter supplement the MN MUTCD in showing typical positions for guide signs at various intersections and interchanges on MnDOT trunk highways.

Typical signing for intersections is found in Figures 6.24A through 6.29.

Typical signing for crossroad approaches to interchanges is found in Figures 6.30 through 6.33.

Typical signing for auxiliary lanes with and without escape lanes on freeways is found in Figures 6.34A through 6.34D.

6-7.02 Freeways

6-7.02.01 Primary Guide Signing

Rural exits shall be identified by the route number of the U.S., State, or County highway intersected, cardinal direction, and destination as applicable, and the exit number on freeway interchanges. Criteria for selecting destinations is shown later in this section under Signing Destinations.

Urban and suburban exits to local road systems shall be identified by route number, street name, exit number and cardinal direction as applicable. Information on the use of destinations is shown later in this section under Signing Destinations. Cardinal directions should be displayed on freeway guide signs, in particular at cloverleaf interchanges (where the intersected highway either begins or ends at the interchange) and at interchanges with collector distributor roads or with a single exit splitting to serve both movements to the crossroad.

6-7.02.02 Supplemental Guide Signing

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. Signs directing motorists to secondary or supplemental destinations should not be installed at interchanges of two or more freeways. Criteria for supplemental guide signing is shown in Appendix A MnDOT Supplemental Guide Signs of this chapter.

6-7.03 Signing Destinations

MnDOT shall fabricate, install, and maintain destination and distance signs on trunk highways. However, if a city, meeting the criteria in this section, requests to be added to an existing sign displaying less than three cities/destinations, the city shall pay for design, fabrication, and installation of the signs unless the existing sign is due for replacement. If the existing sign is due for replacement, the city name may be added at MnDOT's expense.

1. Signing Destinations - At-grade intersections

   The MN MUTCD Sections 2D.36 through 2D.40 establish guidelines for destination signs at at-grade intersections. The following criteria also apply:

b. Urban-Suburban

At interchanges with county or secondary roads, destinations are not to be included on the primary guide signs. Destinations and street names cannot be combined on the same guide sign.

At interchanges having more than one exit to the intersecting highway, names of cities may be included only if they clearly aid in orienting the majority of the drivers. At freeway to freeway interchanges, destinations should be considered for placement on the primary guide signs if they would aid in orienting drivers.

Supplemental guide signs shall not be provided for suburban cities served by roads and streets within the metropolitan grid system in urban-suburban areas.

c. Adjacent Land Uses

The names of adjacent land uses such as airports may be shown if the exit has been provided specifically to serve that land use. These destinations may be signed only when they cannot be related to the street or road identified at the exit.

3. Distance signing

A distance sign indicates how far it is from the sign location to the center of the next city, geographical site, or important junction.

MN MUTCD Sections 2D.41 and 2D.42 establish guidelines to follow in selecting city names or other traffic generators, and in locating distance signs on conventional highways. Only one distance sign is permitted on each conventional highway leaving an intersection, municipality, or interchange.

MN MUTCD Sections 2E.39 and 2E.40 provide guidelines for distance signs on freeways.

City name selection shall be in accordance with the following guidelines:

a. The first city along the route.

b. The first county seat, route number of an intersecting conventional highway, or a significant geographical site or generator.

c. The next major destination or control city.

The following guidelines must be met for a city to be added to an existing distance sign:

a. The existing sign displays less than three cities/destinations.

b. If the city meets the selection criteria previously listed, the requesting city shall pay for all sign replacement costs if the request is made prior to the sign requiring replacement. The city name may be added to a sign, at MnDOT's expense, at the time the existing sign is due for replacement.

6-7.04 Typical Junction Signing Layouts

The following typical sign installations should be used as guidelines in establishing sign locations and distances between signs at junctions.

1. T-intersection (two-lane, two-way) (See Figure 6.24A).
2. T-intersection (divided highway) (See Figure 6.24B).
3. Typical four-leg intersection (See Figure 6.27).
4. Typical intersection with county road/city street (See Figure 6.26).
5. Typical single lane roundabout intersection (See Figure 6.27).

6. Reduced conflict intersection (See Figure 6.28).
7. Named county road on an expressway (See Figure 6.29).

6-7.05 Independent Route Marker Assemblies

Follow the MN MUTCD Sections 2D.29 – 2D.32 for conventional roads and MN MUTCD Section 2E.27 for expressways and freeways for guidance on the use of route, junction, advance route turn and directional sign assemblies. Follow MN MUTCD Section 2D.34 for confirming or reassurance sign assemblies.

The color of the route marker auxiliaries shall match the color of the route marker it supplements (see MN MUTCD Section 2D.12). For example, white on blue auxiliaries supplement the Interstate and Minnesota route markers and black on white auxiliaries supplement U.S. route markers.

It sometimes becomes necessary to include two different color route markers on the same structure. When this happens the auxiliaries may not always match the color combinations of both route markers. To avoid this, install route markers side by side according to the most current MnDOT sign structure details, http://www.dot.state.mn.us/trafficeng/signing/doc/canddsignground.pdf. When this is not possible use the following guidelines to determine the color of the route marker auxiliaries:

1. When two or more route markers must be mounted vertically on a single structure, the auxiliaries shall match the color of the route marker which takes precedence.
2. The order of precedence is Interstate, U.S., State, county, township, and then other routes.

This guideline applies to all route marker assemblies installed on trunk highways and to mark any detours of trunk highways.

6-7.05.01 County Pentagon Route Markers

The pentagon shaped Uniform County Route Marker (M1-6) is an alternate to the standard County Route Marker (M1-X4) in Minnesota.

Upon request by a county, each MnDOT District may elect to upgrade its county junction assemblies on state highways to include pentagon route markers at those county roads where they are being used. If the District decides to do this, pentagon route markers may be installed as a part of the normal sign replacement cycle.

6-7.05.02 Business Route Markers

Route Requirements:

- Business Routes should only be created along the Trunk Highway system in rural areas at locations where a bypass has been constructed or where a Trunk Highway has been decommissioned and turned back to local governments.
  - The Business Route should be created by using the previous alignment of the Trunk Highway.
- Business Routes should travel principally through the corporate limits of a city.
- Business Routes shall leave and rejoin the same Trunk Highway route via different exits or intersections.

Implementation:

- Each road authority of which the Business Route is comprised of must approve of its establishment.
- New Business Routes shall be established through written request by a local government agency to the appropriate MnDOT District Office and should include the following information:

  1) A letter from the local government agency briefly explaining route need, acknowledging initial costs and future maintenance responsibilities.

2) A letter of support from other local road authorities for trail blazing signs in their right of way, acknowledging initial costs and citing future maintenance responsibilities.

3) A completed American Association of State Highway and Transportation Officials (AASHTO) U.S. Route Number Application. The application may be downloaded from the AASHTO website: AASHTO - Special Committee on U.S. Route Numbering - Home. For "recognition of" a business route a local vicinity map will be needed per page 3. On page 6 a short statement to the effect that there are no deficiencies on proposed routing, if true, will suffice.

The MnDOT District Office staff will evaluate the proposed Business Route and send their recommendation to the MnDOT Route Numbering and Control Section Committee (RNCS) for review. The MnDOT RNCS will process the application.

- If the business route is on a US Highway or Interstate, the MnDOT RNCS will submit to the AASHTO Special Committee on US Route Numbering for approval. The Special Committee on U.S. Route Numbering meets twice each year.

- Existing Business Routes established between MnDOT and local government agencies prior to the implementation of this policy will be subject only to their initial agreements.
  - If existing Business Route agreements between MnDOT and local agencies are amended at any time, the amendments should be made to more closely match this policy.

Sign Usage

- Guide signs referring to the highway exit / Business Route entrance shall display the existing route number or name as well as the route number of the designated Business Route.
- Business Routes shall be signed only prior to the first interchange exit or intersection leading to the Business Route in each direction.
  - If more than two exits or intersections exist on the Trunk Highway along a Business Route, no signs referring to the business route shall be placed on the Trunk Highway for the exits or intersections between the exit from and the entrance to the Trunk Highway.
- "Downtown" and "Business District" signs directing motorists to the same exit or intersection as a Business Route shall not be allowed on the Trunk Highway.
- Trailblazing signs shall be installed along the Business Route prior to modifying the guide signs on the primary highway route.

Maintenance Requirements:

- All costs related to fabricating, modifying, installing, and removing signs for the purposes of establishing or disestablishing a Business Route shall be at the cost of the requesting agency. The District Traffic Office will decide if installation is completed by the community under the permit process or installed by MnDOT under the requester pay process.
- All maintenance responsibilities along the Business Route shall continue unchanged from before the Business Route's implementation unless specified otherwise in the new agreement.
- New signs located within and related to the Business Route shall be maintained by the local government agency.
  - The agency shall be responsible for periodically checking the condition of trailblazing signs along the Business Route to ensure that they are well maintained.
  - Failure of the local agency to properly maintain the traffic control devices or fulfill other conditions of the Business Route agreement may result in MnDOT terminating the route's status as a Business Route.
- If the requesting agency wishes to discontinue the route's classification as a Business Route, notification must be sent to the appropriate MnDOT District Office 3 months in advance of when it is to be declassified.
  - The MnDOT District Office must notify the MnDOT Route Numbering and Control Section Committee of this change.
  - Signs referring to the business route shall be removed unless the sign panel contains other information relevant to the traveling public. If so, any legend referring to the Business Route shall be covered until the sign panel is replaced or overlayed.

HANDOUT

6-7.06 Street Name Signs, Advance Street Name Signs, and 911 Address Signs

This section is based on Chapter 2D, Guide Signs - Conventional Roads (see Sections 2D.2, 2D.43 and 2D.44) of the MN MUTCD. Sign designs, including reflectivity, color, legend, and border shall follow the applicable requirements of the MN MUTCD and the MnDOT Standard Signs and Markings Manual and Summary. Structural mounting requirements shall follow applicable requirements as provided by the MN MUTCD or MnDOT structural details.

Standard street name signs (MN MUTCD Section 2D.43) provided by MnDOT and installed on overhead mast arm mounted signs or overhead bridge mounted signs will use the standard green background color for consistency on trunk highways and shall not include pictographs. Advance Street Name signs (MN MUTCD Section 2D.43) will follow the requirements as provided by the MN MUTCD and the standard sign designs set forth in the MnDOT Standard Sign Manual and Summary or the MN MUTCD.

6-7.06.01 General Criteria for Street Names

The following conditions will be used for street names used on MnDOT provided Street Name signs and Advance Street Name signs:

1. Street names shall be officially designated by the appropriate local government having jurisdiction over the road and match the 911 Emergency Telephone System street name.
2. Official street names may include the word lake, beach, or some other geographic point if the road serves only one such item. Otherwise, such word usage should be discouraged.
3. Combination names which attempt to incorporate multiple identifications are confusing and should not be used.
4. Signing for names which identify a specific business or establishment, in order to identify streets which lead to specific establishments or special commercial or private interest facilities, should be discouraged. Generic names are permissible.
5. The use of first and last names of individuals should not be used.
6. If the official road name is changed by the road authority prior to the sign requiring replacement, the requester will be responsible for all sign replacement costs. However, the road name may be changed at MnDOT's expense at the time the original sign would normally be replaced.

6-7.06.02 Street Name Signs

6-7.06.02.01 Overhead mounted street name signs

Overhead signal mast arm and bridge mounted street same signs will be provided by MnDOT in rural and urban areas, as needed, to fulfill basic guide signing responsibilities. MnDOT's practice is to install sheet aluminum retroreflective sign panels on traffic signal mast arms. Internally lit street name signs may be installed on signal mast arms by a road authority .

Specific criteria for internally illuminated street name signs mounted to signal mast arms:

The local road authority shall be responsible for all costs of fabrication, installation, power, and maintenance. MnDOT may require that internally illuminated signs be removed and replaced with standard sheet aluminum if any problems develop.

a. General Criteria

An internally illuminated street name sign may be displayed on the same mast arm with sheet aluminum signs (regulatory, warning, and guide signs).

b. Sign Face

The sign face shall use translucent prismatic retroreflective sheeting for the sign background. If the road authority has an established community-wide color scheme (green, blue, or brown) for the background color of street name signs, the background color of the internally illuminated street name sign may use this color. No other colors will be approved.

HANDOUT

The sign legend may be screened or cut from translucent prismatic retroreflective sheeting. In the event of a complete lamp outage, the retroreflectivity of this material provides a fail-safe operation.

The legend (letters and arrows) on internally illuminated street name signs shall be white. No border is required since the sign face is framed by the sign housing.

Standard letter sizes, series, and spacing shall be used. In the event a route marker is to be displayed, it shall be of the standard size, 24" x 24", unless mast arm loading becomes critical. In this case, an 18" x 18" route marker may be installed.

Detailed specifications for internally illuminated street name signs are located on OTST's Signals or Signing websites.

6-7.06.02.02 Ground mounted intersection corner street name signs

The furnishing, installation, and maintenance of street name signs, ground mounted, slat style, and located at intersection corners, are the responsibility of the local road authority. Signs installed on MnDOT right of way may follow the MnDOT permit process. Signs should be mounted in street corners opposite of STOP signs although mounting above STOP signs may be allowed at the discretion of the District Traffic Office.

General criteria for ground mounted street name sign installations include the following:

1. The governing body shall have street name signs fabricated according to MN MUTCD requirements including retroreflectivity, legend size, border, color, and standard designs to provide the best target value both day and night.
2. Installation of signs shall not obstruct or interfere with existing traffic control devices. The physical location of the signs should be in accordance with the MN MUTCD, Section 2D.43, "In business or commercial areas and on principal arterials, Street Name signs should be placed at least on diagonally opposite corners. In residential areas, at least one Street Name sign should be mounted at each intersection. Signs naming both streets should be installed at each intersection. They should be mounted with their faces parallel to the streets they name."
3. The mounting height of signs shall be in accordance with MN MUTCD Section 2A.18.
4. The street name sign assemblies shall be constructed so that the name plate cannot be turned.

Specific criteria for placement on separate sign structure from STOP sign:

1. The preferred lateral offset to the street name signs is 30 feet or greater from the roadway (near the right-of-way line if practical). The minimum lateral offset should be at least 12 feet from the edge of the shoulder. Unique locations should be reviewed with the District Traffic Office.
2. The street name signs are typically installed on a single post sign structure which shall conform to FHWA breakaway requirements based on the current edition of the AASHTO Standard Specifications for Highway Signs, Luminaires, and Traffic Signals.

Specific criteria for placement above STOP signs:

1. No street name signs are allowed if there are any other signs, such as a ONE WAY sign, in place on the STOP sign structure.
2. Maximum sign panel size should be 9 inches high by 36 inches wide.
3. Not more than three slats (six-way installation) shall be permitted above any one STOP sign.

6-7.06.03 Advance Street Name Signs

In urban areas, advance street name signs for arterial and major streets on conventional highways will be provided by MnDOT, as needed, to fulfill basic guide signing responsibilities.

In rural areas, when the trunk highway intersects a public road, appropriate identification of that public road will be provided on conventional roads and expressways with at grade intersections by MnDOT (see Figures 6.26 and 6.29), based on all of the following conditions:

1. When so requested by the local governing body, MnDOT will furnish and install route marker assemblies on the trunk highway, provided that the intersecting local road is numbered and marked with route

markers. Identification by number only should be encouraged whenever possible.

2. When a numbered public road is also known by an officially designated name, both types of identification may be used on a sign.
3. For road name signs, all initial signing costs, including overhead factors and installation by MnDOT, shall be paid by the road authority requesting the signing, at the current rate per square foot of sign, as established by MnDOT. MnDOT will maintain road name signs at its own expense.

6-7.06.04 911 Address Signs on Trunk Highways

Counties or private citizens are installing these signs at private driveways within trunk highway right of way. The following guidelines have been adopted for these signs:

a. The preferred sign location is near right of way line at access. This will allow the sign to be installed a minimum of 12 feet from the edge of the shoulder (typically gravel). Gopher State One Call shall be contacted prior to installing the sign.
b. Sign panel size is typically 16 inches long x 6 inches high.
c. Mounting height is a minimum of 4 feet from the bottom of the sign panel to the near edge of the pavement (driving lane).
d. Sign post size should be determined using the sign fabricator's recommendations (typically 1.12 lb/ft, with a maximum size of 2 lb/ft.).
e. Sign color is white legend (typically 4 inch C Series) on blue background but other colors are possible. However, red and yellow should not be used in any circumstances.
f. MnDOT is not responsible for fabricating, installing, or maintaining the signs.

6-7.07 Boundary Signs

There is a need to provide certain boundary signs to give orientation and guidance to the motorist. Details on sign design for common boundary signs used on the trunk highway system are found in the MnDOT Standard Signs and Markings Manual.

6-7.07.01 City Name Sign (I2-3)

Under the provisions of Minn. Stat. Section 169.06 Subd. 2a, the Commissioner may construct and maintain signs at the entrance of each city, which sign shall have the name of the city and the population. City Name signs should be installed only for communities identified on the official Minnesota Highway Map and/or official county highway maps. Signs should normally be installed at the actual corporate boundary, subject to the following guidelines:

1. Urban areas

   Signs should be installed at or near the corporate limits on all trunk highways.

2. Rural areas

   Signs should be installed at or near the corporate limits on all trunk highways, excluding interstate highways. On interstate highways, the following criteria apply:

   a. If the corporate limits of a community are crossed by the interstate highway, and there is no interchange serving the community, install the sign on the interstate highway at the corporate limit crossings.
   b. If the corporate limits of a community are crossed by the interstate highway, and an interchange directly serves the community, and the community is not identified on either

the major interchange guide signs or on a supplemental guide sign, install the sign on the interstate highway at the corporate limit crossings.

c. If the corporate limits of a community are crossed by the interstate highway, and an interchange directly serves the community, and the community is identified on either the major interchange guide signs or on a supplemental guide sign, do not install the sign on the interstate highway.

Where proper city names have two words, it may be desirable to arrange the name on two lines rather than one, especially when the words are long. City names should not be abbreviated.

MnDOT will update population figures on city name signs every 10 years and use the population figure of the last official Federal or State census. If a community requests the population figure to be updated, MnDOT will update the population figure at the cost of the community. The updated figure should be from a documented official source and provided to MnDOT.

An exception to the above applies to unincorporated communities which warrant city name signs, but for which population counts are not available. These signs carry only the community name.

Occasionally, municipalities attach certain unauthorized sign panels, (e.g. Green River Ordinance Enforced, Radar Patrolled, etc.) beneath the CITY NAME sign on approaches to the municipality. These attachments, dealing with regulatory and enforcement issues, are not appropriate. The only attachments to signs on the trunk highway system are those allowed under section 6-7.07.03 Community Recognition Signing Program of this chapter. Extraneous and unauthorized sign panels should be removed and no such attachments permitted on any signs on the trunk highway system.

6-7.07.02 Community Identification Sign

Criteria for these signs, which are allowed outside the trunk highway right-of-way, are specified in Minn. Stat. Sec. 173.08 Subd. 1(10).

This signing program is administered by the District offices.

6-7.07.03 Community Recognition Signing Program

The Community Recognition Sign Program allows communities to express their own identity under Boundary signs. Permitting the displaying of sign panels allows the community to pick what is locally important to their community for installation on trunk highway rights-of-way.

Community Recognition sign panels shall not be installed on freeways.

The Community Recognition sign panels shall be initiated and coordinated by the community.

Political or commercial advertising will not be allowed on sign panels.

The sign panel designs shall be approved by the District Traffic Engineer.

1. Examples of permitted sign panels:
   a. Non-profit service organizations.
   b. Special programs, either permanent or temporary; e.g. DARE, Tree City, Storm Ready City, Fit City, Sister City, and Yellow Ribbon City/County.
   c. City pictograph.
   d. City recognition slogans; e.g. State Baseball Champions.
   e. Drinking Water Protection Area sign panel.
   f. Heart Safe Community Sign Panels - A “Heart Safe” designation recognizes a city’s efforts to prepare its staff and citizens to recognize when someone suffers a sudden cardiac arrest and how to respond.

Cities are eligible for signing if they are determined to be "Heart Safe" by Allina hospitals and clinics.

2. Costs

   a. Installation of Community Recognition Sign panels shall be coordinated with the District Traffic Office. The District Traffic Office will decide if installation is completed by the community under the permit process or installed by MnDOT.

   b. If more than two small Community Recognition Sign panels or one large sign panel are to be installed by the community on an existing sign structure, the community shall pay an up-front charge of $200 to MnDOT for reimbursement of costs incurred by state forces to:

      1) Raise the existing CITY NAME sign panel as required to meet the nine foot clearance from the ground.

      2) Modify the U-channel sign structure to include knee braces if necessary in order to meet breakaway and wind loading requirements.

      3) Furnish and install a horizontal stringer for the mounting of the Community Recognition Signs.

3. Sign Format

   The sign panel background, or the predominant color, may be any color except pink, red, orange, yellow, yellow-green, or the fluorescent colors thereof.

   The message on a sign panel shall not simulate a traffic control device or contain directional sign messages or advertising for a commercial product or service.

   The sheeting material on new Community Recognition Sign panels should be Type XI retroreflective sheeting.

   The sign base material shall be sheet aluminum or other material approved by MnDOT. See Minnesota Standard Specifications for Construction, 3352.

   Any combination of sign panels may be allowed up to a total of 72" in length by 24" in height having a total square footage not to exceed 12 square feet. These panels shall be installed horizontally below the CITY NAME sign panel.

4. Installation Guidelines

   The attachment of Community Recognition Sign panels to horizontal stringers or sign posts shall be as shown in Figure 6.35, Community Recognition Signing and as follows:

   a. More than two Community Recognition Sign panels shall be installed on horizontal stringers (installed by MnDOT) by the community as shown in Figure 6.35, Community Recognition Signing.

   b. If less than three Community Recognition Sign panels are to be installed on an existing sign structure, install in accordance with the following:

      1) If only one Community Recognition Sign panel is to be installed, attach it to the sign post farthest from the roadway.

      2) If two Community Recognition Sign panels of the same size (24" x 24") are to be installed, center horizontally on each existing sign post.

      3) If two Community Recognition Sign panels of different heights are to be attached to the sign posts, and the existing sign structure is located on the inslope, the sign panels should be mounted as shown in Figure 6.35. Attach the shortest sign panel to the sign post nearest the roadway and the tallest sign panel to the other sign post. This will provide the maximum clearance from the ground line to each sign panel. If the existing

sign structure is located on the back slope attach the shortest sign panel to the sign post farthest from the roadway.

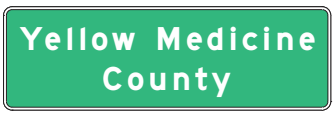
4) If a sign panel is greater than 24 inches and less than or equal to 30 inches in height attach to the sign post furthest from the roadway. When the existing sign structure is located on the backslope, attach the sign panel to the sign post nearest to the roadway. Relocate in place sign panels less than 24 inches in height to another sign post to make room for the new, larger sign panel.

5) Only one sign panel greater than 24 inches and less than or equal to 30 inches is allowed for each sign structure. If there is a desire to install a new sign panel of this size and there is a sign panel of this size in place on the sign structure, the city is responsible for deciding which two sign panels are attached to the sign structure.

MnDOT may check any Community Recognition Sign panel(s) for proper attachment hardware (see Figure 6.35). If an improper mounting procedure or hardware has been used, MnDOT may reinstall the sign panels with the correct hardware or remove it.

The replacement cycle (end of useful life) of the sign panels will be determined by each MnDOT District office.

6-7.07.04 County Name Sign (I2-5)



The County Name Marker (I2-5) sign is placed at all county line boundaries on the trunk highway system. When the county line is also at a river or municipal boundary, the sign should include both entities.

County Land Use Zoning signs shall not be installed or retained on trunk highways, either individually or as part of a sign assembly.

Extraneous sign panels shall not be installed on this structure, unless specifically noted as permissible under the Community Recognition Signing Program (e.g. Yellow Ribbon County).

6-7.07.05 Drainage Divide Sign

The Minnesota state highway map displays drainage area divides. It shows the four major drainage divides for Hudson Bay, the Mississippi River, Lake Superior and the Missouri River crossing approximately fifty state highways. Nine highways are crossed at least twice by a drainage divide.

Drainage divides in Minnesota are not obvious to motorists and are not geographically distinct features, nor is their identification of interest, significance, or benefit to the majority of motorists.

Drainage divides shall not be signed on any trunk highways.

Drainage divide identification signs may be installed within a rest area or wayside parking area established at the site to accommodate vehicles off the roadway. Signing for drainage divides shall be paid for by the requester.

Remove existing drainage divide identification signs without roadside parking facilities at the end of their sign life.

6-7.07.06 Municipal Identification Entrance Sign

Under the provisions of Minn. Stat. 173.025 a local road authority may erect a municipal identification entrance sign within the right-of-way of a trunk highway with the written permission of the commissioner. Municipal identification entrance signs erected without the written permission of the commissioner are prohibited. These signs shall be located outside of the clear zone and installed through the MnDOT permit process.

Refer to the MnDOT Right of Way Manual 5-491.514 for all applicable guidelines and provisions.

6-7.07.07 Reservation Boundary Sign

Signs may be installed for reservation boundaries which cross trunk highways, except freeways, with a limit of two signs per trunk highway.

The sign panel may include the name of the reservation, the tribal logo, and either the year of treaty or the reservation population. The panel must also be void of any commercial advertising. Sign size is variable based on sign message and font sizes. Sign panel designs shall be approved by MnDOT prior to fabrication.

The signs are to be fabricated, installed, and maintained by MnDOT unless otherwise directed by the District Traffic Office. Sign costs will be paid by the community.

6-7.07.08 Soil and Water Conservation District Sign

The Soil and Water Conservation District shall complete and submit a permit for approval to install a sign. If approved, install in accordance with all of the following criteria:

1. Locate signs on the top of the back slope just inside the right-of-way line. The sign cannot be placed on the shoulder slope or in the ditch bottom. The sign should be placed to obtain a minimum hazard location.
2. Signs are permitted only on non-freeway types of roadways.
3. Install signs on breakaway sign supports when located within the clear zone (MnDOT Road Design Manual, Chapter 4-6.04).
4. Design sign panels to be the same design or equal to that available from the National Association of Conservation Districts.
5. Maintain the signs in good repair. If this requirement is not met, the applicant will be notified to remove the signs.
6. A sign cannot be placed at a location where it will interfere with the effectiveness of any traffic control device, or interfere in any way with the safe operation of motor vehicle traffic or the safety of pedestrians and non-motorized vehicles.
7. The Soil and Water Conservation Districts will be responsible for furnishing the signs and posts, and for installation at the designated locations.

6-7.07.09 State Entry/Exit Signs

State Entry Monument (SEM) Program and Entry Signs

There are three Minnesota State Entry Monument marker types in use today: Type I and Type II monuments, and Type III metal sign panels.

Type I State Entry Monuments (constructed of precast concrete in the shape of Minnesota) and several Exit Monuments were designed in 1996 via a University of Minnesota student competition. They are typically located where interstate highways cross Minnesota's boundary, and at the Minnesota/ Canadian border.

Type II State Entry Monuments were constructed circa 1939 through 1955, and were made of a stone masonry pylon with timber arm and wood sign panel. Type II Historic SEM are restored, but not replicated, because most are eligible for the National Register of Historic Places (NRHP).

Type I and Type II entry markers are managed by the Site Development Unit in the Office of Project Management and Technical Support.

Type III state entry (WELCOME TO MINNESOTA, I2-10) metal signs are managed by the District Offices. The colors on the Type III sign panel were revised in 2006. Type III metal signs are placed on highway entrance routes with the lowest traffic volume, where no Type I or Type II monuments are located. Inplace sign panels should be replaced through attrition. Type III metal signs should be removed if a Type I or Type II state entry monument is located in the same vicinity.

State Exit Monuments and Signs

Where road conditions allow, some Type I monuments and Type III signs have a companion exit monument or sign on the opposite side of the road. Type II monuments have no 'exit' counterparts, as they were not designed and built during the time of original construction. Type I and Type II State Exit Monuments are managed by the Site Development Unit in the Office of Project Management and Technical Support.

Type III state exit metal signs (VISIT AGAIN, I2-12) are managed by the District Offices. Type III metal signs are located where no Type I State Exit Monument or Type II State Entry Monuments are located. Type III metal signs should be removed if a Type I State Exit Monument or a Type II State Entry Monument is located in the same vicinity.

More information regarding State Entry Monuments and Signs can be found here:

http://www.dot.state.mn.us/restareas/entry-signs/es-history.html.

6-7.07.10 Township Boundary Sign

Township boundary signs shall not be installed or retained on trunk highways, either individually or as part of a sign assembly. Township boundary signs do not have sufficient orientation value to warrant installation on the trunk highway system.

6-7.07.11 Watershed District Sign

Watershed districts are local units of government which exist to protect water resources. There are over 40 watershed districts throughout the state authorized by the Legislature in 1995.

They are established at the request of citizens, counties, or cities when water management problems escalate. The boundaries are widely variable and do not follow political boundaries.

Watershed districts in Minnesota are not obvious to motorists and are not geographically distinct features. Therefore, their identification is not of interest, significance, or benefit to the majority of motorists.

Watershed Districts shall not be signed on any trunk highway.

Watershed district identification signs may be installed within a rest area or wayside parking area established at the site to accommodate vehicles off the roadway.

Existing watershed district identification signs without roadside parking facilities shall be removed at the end of their sign life.

ramp at the beginning of the designated route. If installation of a sign on the entrance ramp is still not practical, then consider installation of a sign on the mainline. If memorial highway signs are installed on the mainline, one sign in each direction of travel at or near the beginning of the designation may be installed and is to be placed in an area which will not interfere with any other traffic control device.

b. Expressways

For designated routes along expressways, signs may be installed along mainline roadway. If memorial signs are installed on the mainline, one sign in each direction of travel at or near the beginning of the designation may be installed and is to be placed in an area which will not interfere with any other traffic control device.

c. Conventional Roadways

Memorial highway signs may be installed along conventional roadways in accordance the MN MUTCD. One sign in each direction of travel at or near the beginning of the designation may be installed and is to be placed in an area which will not interfere with any other traffic control device.

d. Bridges

Designated bridges will be signed for road users on the carrying roadway and not for the roadway beneath.

e. Rest Areas and Other Roadside Areas

Memorial highway signs installed in rest areas or other roadside areas and intended for viewing by non-motoring public may allow for non-standard design, such as a photo of the person being commemorated or symbols. A new sign panel should be installed on its own structure. Standard signs installed on the entrance ramp are to be installed on the right side of the ramp, between the entrance gore and the parking area, with 150 to 200 foot spacing between signs.

f. Prohibition of Signs Mounted Overhead

Under no circumstances will memorial signs be mounted overhead on a roadway or bridge.

Memorial highway sign designs shall be designed in accordance with the MN MUTCD Section 2M.10. The sign designs shall use a six inch combination of initial upper case and lower case letters for the person or entity being recognized. Text size may be reduced in urban areas where physical space is restricted. New sign design requests should be sent to OTST State Signing Office.

The organization sponsoring the route or bridge designation shall reimburse MnDOT according to Technical Memorandum No. 12-02-T-01 or Chart 6.6, Requester Pay Signing Costs, for the cost of fabricating, installing, and maintaining signs on trunk highways. (See Minn. Stat. Sec. 161.139).

Memorial Highway Signing - Guidance for Requesters is available to MnDOT staff when assisting requesters through the process of memorial highway signing.

6-7.09 Supplemental Guide Signing Programs

The MN MUTCD, Minnesota Statutes, and MnDOT policy allow supplemental guide signs to be installed on trunk highways for a variety of public and private facilities. A complete list of allowable facilities, general criteria, and facility specific criteria can be found in Appendix A MnDOT Supplemental Guide Signs. Standard sign designs for a variety of supplemental guide signs can be found in the MnDOT Standard Signs Summary and Manual. All other sign designs will follow the design guidance in Charts 6.1A through 6.1D and the MN MUTCD.

MnDOT provides signs at no cost to the requester for qualified facilities under the following signing programs:

1. General Motorist Service
2. Hospital
3. Resort and Camping

Unless otherwise noted, qualified facilities under Appendix A MnDOT Supplemental Guide Signs, shall pay for signs following Technical Memorandum No. 12-02-T-01 or Chart 6.6, Requester Pay Signing Costs, found in this chapter

6-7.09.01 LOGO Sign Franchise Program

Logo signs are permitted on interstate highways and urban controlled access trunk highways (freeways) as specified in Minn. Stat. Sec. 160.80 and the Logo Sign Franchise Program Agreement.

The MN MUTCD Part 2J covers standards and guidelines on the use of logo signing. Minn. Stat. Sec. 160.80 and the Logo Sign Franchise Program, authorize MnDOT to establish this program for the purpose of providing specific information on gas, food, lodging, camping, attractions and 24-hour pharmacies for the benefit of the motoring public on the right-of-way of interstate and certain other controlled-access trunk highways.

This program is currently operated by Minnesota Logos, Inc. under an agreement with MnDOT. Businesses interested in this program may contact Minnesota Logos, Inc.

Existing MnDOT installed GENERAL MOTORIST SERVICE signs should remain in place at each interchange if all businesses are not accommodated in the Logo Sign Franchise Program. Per the logo contract, the State Signing Engineer in conjunction with the District Traffic office will review and approve all site plans to verify that the proposed logo signs meet the contract requirements, will not have a negative impact on other required signing, proper sign spacing will be maintained, and no other known construction or permit projects will impact the sign locations.

6-7.09.02 Specific Service Signing Program (D9-X6)

The Specific Service Signing Program was mandated by the 1980 Legislature under Minn. Stat. Sec. 160.292 to 160.298. See these statutes for complete legislative intent.

1981 - Permitted the inclusion of motels.

1984 - Permitted the inclusion of restaurants.

1988 - Added rural agricultural businesses and places of worship.

1989 - Added tourist-oriented businesses.

1996 - Added gasoline service station or other retail motor fuel business and optional business panel (logo).

Definitions:

1. Specific Service - restaurants, rural agricultural or tourist-oriented businesses, places of worship, gasoline service stations or other retail motor fuel businesses, motels, resorts, and recreational camping areas.
2. Specific Service Sign - a rectangular sign panel no greater than 72” x 18” displaying the name or optional business panel, or both, of the specific service, the direction to, and where appropriate the distance to the facility.
3. Specific Service Sign Assembly - a combination of specific service sign panels on a single sign structure are to be placed within the right-of-way on appropriate approaches to an intersection or interchange. MnDOT allows a maximum of four sign panels on a sign structure.
4. Specific Service Sign Cluster - a grouping of specific service sign assemblies on appropriate approaches to an intersection or interchange.

Installation:

Specific Service signs should be installed in accordance with all of the following:

1. Priority of installation
    a. A business shall not be allowed to "bump" another business from a specific service sign.
    b. If two or more eligible businesses apply at the same time, year-round businesses have priority over seasonal businesses.
    c. Left- or right-oriented businesses have priority over straight-ahead oriented businesses. If a business is eligible for a left or right directional sign panel on one approach, then it is eligible for a straight-ahead directional sign panel on the other approach. Although straight ahead signing is to be discouraged, it may be permitted at certain intersections. See Figures 6.36A and 6.36B.
2. Sign placement
    a. No specific service sign or assembly shall be placed at a location that will interfere with other necessary signing as determined by the Commissioner of Transportation. Requests will be denied if space is unavailable.
    b. A specific service sign on a ramp shall not be allowed if the business is readily visible from the ramp terminal or effective directional signing is visible.
    c. A specific service sign should be installed on the right side of the roadway.
    d. A sign assembly shall be limited to four panels. Assemblies on mainline approaches to interchanges are limited to three panels and one action message panel, e.g. NEXT RIGHT.
    e. Specific service signs should be installed approximately 300 feet from any inplace signs on a conventional road and approximately 500 feet from any inplace signs on an expressway. Inplace signs are not to be removed to accommodate specific service signs.
    f. The maximum number of specific service sign assemblies per intersection approach should not exceed three nor be placed past the previous interchange entrance ramp.
3. Order of installation

    The following sequence of signs should be used at intersections on conventional highways to integrate specific service signs with other traffic signs in a uniform manner. The signs are listed in the order that a motorist would encounter them as they approach an intersection. The spacing of the signs should be as shown in Figure 6.26.

    a. Junction assembly (if applicable).
    b. Road name advance sign (if applicable).
    c. Directional sign to cities (if applicable).
    d. Other guide signing (hospital, landfill, etc. if applicable).
    e. Inplace RESORT/CAMPING motorist service signs (D9-X3 and D9-X4).
    f. Specific Service Sign (D9-X6) or assembly(ies).
    g. Road name with arrow sign at or near intersection (if applicable).
    h. Route marker directional assembly at intersection (if applicable).
    i. Turn lane sign, where a turn lane is in place.

    Only Specific Service Signs shall be installed on Specific Service Sign assemblies. Specific Service Signs are not allowed to be installed on any other sign type such as other guide signs.

4. Sign panel design:
    a. Show distances in one mile increments. Omit distances for those less than one mile.
    b. Mount left directional panels above right directional panels.
    c. Only one business shall be displayed on a sign panel.
    d. Businesses which have combinations of approved services may combine these names in their sign legend, if possible, e.g. “RESORT CAMPING”, “MOTEL CAFE”. The legend size should not be reduced. Abbreviations may be required, but only standard abbreviations may be used.
    e. Proper name abbreviations may be used as determined by the District Traffic Engineer.
    f. Inappropriate business names shall not be allowed to be displayed on sign panels.
    g. Business Panels or Logos
        1) Logos shall not resemble traffic control devices.
        2) Inappropriate logos shall not be permitted.
        3) Businesses supply either the business logo panel or the electronic image to the District Traffic Office. If the business logo panel needs replacing due to damage beyond repair or other reasons, the District Traffic Office will work with the business on the best method of replacement.
        4) Sheeting should match MnDOT’s current sign sheeting standard.
    h. Both the ramp sign and the mainline sign shall be identical in format. Ramp signs shall have directional arrows (if needed) and mileage (for distances of one mile or greater).
    i. All sign panels for seasonal services shall be covered or removed when the service is not available and is the responsibility of the facility or business. A CLOSED plaque may be bolted over the arrow/distance portion of the sign panel, for seasonal businesses. CLOSED plaques are required on the mainline sign and not on the ramp sign at an interchange.
    j. Specific service sign panel (D9-X6) details are shown in the MnDOT Standard Signs and Markings Manual.

6-8.00 APPLICATION GUIDELINES - MISCELLANEOUS SIGNS

6-8.01 Adopt-A-Highway Sign Program (I-X1)

This signing program is administered by the District offices under the direction of the Office of Maintenance. MnDOT shall fabricate and install signs. One sign shall be installed in each direction at the beginning of the adopted highway segment. Volunteer group names should be limited to a maximum of 18 characters per line to maximize legibility. Each space between words and each type of punctuation takes up a character on a line. All letters shall be uppercase.

A 60” x 18” plate with the words THIS SECTION AVAILABLE should be attached to the bottom half of the 60” x 36” sign panel if a group ceases to participate in the Adopt-A-Highway program and no other group adopts that section of highway for a period of time. This plate is to be attached to the sign panel with bolts utilizing spacers to minimize damage to the retroreflective sheeting on the overlaid sign panel. The colors on the bottom 60” x 18” portion of the sign panel were reversed (white legend and border on blue background) in 2006. A 60” x 18” panel may be attached to the bottom half of the 60” x 36” sign panel for new volunteer groups until the 60” x 36” sign panel reaches the end of its useful life.

A Reference Location sign panel may be combined with an Adopt-A-Highway sign panel on the same structure. For ease of reference and termini location for litter pickup, many Districts have installed the Adopt-A-Highway signs either adjacent to, or in close proximity to reference post markers on rural sections of freeways and expressways.

Rather than two separate sign structures close together, both sign panels may be combined on one sign structure in accordance with all of the following criteria:

1. The Adopt-A-Highway sign panel is the primary sign panel on the sign structure.
2. At the correct engineering station for the Reference Location sign, install an Adopt-A-Highway sign according to the most current MnDOT sign structure details, http://www.dot.state.mn.us/trafficeng/signing/doc/canddsignground.pdf.
3. Attach the reference post marker to the left vertical post, directly below the Adopt-A-Highway sign panel with mounting hardware shown in http://www.dot.state.mn.us/trafficeng/signing/doc/canddsignground.pdf.

6-8.02 Adopt-A-Rest Area Sign Program

MnDOT non-interstate rest areas, waysides, scenic overlooks, and historic properties not serviced by MnDOT’s statewide custodial service provider or by a facility partner may be adopted by groups for the purpose of litter pickup, similar to adopting a highway segment. For a current list of facilities available for adoption, contact the MnDOT Safety Rest Area (SRA) Program Manager. See www.dot.state.mn.us/restareas for contact information.

For historic properties, contact the MnDOT Historic Roadside Properties Manager for guidance with respect to the placement of Adopt-A signs. Additional restrictions on the placement of signs apply at historic sites. See www.dot.state.mn.us/roadsides/historic for contact information.

One ADOPT-A-REST AREA sign (I-X1), 42” x 24” may be installed along the entry drive into the property or within the site as approved by the SRA Program Manager and/or as determined by the Historic Roadside Properties Manager, where applicable. All other pertinent guidelines of the Adopt-A-Highway program shall apply to the Adopt-A-Rest Area program.

6-8.03 Community Wayfinding Sign Program

Generally, guidelines that are discusses in this section are those which (1) are not specifically addressed in the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) Part 2D.50, (2) provide additional guidance to that given in the MN MUTCD on application, location and usage of signs, and (3) must be addressed because MnDOT is charged with developing and implementing design, use and application of certain guide signs in accordance with Minnesota Statutes.

1. Introduction

   The community must develop a master plan for Community Wayfinding signing which contains a map of the community, including the city street/local road system and a concept design of the community wayfinding sign structure and sign panels.

2. Community Map

   The map of the community shall include:

   a. Exact locations of private and publicly owned destinations and attractions to be included in this signing program. Destinations or attractions must be key civic, cultural, visitor, and recreational attractions and other destinations of general interest to tourists and the traveling public and shall not be a retail, business, or manufacturing center. In addition, this type of signing shall not display advertising for a commercial product or service.

      Only those destinations/attractions which qualify under MnDOT's Minor Traffic Generator Signing program guidelines are eligible for signing (contact the MnDOT District Traffic Engineer to obtain the listing of destinations/attractions eligible for signing). Community requests for other types of destinations/attractions may utilize MnDOT's sign variance process.

   b. Conventional highway approaches to city street/local road intersections where signing is proposed.

   c. Which destination(s) and attraction(s) are to be signed on each conventional approach at each city street/local road intersection.

   d. City street/local road intersections where trailblazing signing is required to direct motorists to each facility. If signing is approved on the conventional highway to a facility, trailblazing signing shall be installed on the city streets/local roads by the community before signing is installed on the conventional highway.

3. General Requirements

   When interested, a community initiates, coordinates and submits a master plan to the MnDOT District Traffic Engineer. The master plan needs to include a resolution (see Form 6.1) and one lead contact person within the community through which all MnDOT correspondence and contact will be made.

   If a community obtains MnDOT approval for Community Wayfinding Signing, MnDOT will remove any existing minor traffic generator signs within the community. No requests for minor traffic generator signing will be approved within the community while the Community Wayfinding Signing program is in effect.

   For those facilities that MnDOT considers eligible for signing on state trunk highways, the eligible community is responsible for the construction, installation, and maintenance of the community wayfinding sign structures and sign panels at its own expense.

   If community wayfinding signs are not properly maintained, MnDOT will request that the community remove the signs at its own expense. If the signs are not removed within 30 days of notification, MnDOT will remove the community wayfinding signs at the expense of the community.

4. Criteria for Community Wayfinding Signing

   a. Signing may be permitted on conventional highways within a community.

b. Sign locations on conventional highways shall be approved by the MnDOT District Traffic Engineer. Installation of signs shall be through the MnDOT permit process.

c. Only one sign structure is allowed in each direction approaching an intersection and should be located on the right side of the roadway.

d. A sign shall not obscure or detract from any existing traffic control devices.

e. If a sign structure is located in the clear zone, it shall meet FHWA breakaway requirements based on the current edition of the AASHTO Standard Specifications for Highway Signs, Luminaires, and Traffic Signals, or be protected as approved by the MnDOT District office.

f. Sign panel offset and mounting heights shall be in accordance with the MN MUTCD and shall not be mounted overhead.

g. Signing is allowed for left and right turning movements. Straight ahead confirmatory signing may be permitted in unique circumstances.

h. A specific destination may only be displayed on one sign structure in each direction on a conventional highway unless straight ahead confirmatory signing is also approved by the District Traffic Engineer.

i. Roadway reconstruction and/or installation of new regulatory, warning, or guide signs may necessitate relocation or removal of community destination signs by the community at its own expense.

5. Sign Design Criteria

a. Following MN MUTCD 2D.50, the sign panel background color shall not use red, orange, yellow, purple or the fluorescent versions thereof, fluorescent yellow-green or fluorescent pink.

b. The sign panels shall be made using retroreflective sheeting (see MnDOT Standard Specifications for Construction Section 3352.2A2b). Fluorescent sheeting shall not be used on sign panels.

c. The sign base material should be sheet aluminum (see MnDOT Standard Specifications for Construction Section 3352.2A1a).

d. If separate sign panels are to be used, each sign panel should not exceed six feet in length and two feet in height.

e. Pictographs may be used on community wayfinding signs and if used, comply with the requirements of the Community Wayfinding section of Part 2D in the MN MUTCD. The city pictograph, if displayed, shall be simple, easily recognizable and placed at the top of the sign structure (independently or on the top of a sign panel).

f. The lettering of a city name shall be of a font style and high color contrast for motorists to read at normal highway speeds. If used, place near the top of the sign panel.

g. Symbols, business logos or other forms of advertising for destinations and attractions are not permitted per the MN MUTCD.

h. Up to three destinations/attractions may be displayed on a sign structure (three separate sign panels or one sign panel with three destinations).

i. Destinations shall be displayed (from top to bottom of sign) in the following sequence: straight ahead destination followed by left-oriented destination followed by right-oriented destinations. Closer destinations shall be displayed above further destinations if they are in the same direction.

j. Lettering shall be 6-inches high. The suggested font is Series C Federal Highway Gothic font (or a similar font style that does not detract noticeably from legibility) with approximately a maximum number of 14 characters per line (including spaces between words). Abbreviations, if used, should be standard abbreviations.

k. Lettering and arrows shall be the same color.

l. Arrows shall be MnDOT standard arrows or similar so as to be legible and not a distraction without encircling accents or contrasting mini-backgrounds.

m. Left arrows and upward pointing arrows shall be displayed on the left side, and a right arrow on the right side of a sign panel. If a border is used, it shall be plain, not decorative.

n. All sign panel designs should be reviewed by the MnDOT District Traffic Office before fabrication.

o. The sign shall not contain any animated or moving parts or flashing disks.

p. Distracting flashing or moving lights are not allowed. Lighting which presents a new message, pictorial image, or changes illumination at a rate less than once every six seconds is determined to be a flashing or moving light and is in violation of Minn. Stat. Sec. 173.15, Subd. 7.

6-8.04 Emergency 911 sign

This sign informs motorists entering Minnesota that emergency services may be reached by dialing 911. It should be installed within five miles of the state border on major entry points into the state. Additional signs may be placed at locations such as airports, weigh stations, and rest areas.

6-8.05 Reference Location Sign (D10-1, D10-2, and D10-3)

Reference Location signs, often referred to as Reference Post markers, shall be erected along trunk highways to assist drivers in estimating their progress, provide a means for identifying the location of emergency incidents, and aid in highway planning and maintenance efforts. The zero mile point should begin at the south or west state line or at the south or west terminus where routes begin.

The Office of Transportation Data and Analysis (TDA) shall be notified of new installations of Reference Location signs. Notification shall also be made for replacement of the sign if the previous location cannot be accurately determined (i.e. knockdowns). TDA will provide correct location information for the signs. Notification should be made during the plan development stage.

A Reference Location sign shall be installed within six feet of its correct location. When a Reference Location sign cannot be installed within this distance, it may be moved and installed within 50 feet of its correct location; in this case TDA must be notified of the change. If it cannot be placed within 50 feet of its correct location, it should not be installed.

Further information about Reference Location signs can be found in the MN MUTCD Section 2H.5 and in Chapter 14-5.09 Reference Point System of the Traffic Engineering Manual.

For the design and size of Reference Location signs refer to the MN MUTCD.

MnDOT installs One Tenth Mile (X4-8) delineators on freeways and expressways to further enhance the usefulness of the Reference Location Sign System. Fabrication and installation details are specified later in Section 6-10.04.06 Tangent of this Chapter.

of Strategic Highway Research Program (SHRP) signing which should be retained as long as the program is still operating.

If a test section is to be retained when signs are due to be removed, the test section, with the exception of SHRP signing, should be identified by one of the methods specified in Item 3.

6-9.00 OBJECT MARKERS

6-9.01 Purpose

Object markers are used to mark obstructions within or adjacent to the roadway and mark the end of a roadway.

6-9.02 Types of Object Markers

For object marker types, colors, and uses, consult the MN MUTCD Sections 2C.63 through 2.66. Additionally, MnDOT uses markers uniquely designed for snow plow operations which are not referenced in the MN MUTCD. See the MnDOT Standard Signs Summary and Manual for MnDOT sign designs and sizes for use on MnDOT highways.

6-9.03 Applications and Guidelines

6-9.03.01 Bridge Abutments, Piers, and Rails

Bridge abutments, piers and rails within the width of the approaching shoulders should be marked with Type 3 Object Markers (X4-4). A typical application can be found in Figure 6.38.

6-9.03.02 Bridges - Narrow Bridges/One Lane Bridges

Narrow bridges should be marked and delineated as shown in Figure 6.39. More information on signing narrow bridges can be found in MN MUTCD 2C.20.

One-lane bridges should be marked and delineated as shown in Figure 6.40. More information on signing one lane bridges can be found in MN MUTCD 2C.21.

6-9.03.03 Cattle Passes/Large Culverts

Cattle passes and larger culverts that meet one of the following descriptions are subject to the provisions of this subsection:

1. Headwalls are present and are not protected by guardrail, subject to engineering judgment.
2. Minimum width of 42 inches and a maximum width of 20 feet. Large culverts 20 feet or wider may be treated as a bridge, subject to engineering judgment.
3. Any culvert with an end or opening that is within eight feet of the outside edge of the shoulder. This eight foot distance was selected because it may allow a motorist to pull off of a narrow shouldered roadway if other conditions permit.
4. Other structures as determined by the District Traffic Engineer.

All cattle passes and larger culverts meeting the above criteria should be marked with Type 2 object markers as described in Section 2C.63 and 2C.65 of the MN MUTCD and as follows:

1. The Type 2 Object Marker (X4-3) used should be constructed of 0.062-inch aluminum or other lightweight material such as fiberglass or flexible urethane sheeting. Use fluorescent yellow prismatic retroreflective sheeting of a type compatible with the base material.
2. Mount two markers back-to-back on a flexible post or 2-pound steel post. A flexible post is preferred due to its resistance to being knocked down by snowplows and farm equipment. Additionally, it provides better daytime visibility. Install the two-way marker assembly on the near right side immediately in front of the structure as shown in Figure 6.41.

6-9.03.04 Driveways

A property owner may mark each side of a driveway entrance with reflectors. Blue colored reflectors are preferred although white (colorless) may be used. Place each reflector on its own structure (not to exceed a 1.0 pound post), not more than five feet above the ground, and at least 12 feet from the outside edge of the shoulder to prevent snowplow damage.

Red or yellow reflectors should not be used since they can be easily confused with motor vehicle tail lights. MnDOT may remove existing reflectors if they obstruct or interfere with the effectiveness of any traffic control device (Reference: Minn. Stat. Sec. 169.07).

6-9.03.05 End of Roadway

A typical placement of markings for a roadway that ends with no alternative vehicular path is shown in Figure 6.38.

6-9.03.06 Guardrails

The approach end of plate beam guardrail installations should be marked with a Type 3 Object Marker in accordance with the MN MUTCD Section 2C.65.

On guardrail installations with flat end treatments, the object marker shall fit within the recessed area. On installations with round end treatments, the object marker shall wrap around the circular end treatment and shall be mounted so that the top of the marker is even with the top of the circular end treatment.

Both ends of all guardrails shall be marked with the Snowplow Marker (X4-5) as shown in Figure 6.38.

6-9.03.07 Infiltration Areas (X3-6a)

Special drainage infiltration areas are built as part of construction projects. Each infiltration area may be marked with the standard sign X3-6a to identify the area to field personnel. For more information about infiltration areas see MnDOT Tech Memo 14-06-ENV-01.

6-9.03.08 Islands

A typical application of the placement of object markers on islands can be found in Figure 6.38.

6-9.03.09 Snowplow Operations

The Snowplow Marker (X4-5) is used to indicate to a snowplow operator the beginning and end of a guardrail installation. The snowplow marker is shown in Figure 6.38. An alternate to the snowplow marker is a Snow Pole.

Interchange gores (freeways and expressways) are marked with a 12” x 24” Type 3 Object Marker Center (X4-4C).

6-9.03.10 Other Objects

Objects located within the clear zone should be marked with the proper object marker. The clear zone should be determined as stated in MnDOT Road Design Manual, Chapter 4-6.04.

6-10.0 DELINEATORS

6-10.01 Purpose

Delineators are guidance devices used where the alignment might be confusing or unexpected, such as lane reduction transitions and curves. They are effective guidance devices at night and during adverse weather and remain visible when the roadway is wet or snow covered.

6-10.02 Types of Delineators

For delineator types and colors, consult the MnDOT Standard Signs Summary and MnDOT Standard Signs and Markings Manual for use on MnDOT highways. Commonly used delineators types are shown in Figure 6.42 of this chapter.

6-10.03 Placement

Delineator placement guidance can be found in the MN MUTCD Section 3F. Delineator height and lateral placement are shown in Figure 6.44.

6-10.04 Applications and Guidelines

Examples of delineator installations are shown in the MN MUTCD Section 3F.

6-10.04.01 Guardrail

Delinieate three-cable guardrail as shown in the current version of MnDOT Standard Plates Nos. 8330 and 8331. The color of the retroreflective sheeting shall match the color of the adjacent edge line.

6-10.04.02 Horizontal Curves

When applied on the approaches to and throughout horizontal curves, spacing should permit several delineators to always be visible along the curve ahead of the driver. The MN MUTCD Figure 3F-1 and Table 3F-1 show the approximate spacing for delineators along horizontal curves. Figures 6.44 through 6.46 of this chapter have additional information regarding delineating curves on interchange ramps. A simple method for field personnel to determine the degree of curve or the radius of a curve is shown in Chart 6.8 of this chapter.

6-10.04.03 Interchanges

Delineation of cloverleaf and diamond interchanges is shown in Figures 6.44 through 6.46 of this chapter.

The yellow guide delineator used on the left side of exit ramps complies with MN MUTCD Section 3F.3. Spacing should follow either Plan A for an exit ramp or Plan B for an exit loop.

6-10.04.04 Intersections

Intersection delineation guidance can be found in MN MUTCD Section 3F.4.1 and placed as shown in MN MUTCD Figure 3F-2. Delineation of intersection median corners on divided-highway crossovers is shown in Figure 6.43 of this chapter.

6-10.04.05 Lane Reductions

The MN MUTCD Section 3F.3 gives guidance on delineation of lane reductions and refers to MN MUTCD Figure 3B-14.

6-10.04.06 Tangent

Per the MN MUTCD, Section 3F.3 requires single delineators to be installed on freeways and expressways except where continuous lighting is in operation between interchanges. The MN MUTCD Section 3F.4 provides guidance that delineators on mainline tangent sections should be spaced between 200 and 530 feet apart. MnDOT uses the Tenth Mile Delineator (X4-8) and spaces it approximately at 0.1 mile apart (530 feet).

6-10.04.07 Vertical Curves

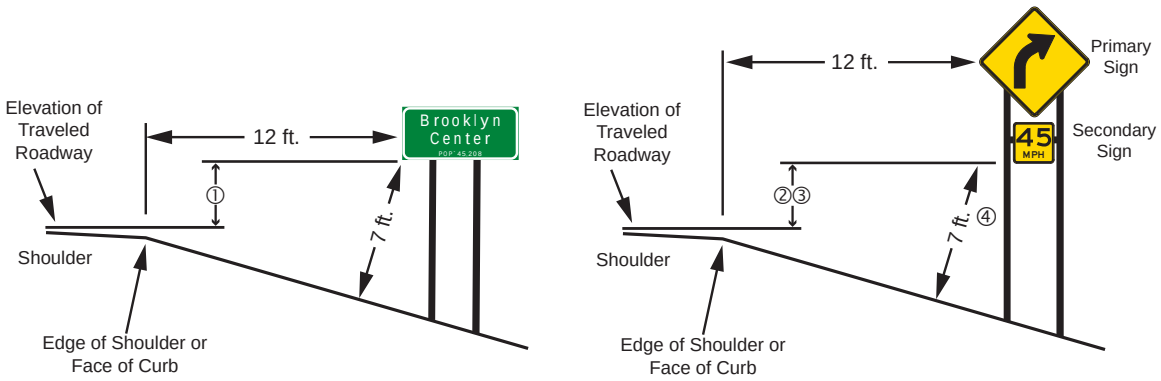
When applied on crest vertical curves, the spacing should permit a minimum of three delineators to be visible from all points along the centerline of the curve at an eye level of four feet above the pavement.

6-11.0 REFERENCES

1. Minnesota Department of Transportation, Minnesota Manual on Uniform Traffic Control Devices, current edition.
2. American Association of State Highway Officials, A Policy on Geometric Design of Rural Highways, current edition.
3. State of Minnesota, Minnesota Statutes.
4. Minnesota Department of Transportation, Standard Signs Summary and Manual, current edition.
5. Minnesota Department of Transportation, Road Design Manual, current edition.

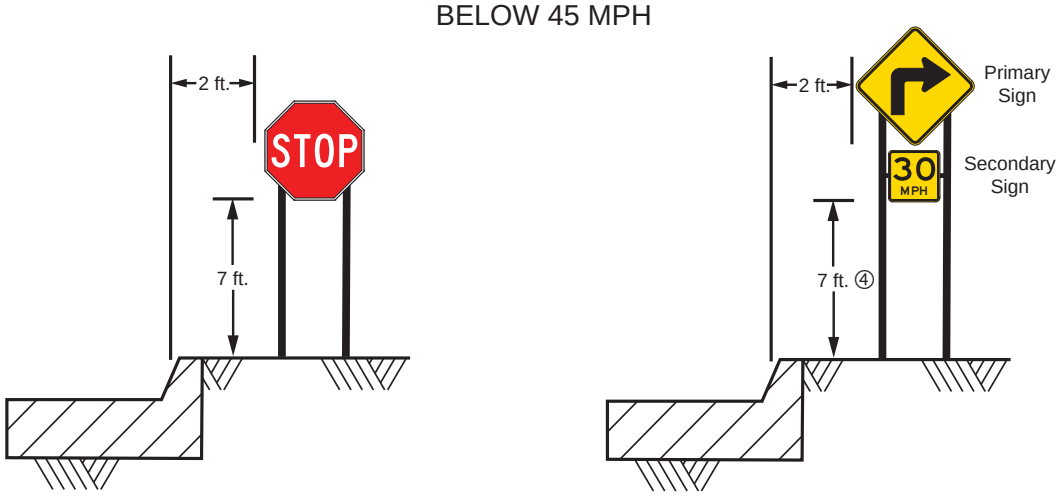
RURAL

TYPICAL SPEEDS
45 MPH AND ABOVE



URBAN

TYPICAL SPEEDS
BELOW 45 MPH

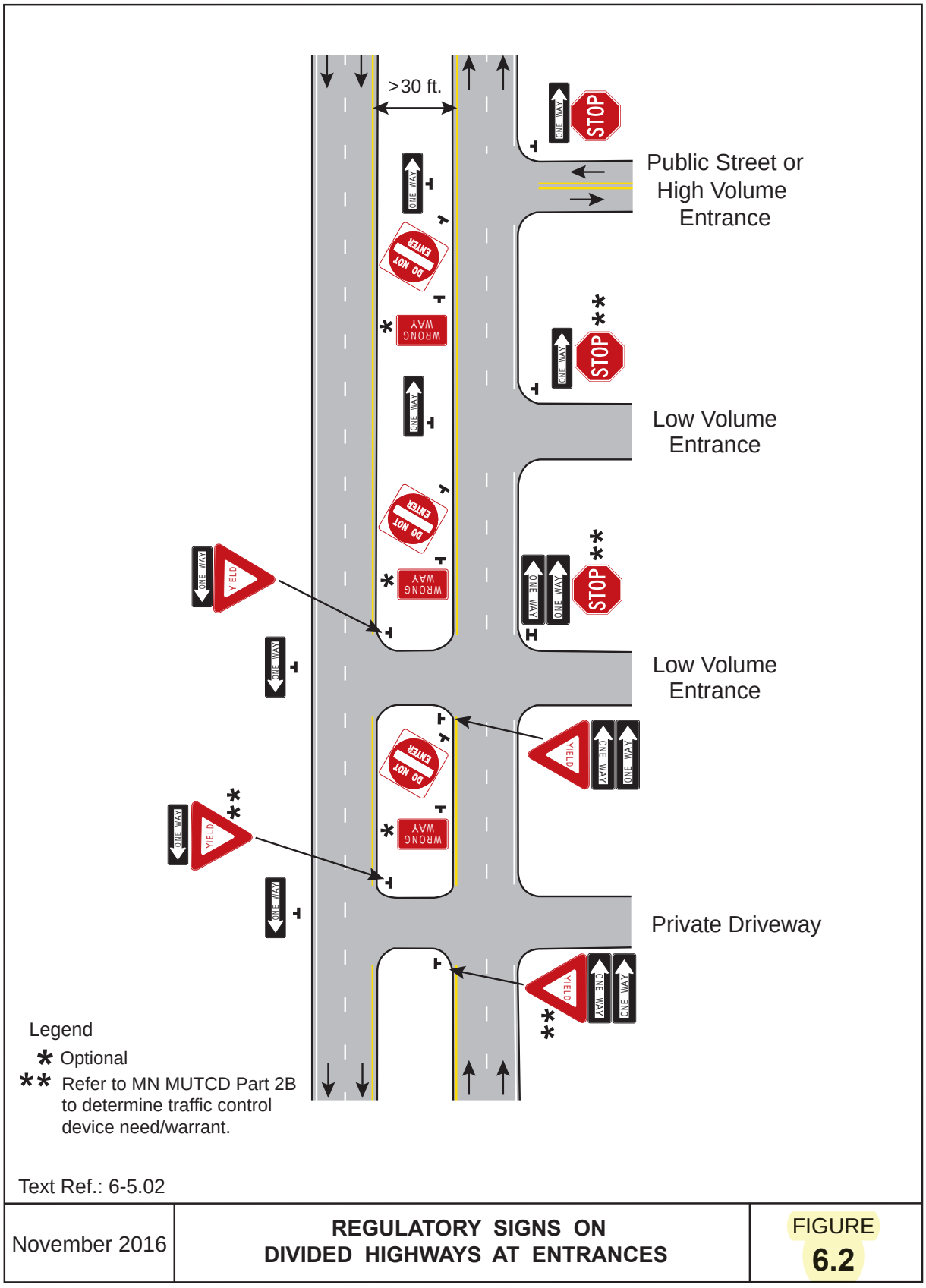


NOTES:

① 5 ft on conventional roads; 7 ft on expressways and freeways.
② When a secondary sign is mounted to more than one riser post, the mounting height from the elevation of the roadway to the bottom of the secondary sign shall be 5 ft on conventional roads and 7 ft on expressways and freeways.
③ When a secondary sign is mounted on a single riser post, the mounting height from the elevation of roadway to the bottom of the secondary sign may be 1 ft less than the height specified in note 2.
④ When a secondary sign is mounted on a single riser post the mounting height of the secondary sign may be mounted 5 ft. above the ground.
5. All dimensions are minimums.

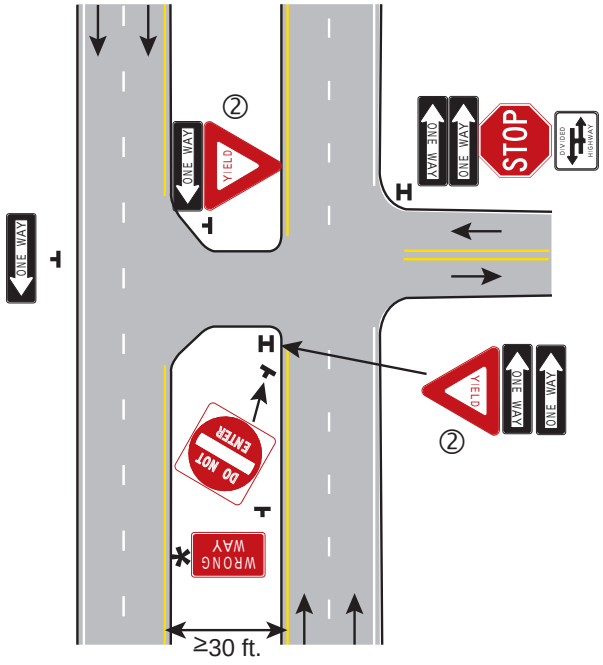
Text Ref.: 6-4.07

May 2015	**SIGN PLACEMENT**	FIGURE **6.1**

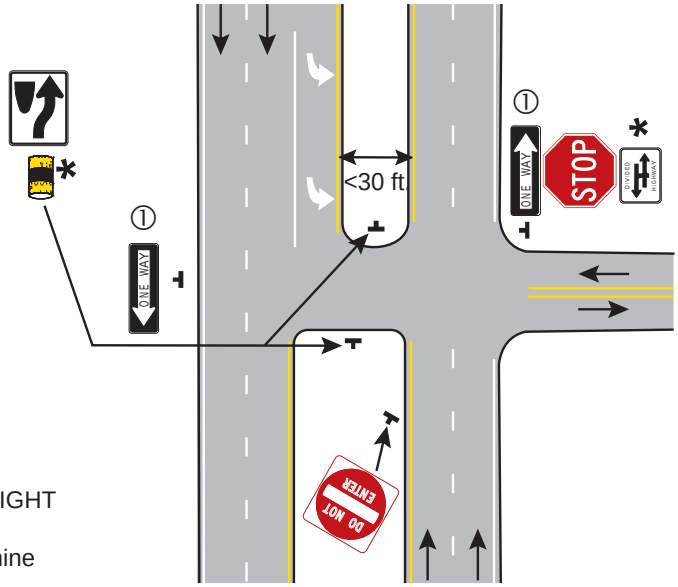


Text Ref.: 6-5.02

November 2016	REGULATORY SIGNS ON DIVIDED HIGHWAYS AT ENTRANCES	FIGURE 6.2



MEDIAN 30 FT. OR GREATER



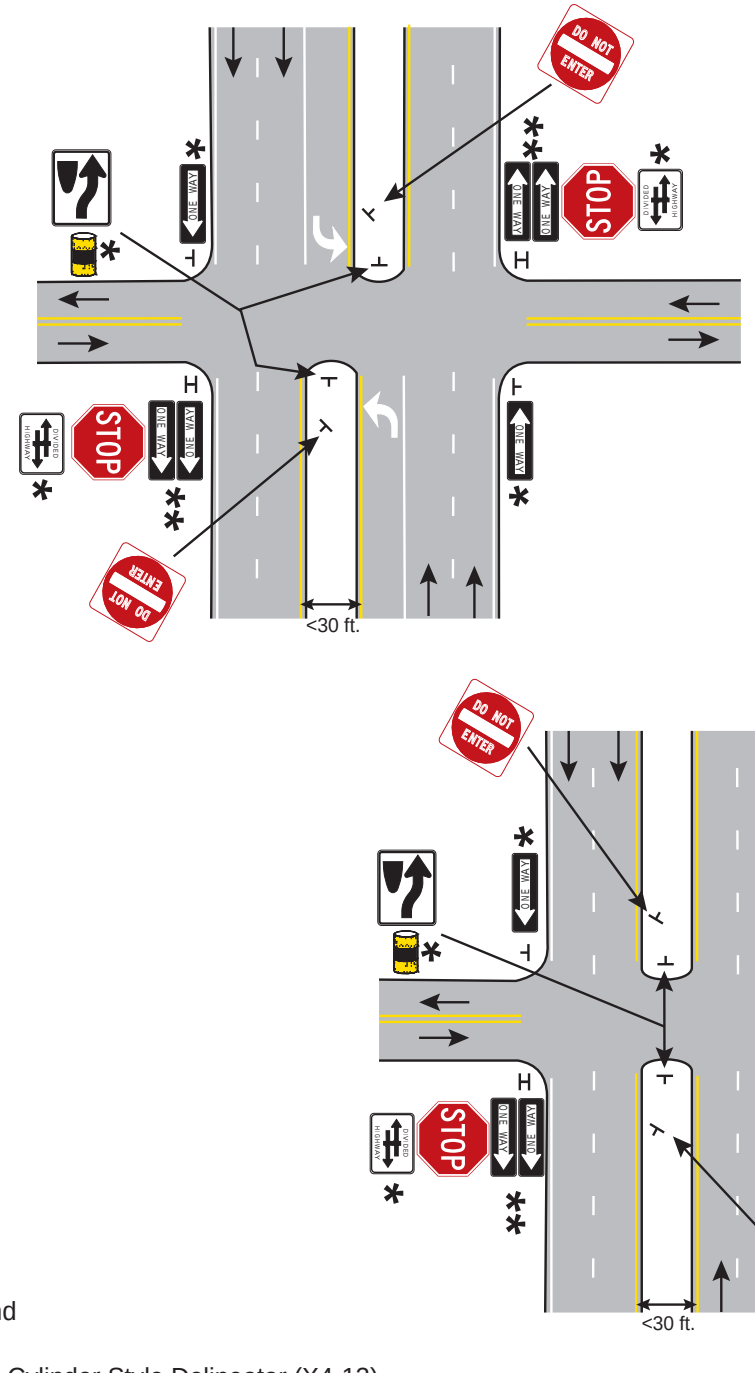
MEDIAN LESS THAN 30 FT.

NOTES:
1. If "ONE WAY" signs are to be used, both shall be installed.

Legend
- Cylinder Style Delineator (X4-13)
- * Optional
- ① ONE WAY signs are optional if KEEP RIGHT signs are installed.
- ② Refer to MN MUTCD Part 2B to determine traffic control device need/warrant.

Text Ref.: 6-5.02

November 2016	**REGULATORY SIGNS FOR DIVIDED HIGHWAY - T INTERSECTIONS**	FIGURE **6.3**



Legend

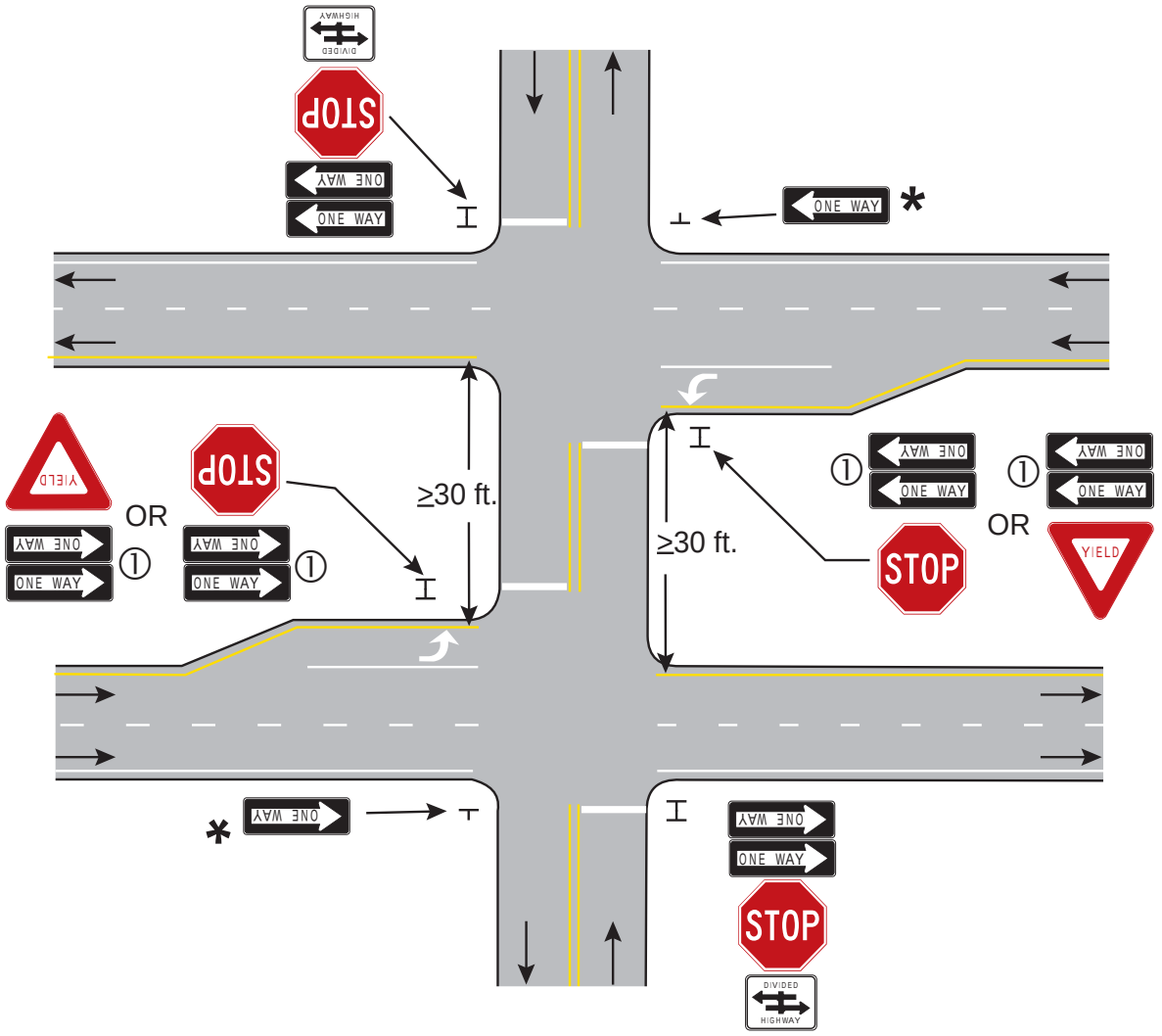
Cylinder Style Delineator (X4-13)

* Optional

** ONE WAY signs are optional if KEEP RIGHT signs are installed.

Text Ref.: 6-5.02

November 2016	REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTIONS - MEDIANS LESS THAN 30 FT. WIDE	FIGURE 6.4

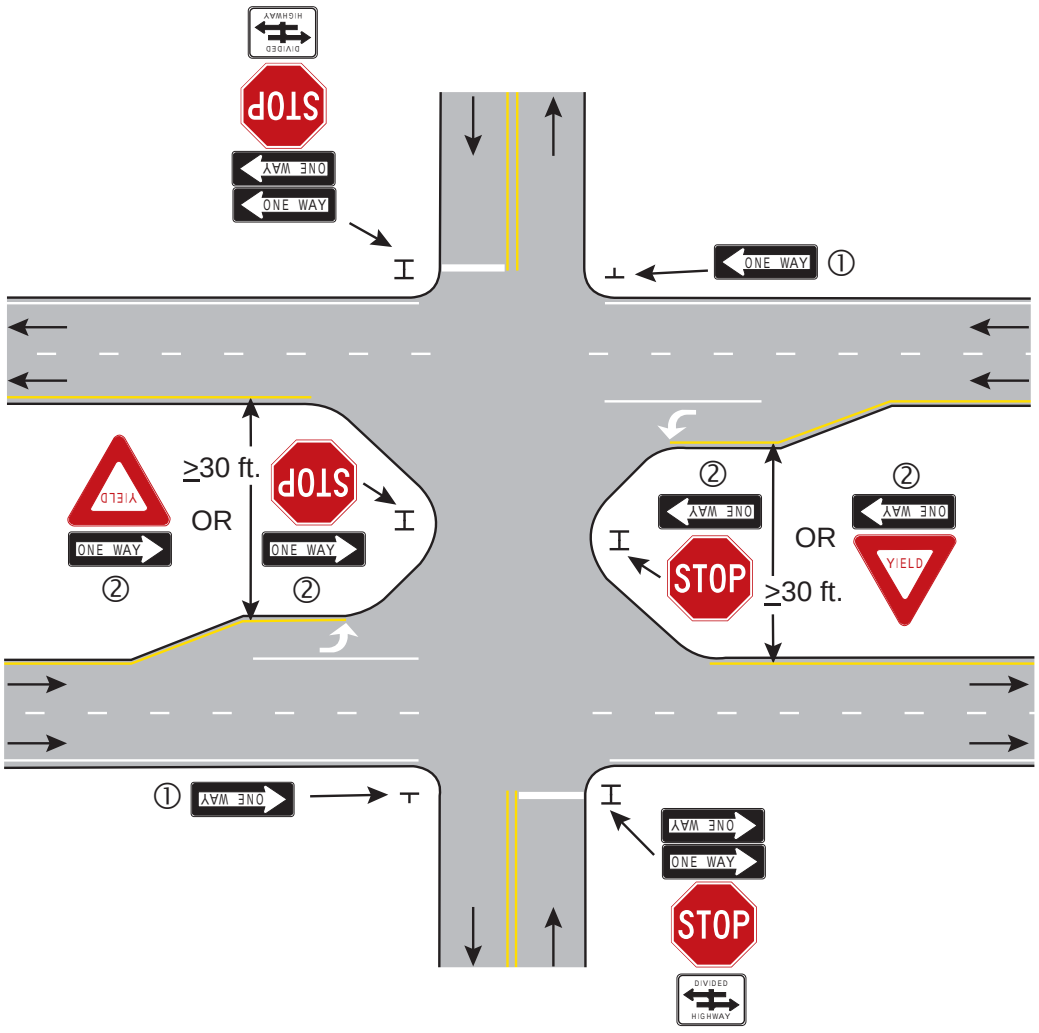


NOTES:
① If placement of the ONE WAY signs in the median creates confusion see Figure 6.7B.
2. See Figure 6.8 for DO NOT ENTER and WRONG WAY signs.

* Optional

Text Ref.: 6-5.02

November 2016	**REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTION - MEDIAN WIDTH 30 FT. OR GREATER**	FIGURE **6.5A**



NOTES:

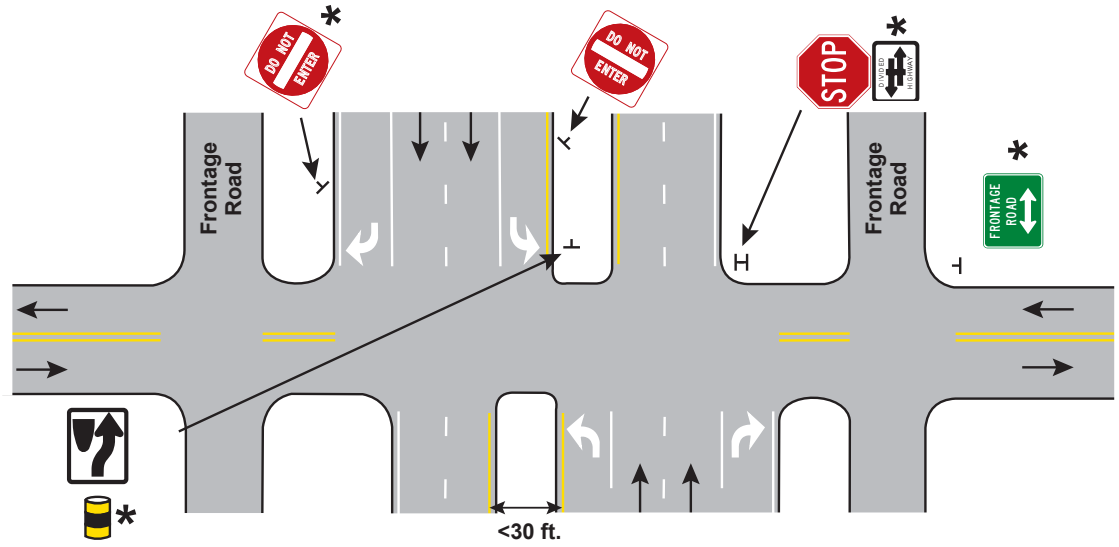
① Exercise engineering judgment in determining placement of ONE WAY signs. Field experience has shown that when placed in the median, the ONE WAY signs above the STOP/YIELD signs point towards each other causing confusion to motorists from the approaching cross streets. The MN MUTCD states to install ONE WAY signs in the near right and far left corners of each intersection. Instead of placing a ONE WAY sign in the near right corner (typically mounted above the STOP/YIELD sign in the median), consideration could be given to installing that sign in the far right corner of the intersection as shown in the figure above.

② Mount the ONE WAY sign back-to-back above the STOP or YIELD sign.

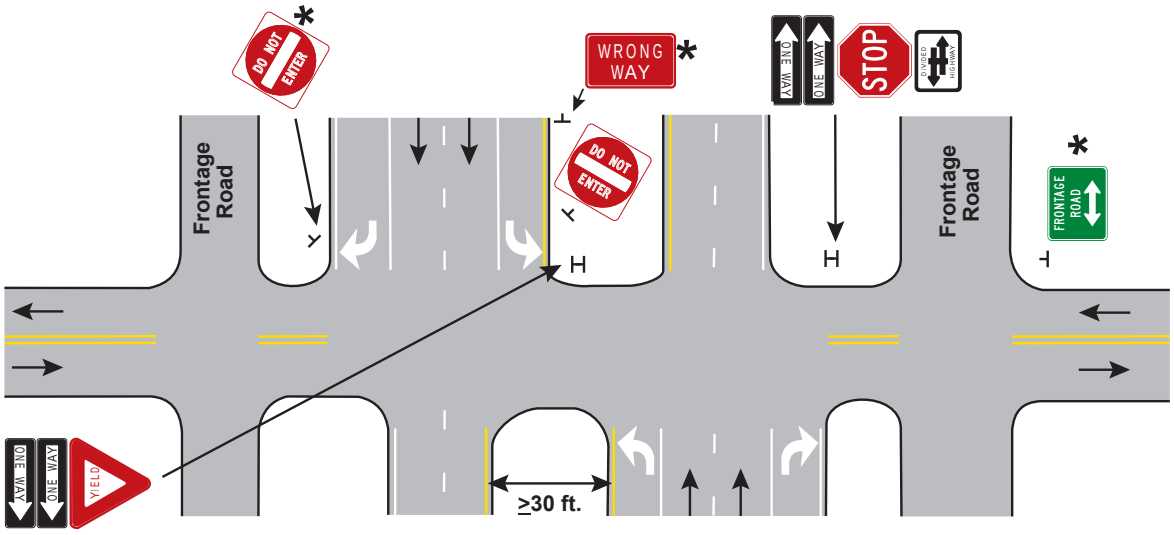
3. See Figure 6.8 for DO NOT ENTER and WRONG WAY signs.

Text Ref.: 6-5.02

November 2016	**REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTION - MEDIAN WIDTH 30 FT. OR GREATER**	FIGURE **6.5B**



MEDIAN LESS THAN 30 FT.



MEDIAN 30 FT. OR GREATER

Legend

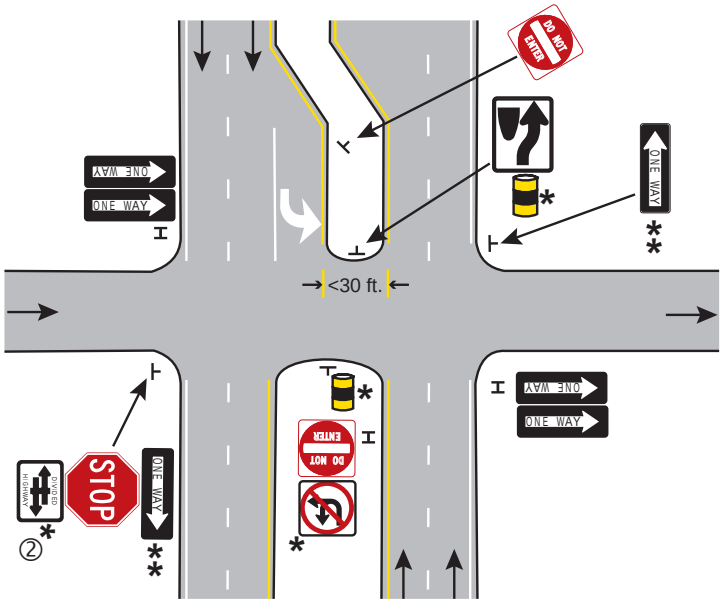
Cylinder Style Delineator (X4-13)

* Optional

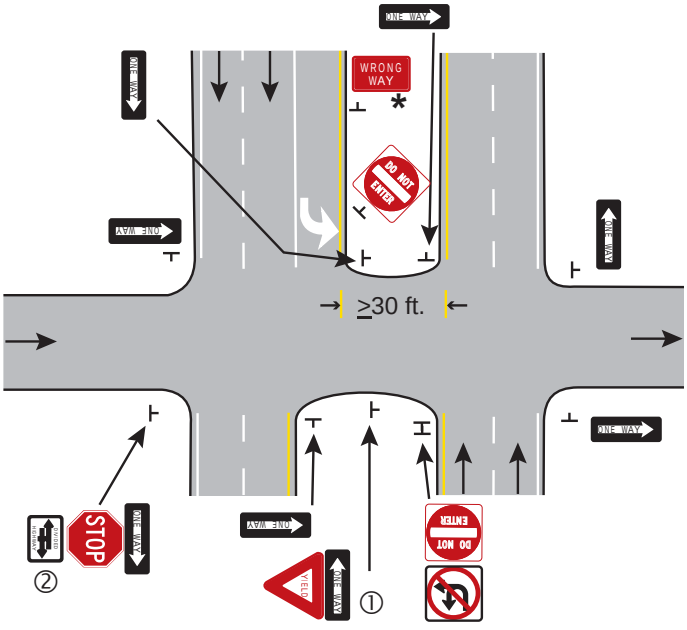
NOTES:
1. The signing is the same for both approaches to the intersection.

Text Ref.: 6-5.02

November 2016	REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTIONS WITH FRONTAGE ROADS	FIGURE 6.6



MEDIAN LESS THAN 30 FT.



MEDIAN 30 FT. OR GREATER

Legend

- Cylinder Style Delineator (X4-13)
- * Optional
- ** ONE WAY signs are optional if KEEP RIGHT signs are installed.

NOTES:

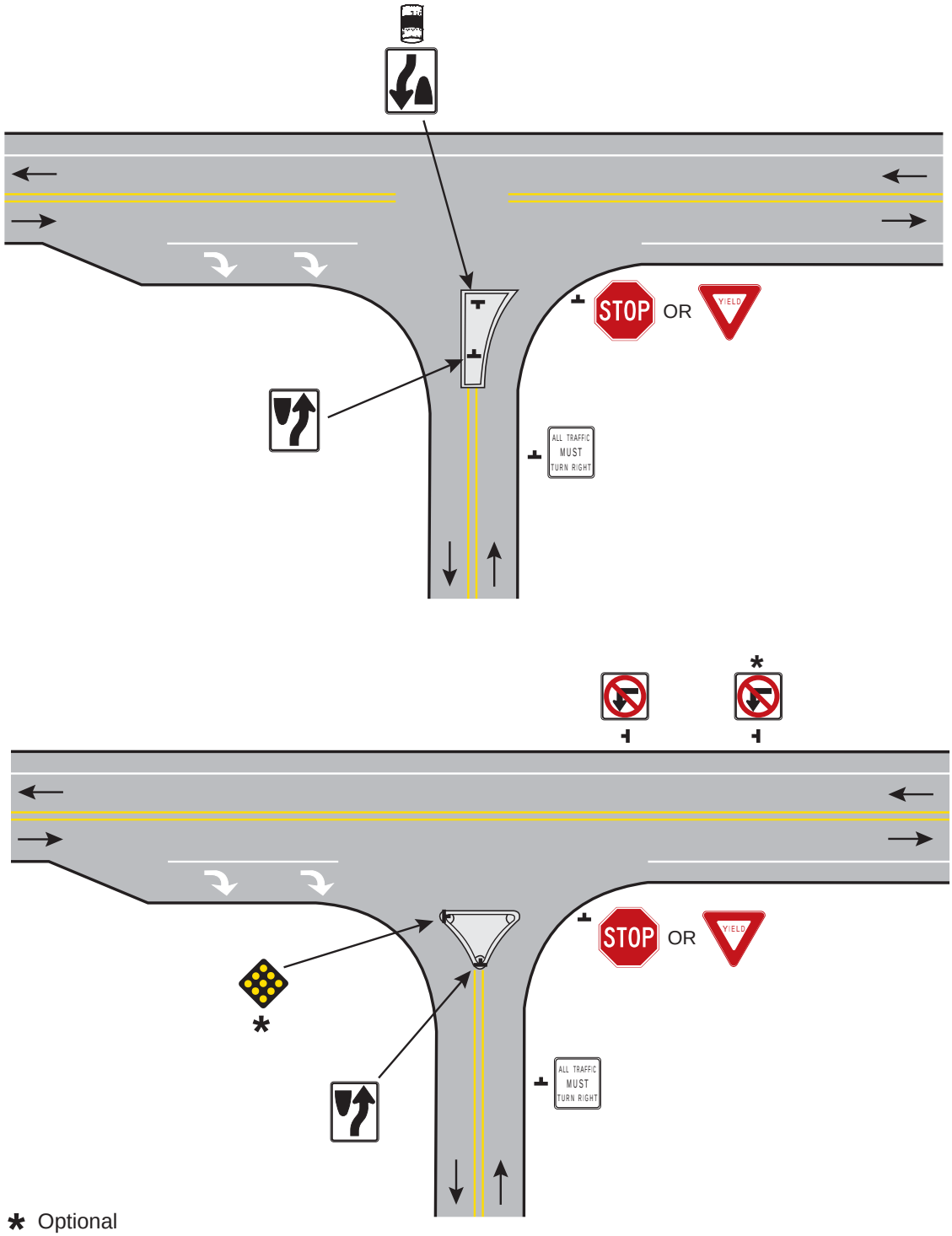
① See Figure 6.7B for optional location of ONE WAY signs above YIELD signs.

② The DIVIDED HIGHWAY sign should not be used when the roadway is divided only at the junction.

3. See Figures 6.12 and 6.13 for regulatory signs on ramps.

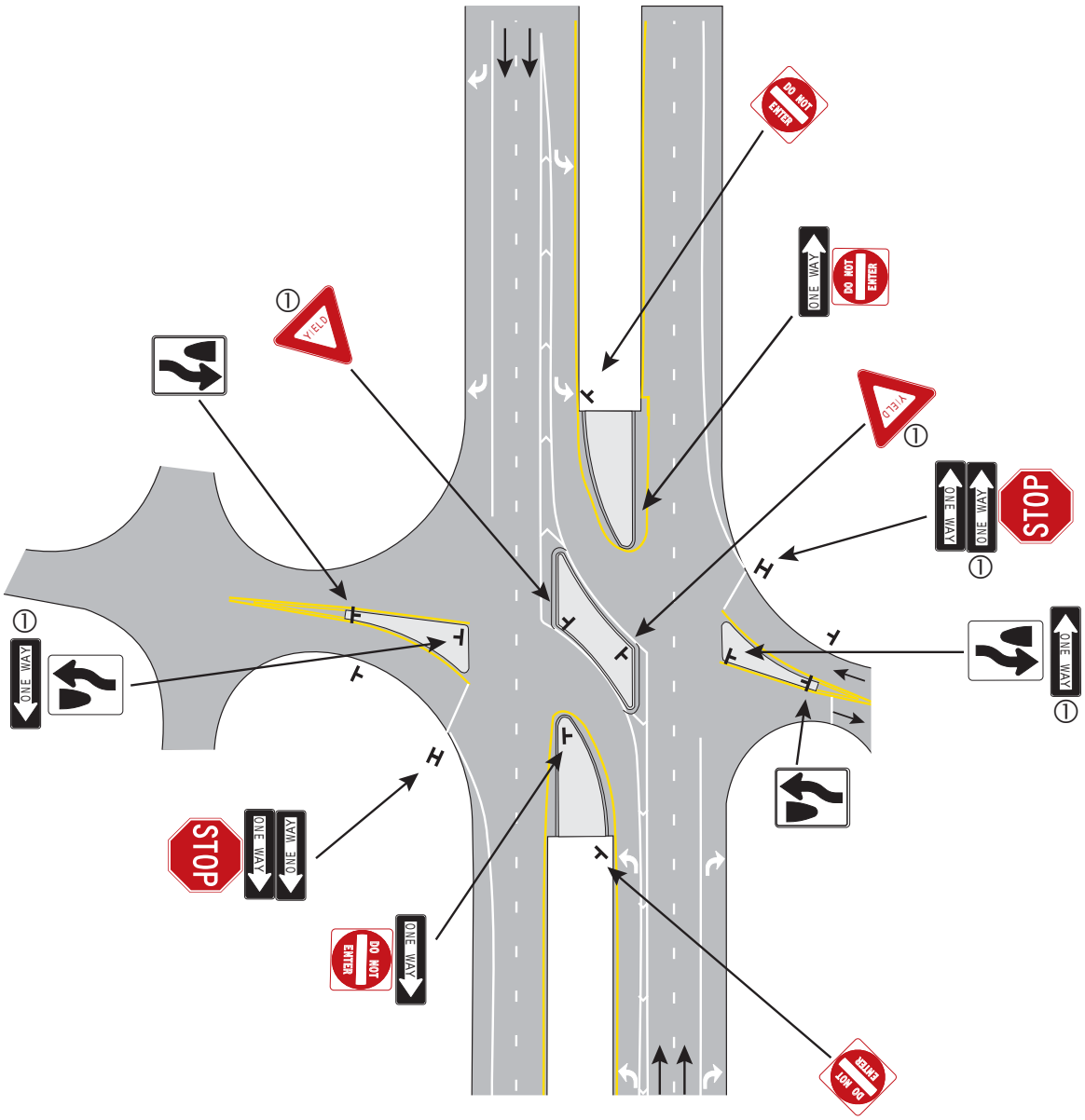
Text Ref.: 6-5.02

November 2016	**REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTIONS WITH A ONE-WAY STREET/RAMP**	FIGURE **6.7**



Text Ref.: 6-5.02

May 2015	REGULATORY SIGNS RIGHT IN - RIGHT OUT INTERSECTIONS	FIGURE 6.10

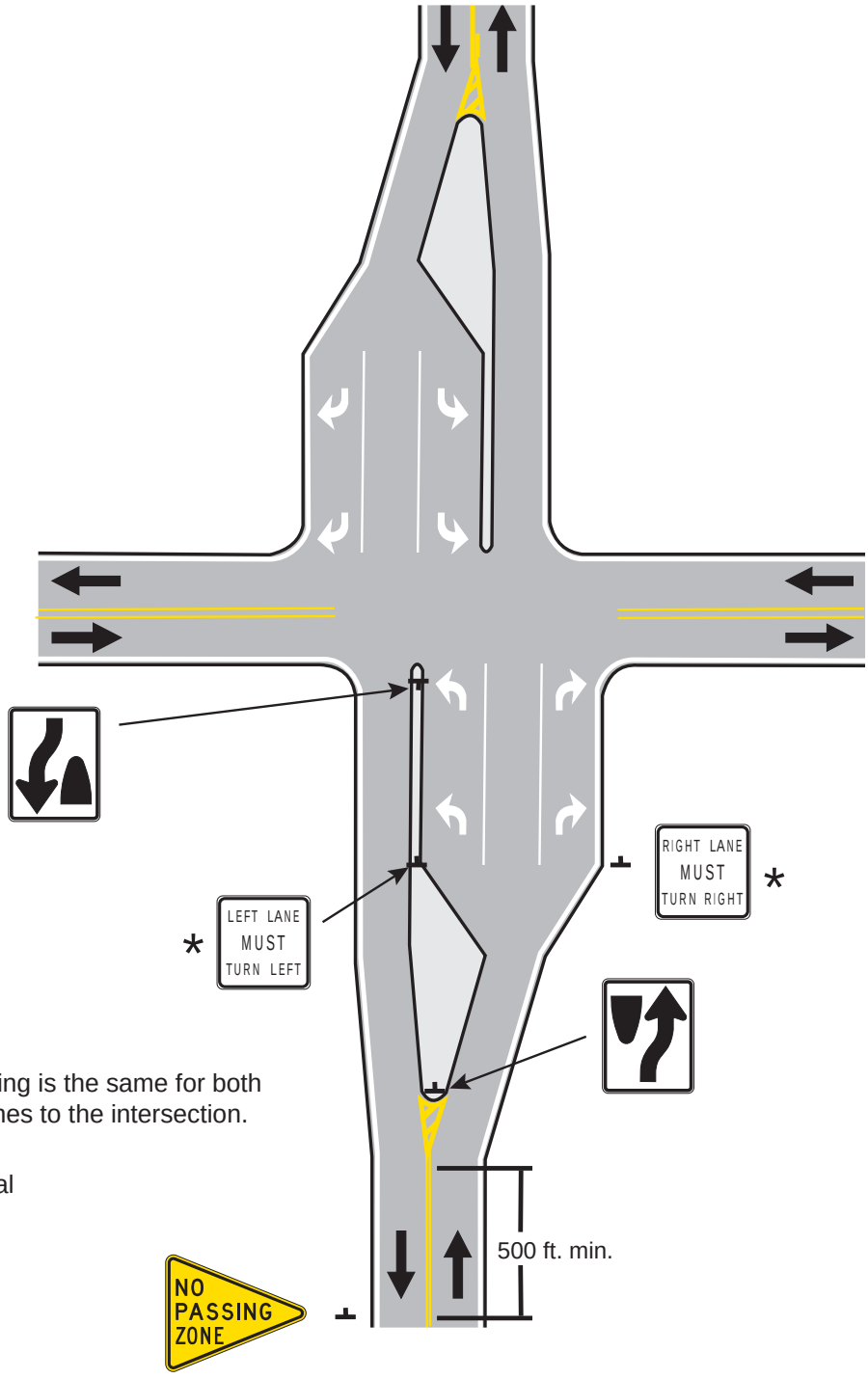


NOTE:

① Exercise engineering judgment in determining placement of ONE WAY signs. Field experience has shown that at most 3/4 intersections the ONE WAY signs placed on the near right and far left corners of the intersection can cause confusion to motorists from the approaching cross streets and the YIELD signs in the median are angled in such a way that placing ONE WAY signs above them is not feasible. Instead of placing the ONE WAY signs on the near right, consideration could be given to installing that sign in the far right corner (mounted above the KEEP RIGHT) as shown in the above figure.

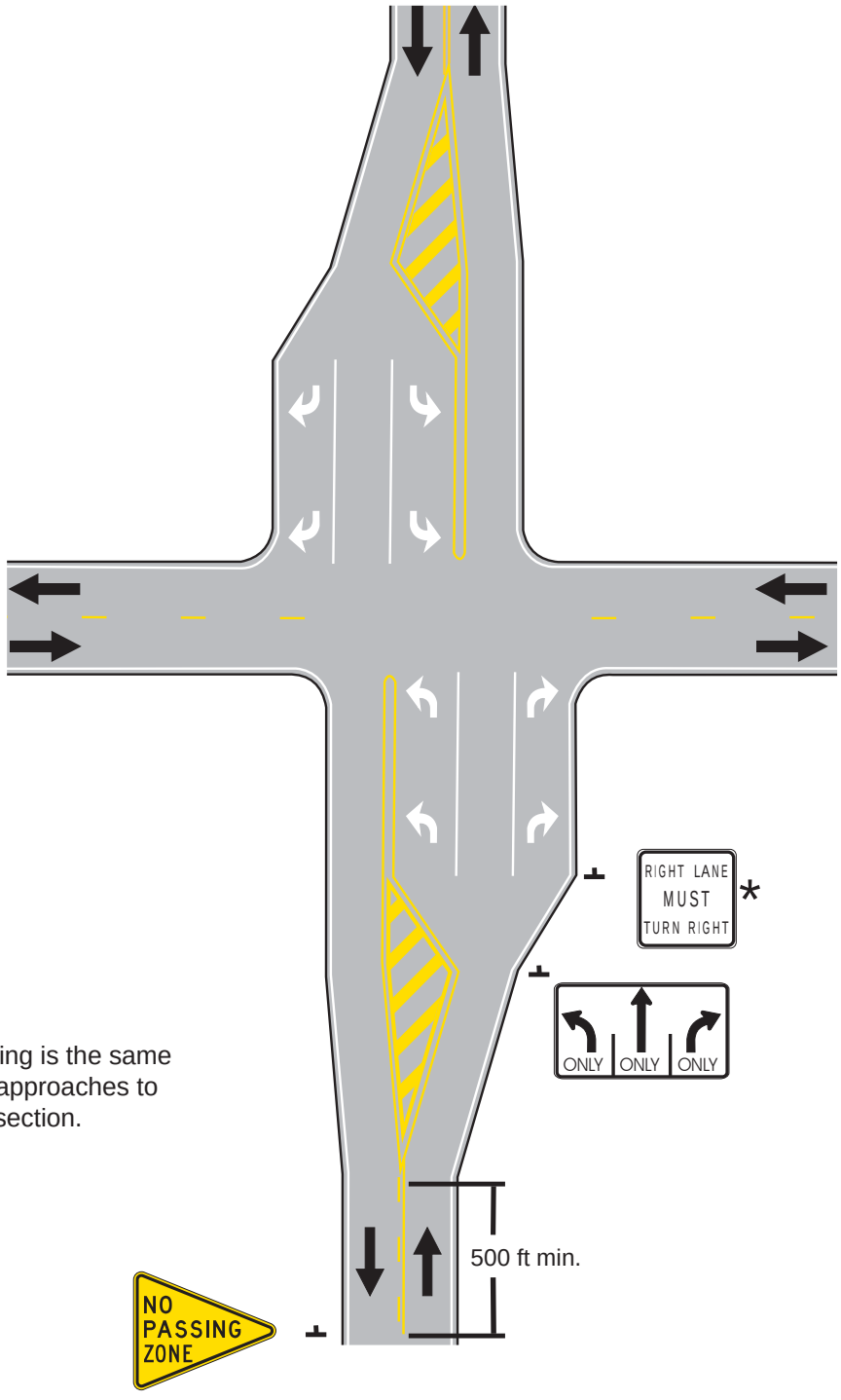
Text Ref.: 6-5.02

May 2015	¾ ACCESS INTERSECTION SIGNING	FIGURE 6.11



Text Ref.: 6-6.07

May 2015	CHANNELIZED INTERSECTION SIGNING RAISED MEDIAN	FIGURE 6.19A

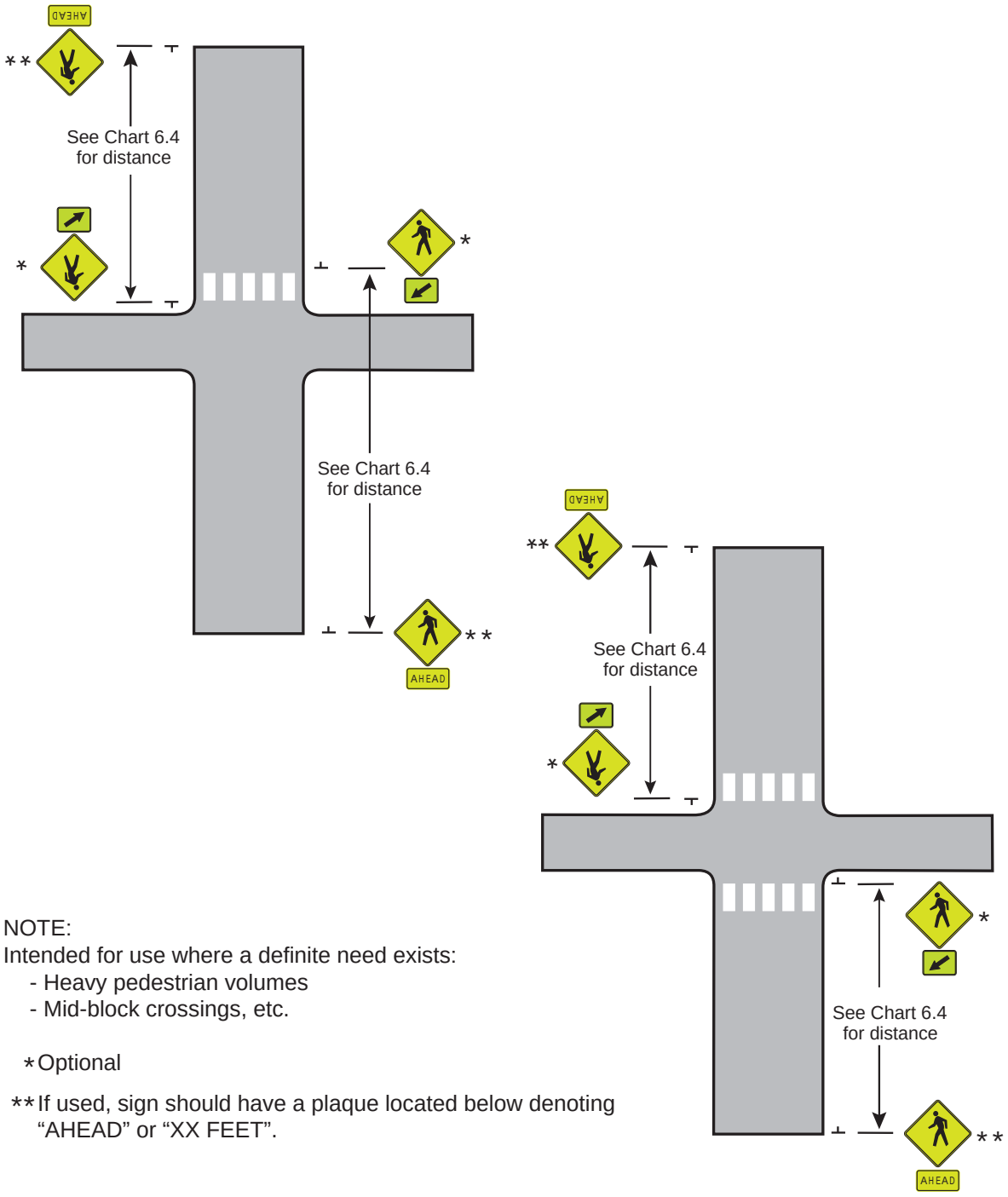


NOTE:
The signing is the same for both approaches to the intersection.

* Optional

Text Ref.: 6-6.07

May 2015	CHANNELIZED INTERSECTION SIGNING PAINTED MEDIAN	FIGURE 6.19B



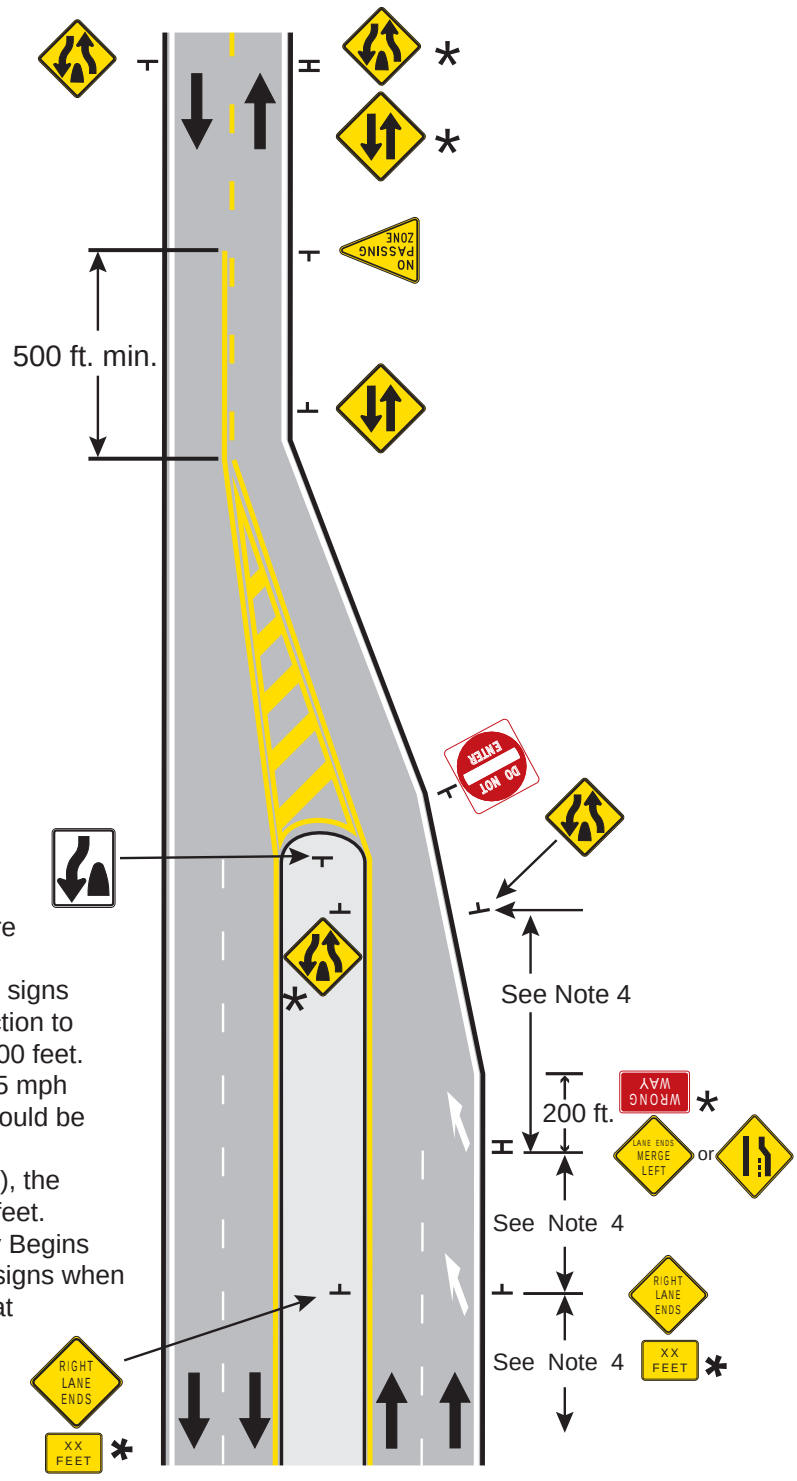
NOTE:
Intended for use where a definite need exists:
- Heavy pedestrian volumes
- Mid-block crossings, etc.

*Optional

**If used, sign should have a plaque located below denoting "AHEAD" or "XX FEET".

Text Ref.: 6-6.09.01

May 2015	PEDESTRIAN CROSSING SIGNING AT UNCONTROLLED LOCATIONS	FIGURE 6.20



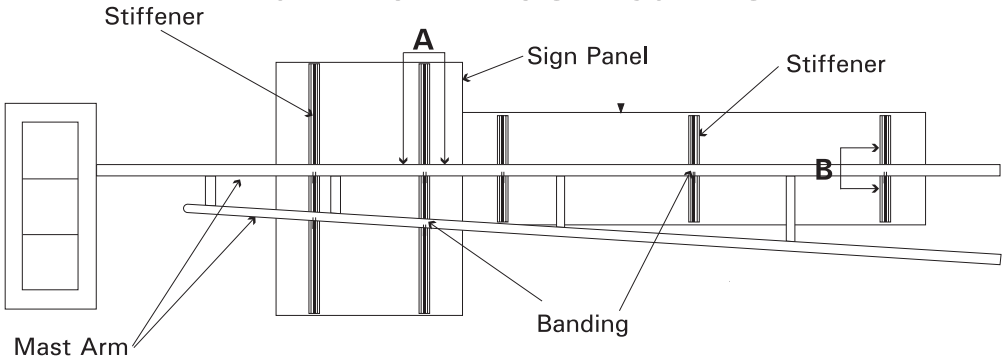
NOTES:
1. All sign location distances are approximate.
2. Distances between advance signs in the two-lane, two-way section to the painted gore are 500-1200 feet.
3. On high-speed roadways (45 mph and greater), the spacing should be 400-500 feet. On low speed roadways (less than 45 mph), the spacing should be 200-400 feet.
4. Do not use Divided Highway Begins and Divided Highway Ends signs when the highway is divided only at intersections or junctions.

* Optional

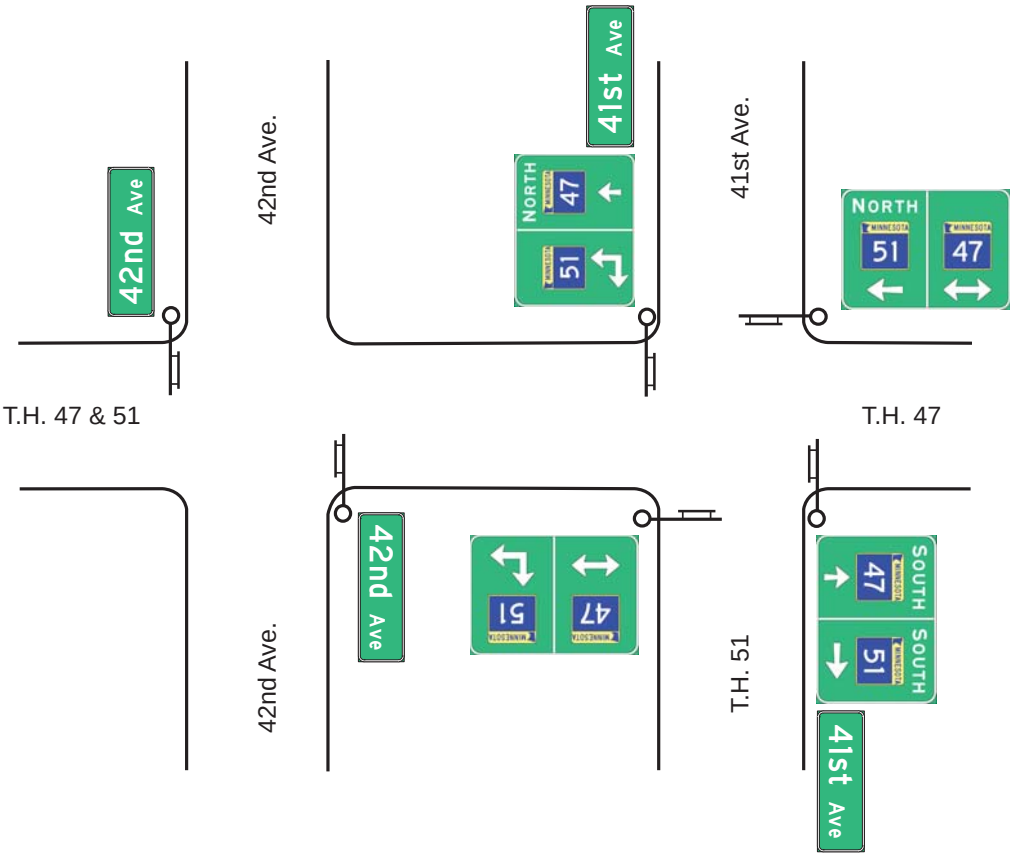
Text Ref.: 6-6.20

May 2015	TRANSITION SIGNING DIVIDED AND UNDIVIDED ROADWAYS	FIGURE 6.22

TYPICAL MAST ARM SIGN MOUNTING

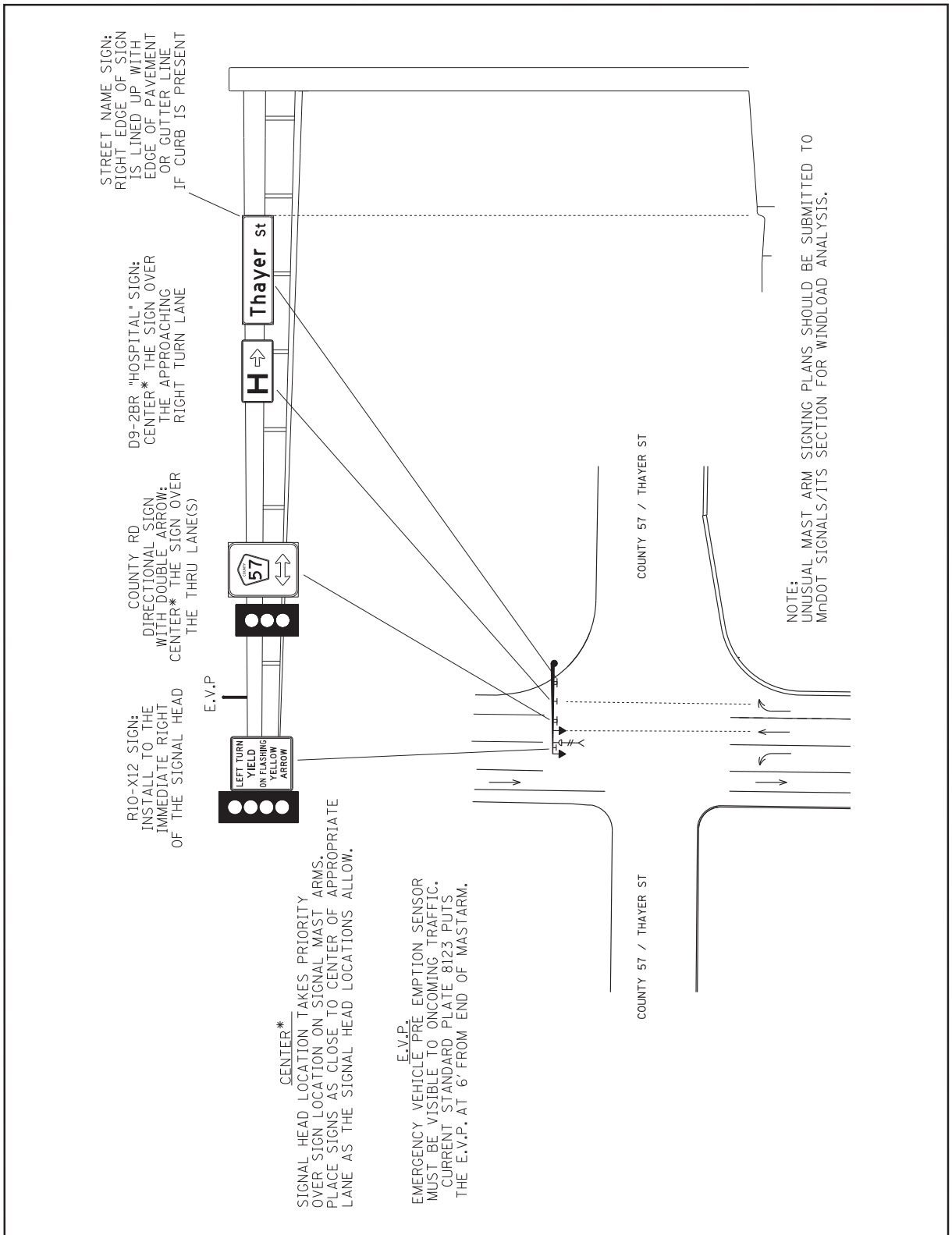


See MnDOT Standard Signs and Markings Manual, Standard Sign Details, page 105A , STRUCTURAL DETAILS FOR SIGNAL MAST ARM MOUNTED SIGNS.

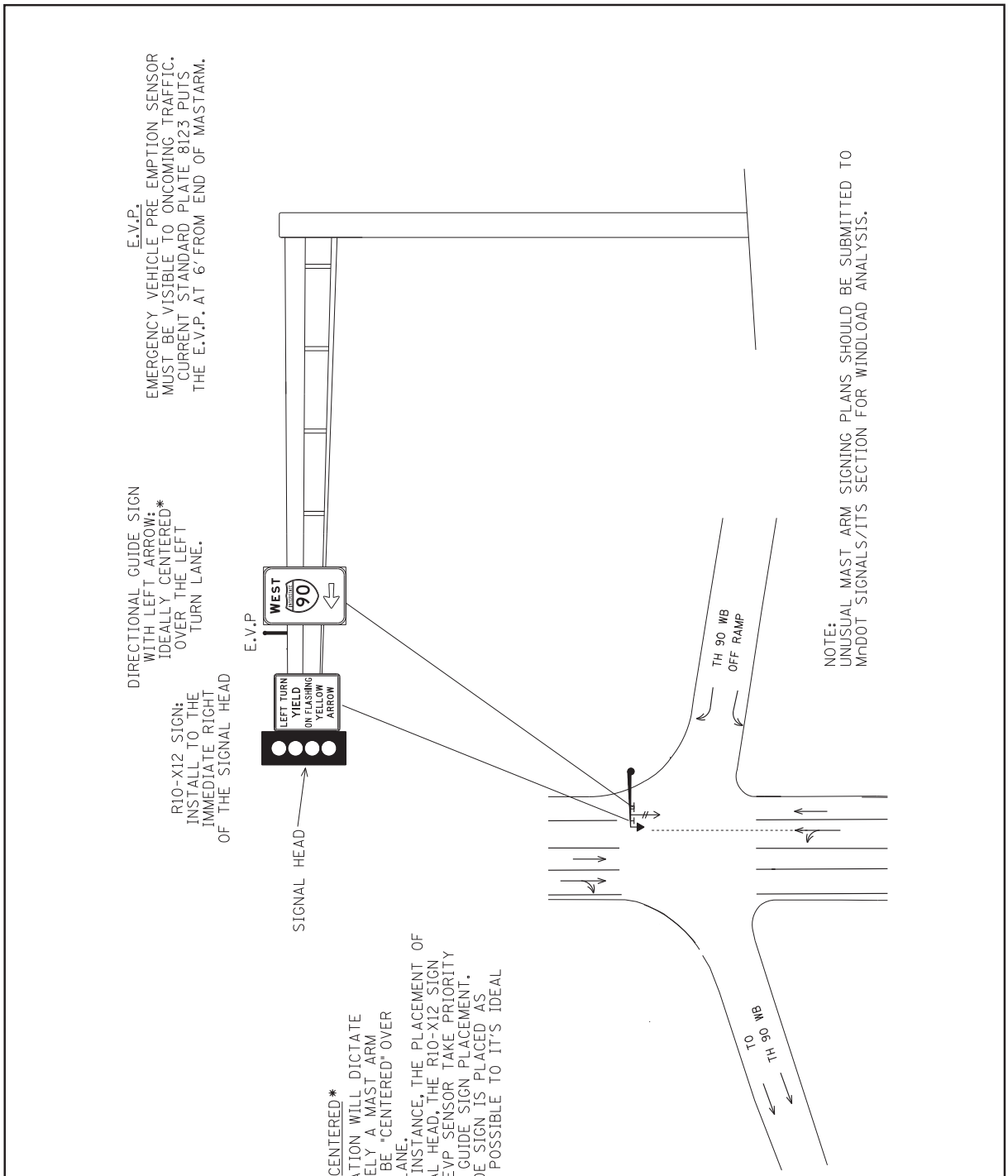


Text Ref.: 6-4.04

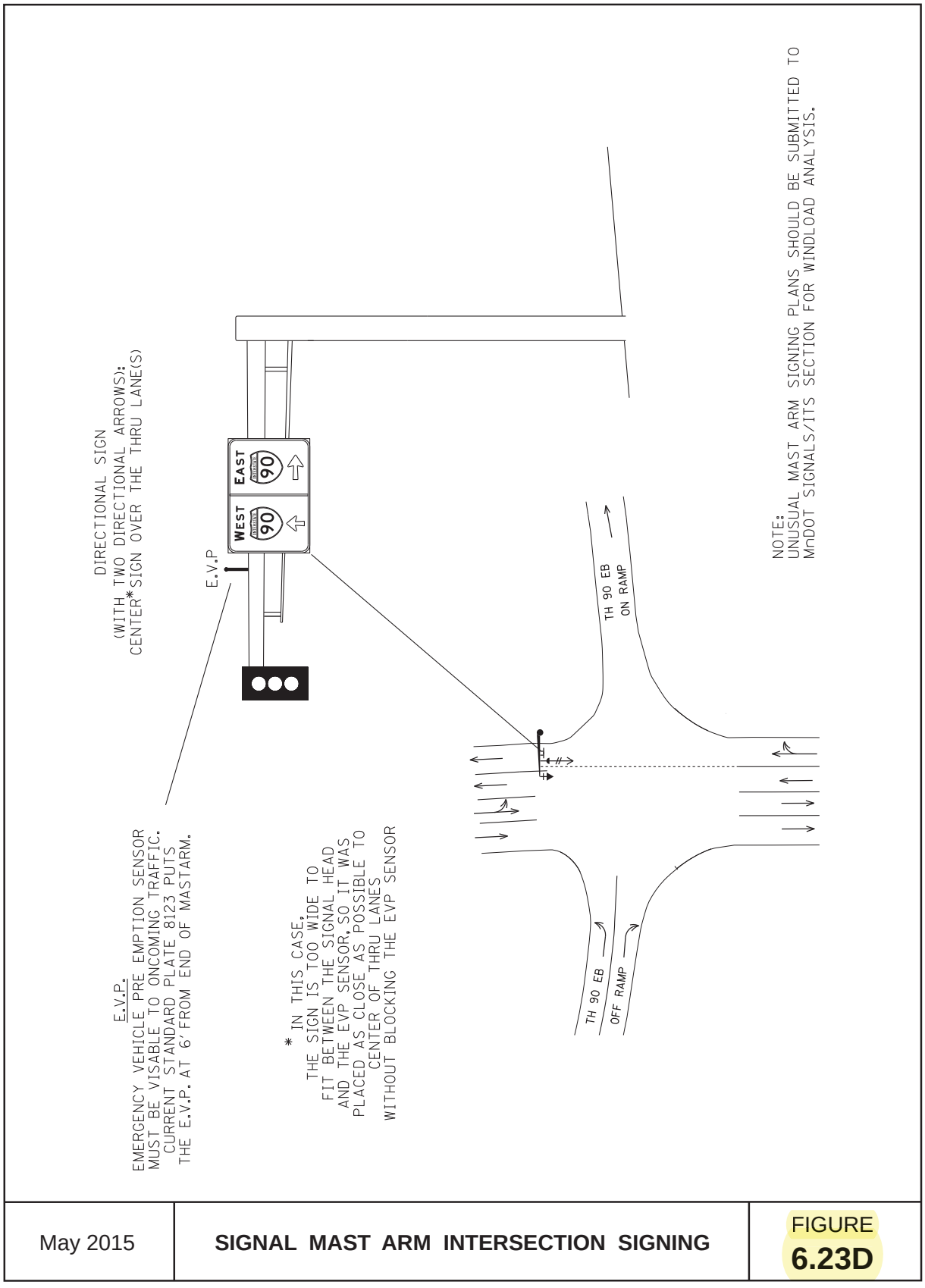
May 2015	SIGNAL MAST ARM INTERSECTION SIGNING	FIGURE 6.23A



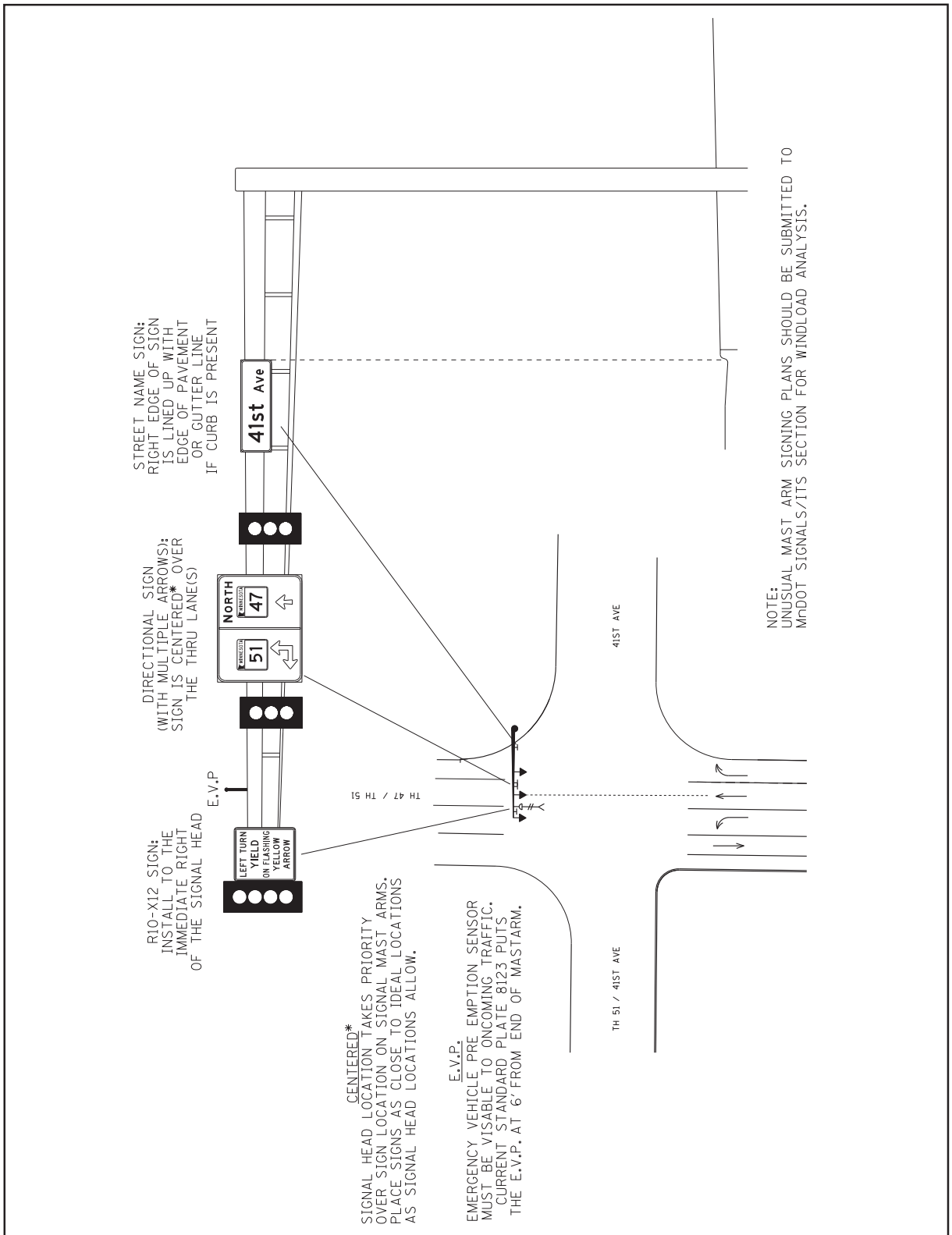
May 2015	SIGNAL MAST ARM INTERSECTION SIGNING	FIGURE 6.23B



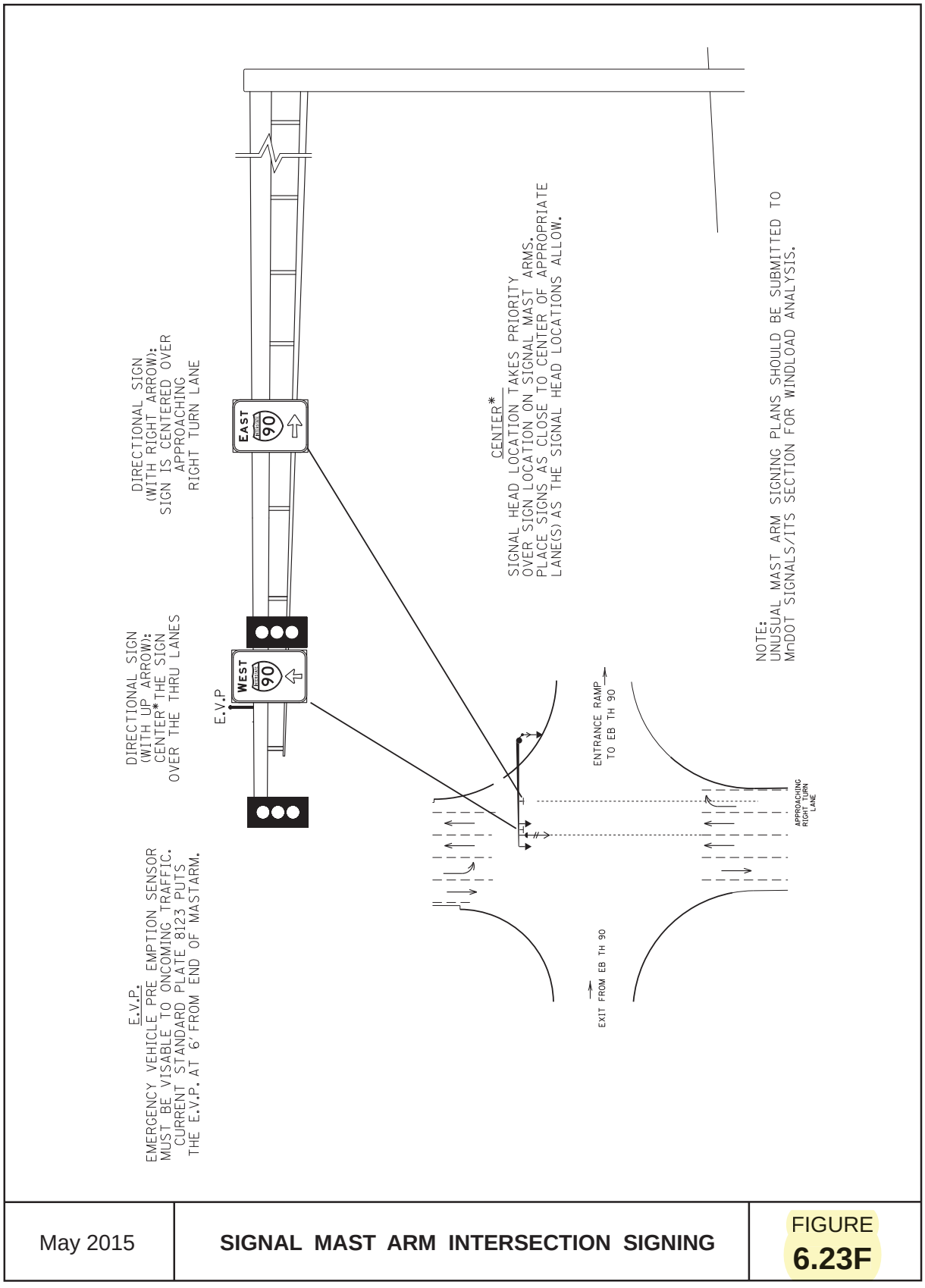
May 2015	SIGNAL MAST ARM INTERSECTION SIGNING	FIGURE 6.23C



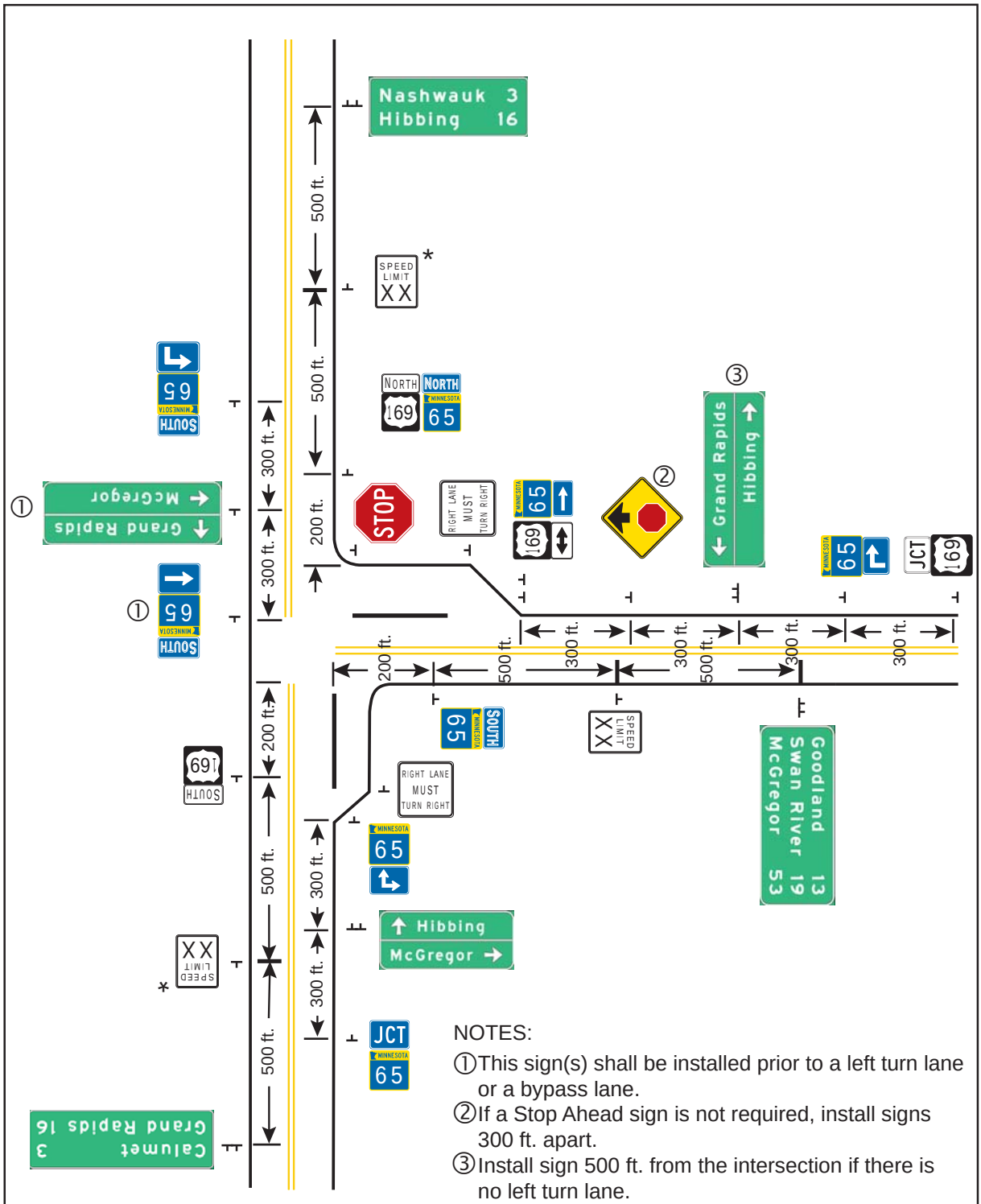
May 2015	**SIGNAL MAST ARM INTERSECTION SIGNING**	FIGURE **6.23D**



May 2015	SIGNAL MAST ARM INTERSECTION SIGNING	FIGURE 6.23E



May 2015	SIGNAL MAST ARM INTERSECTION SIGNING	FIGURE 6.23F



NOTES:

①This sign(s) shall be installed prior to a left turn lane or a bypass lane.

②If a Stop Ahead sign is not required, install signs 300 ft. apart.

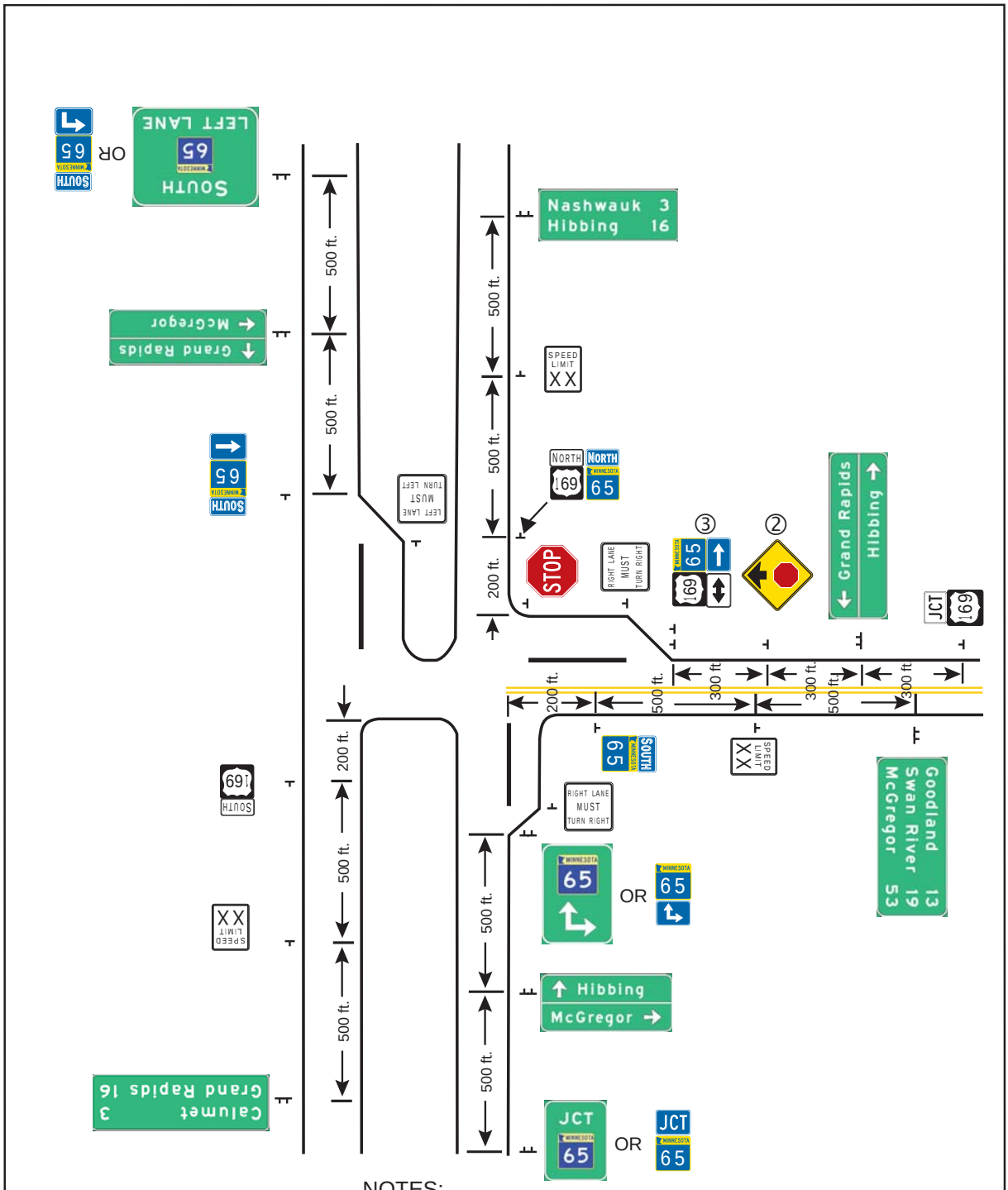
③Install sign 500 ft. from the intersection if there is no left turn lane.

∗ Optional

RECOMMENDED SPACING DISTANCES

Text Ref.: 6-4.08, 6-7.01, 6-7.04

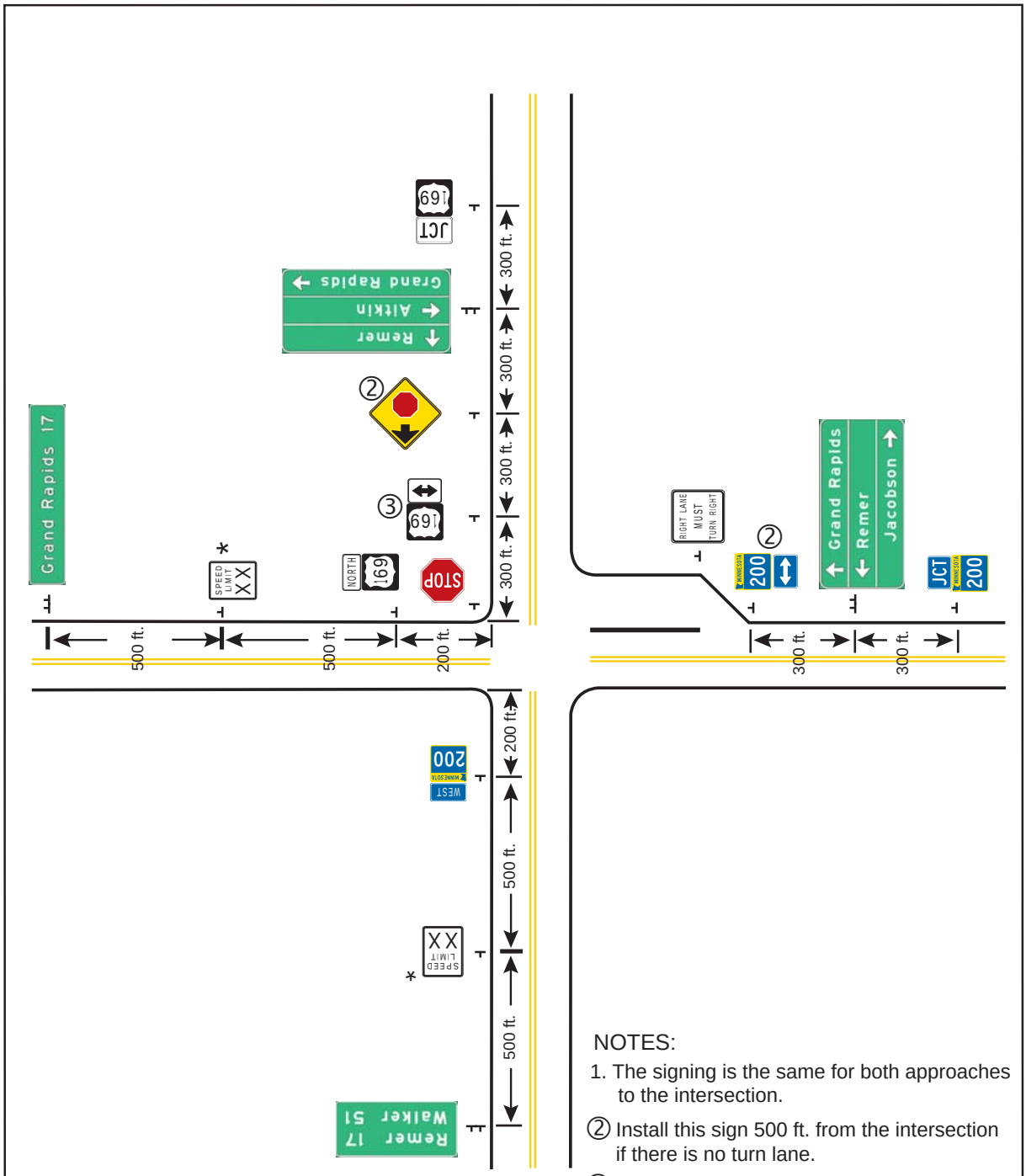
May 2015	**"T" INTERSECTION SIGNING (2-LANE, 2-WAY)**	FIGURE **6.24A**



NOTES:
1. See Figures 6.4 thru 6.9 for other regulatory signs.
② If Stop Ahead sign is not required, install signs 300 ft. apart.
③ If there is no turn lane, install these signs 500 ft. from the intersection.

Text Ref.: 6-4.08, 6-7.01, 6-7.04

May 2015	**RECOMMENDED SPACING DISTANCES "T" INTERSECTION SIGNING (DIVIDED HIGHWAY)**	FIGURE **6.24B**



NOTES:

1. The signing is the same for both approaches to the intersection.

② Install this sign 500 ft. from the intersection if there is no turn lane.

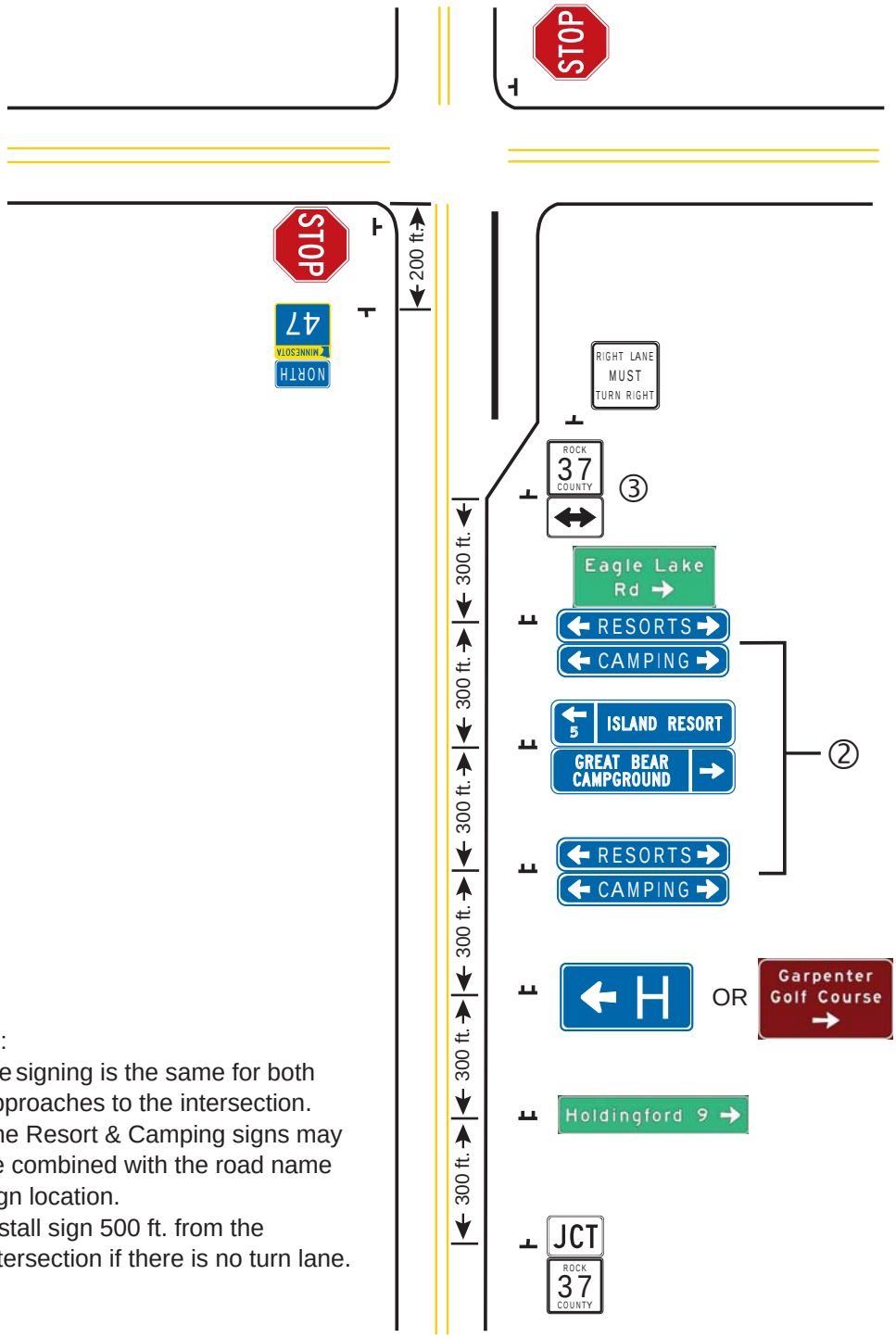
③ This sign shall be installed prior to the beginning of the taper if a right turn lane is present.

* Optional

RECOMMENDED SPACING DISTANCES

Text Ref.: 6-4.08, 6-7.01, 6-7.04

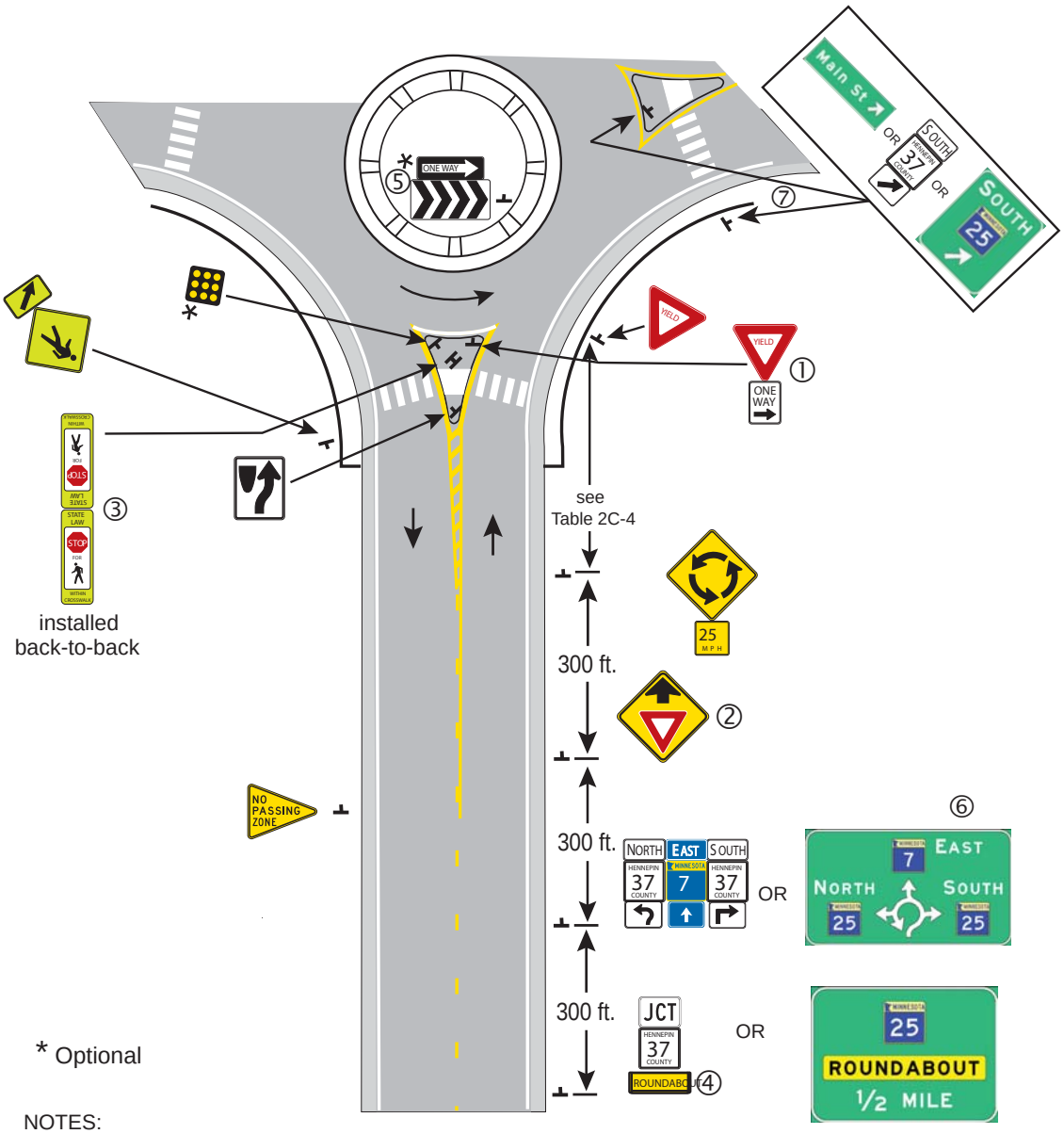
May 2015	**4-LEG INTERSECTION SIGNING**	FIGURE **6.25**



NOTES:
1. The signing is the same for both approaches to the intersection.
② The Resort & Camping signs may be combined with the road name sign location.
③ Install sign 500 ft. from the intersection if there is no turn lane.

Text Ref.: 6-4.08, 6-7.01, 6-7.04, 6-7.06.03, 6-7.09.02, Appendix A - Resorts

May 2015	**LOCAL ROAD/STREET INTERSECTION SIGNING**	FIGURE **6.26**

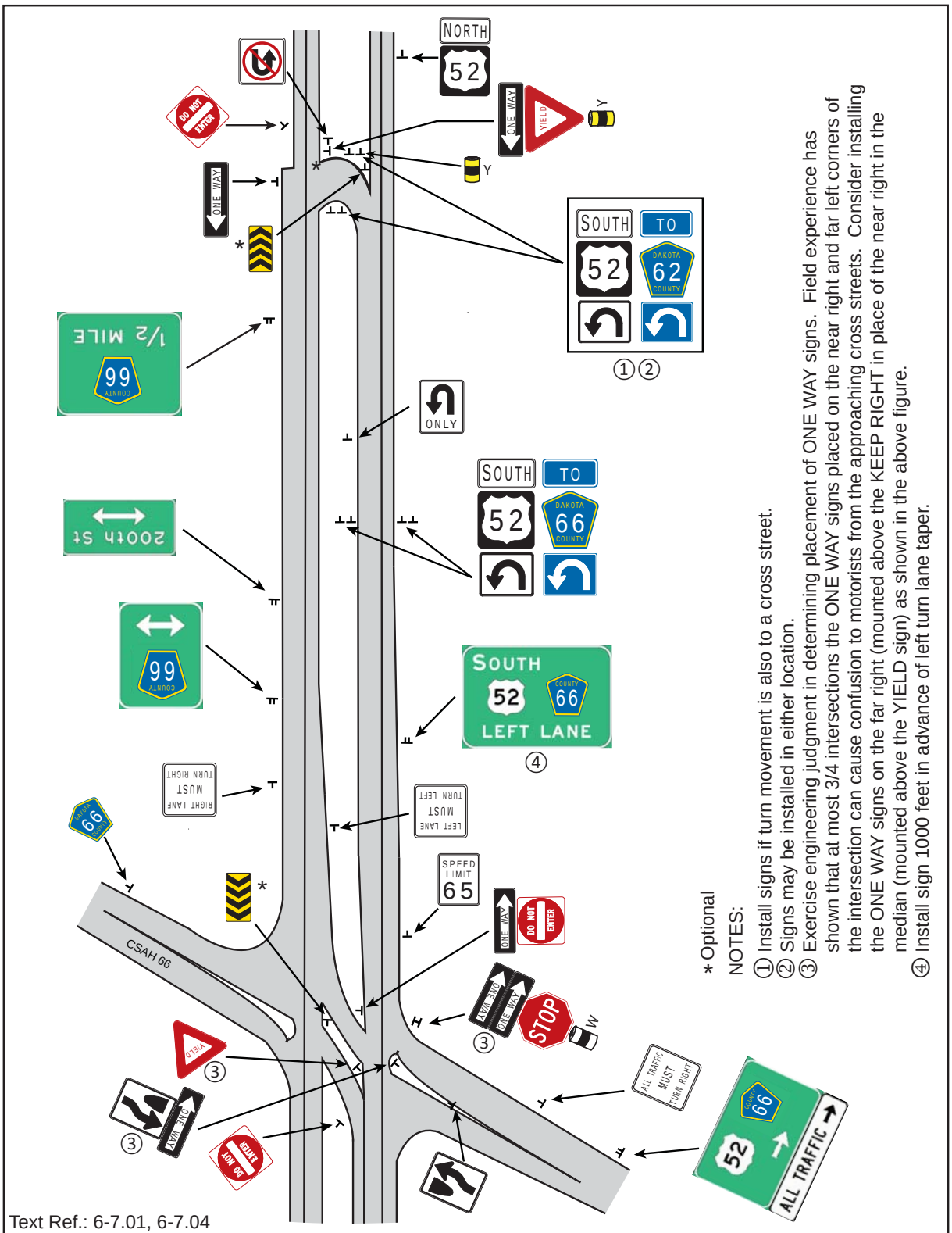


NOTES:

① Consider these factors for placement: visibility, skew, and geometrics.
② Optional where posted speed limit is ≤ 40 mph. See Chart 6.5 for sign placement distance.
③ If used, mounting height to be 1 foot.
④ If there is no junction route marker assembly, then install the roundabout plaque above the roundabout warning sign.
⑤ Use the R6-4B sign for speed zones ≥ 45 mph and/or multi-lane approaches.
Use the R6-4A sign for speed zones < 45 mph and single lane approaches.
⑥ Diagrammatic sign shall be installed for speed zones ≥ 55 mph. Signs may be installed at District Traffic Engineer's discretion for speed zones 40-50 mph.
⑦ Guide signs may be installed in either location.

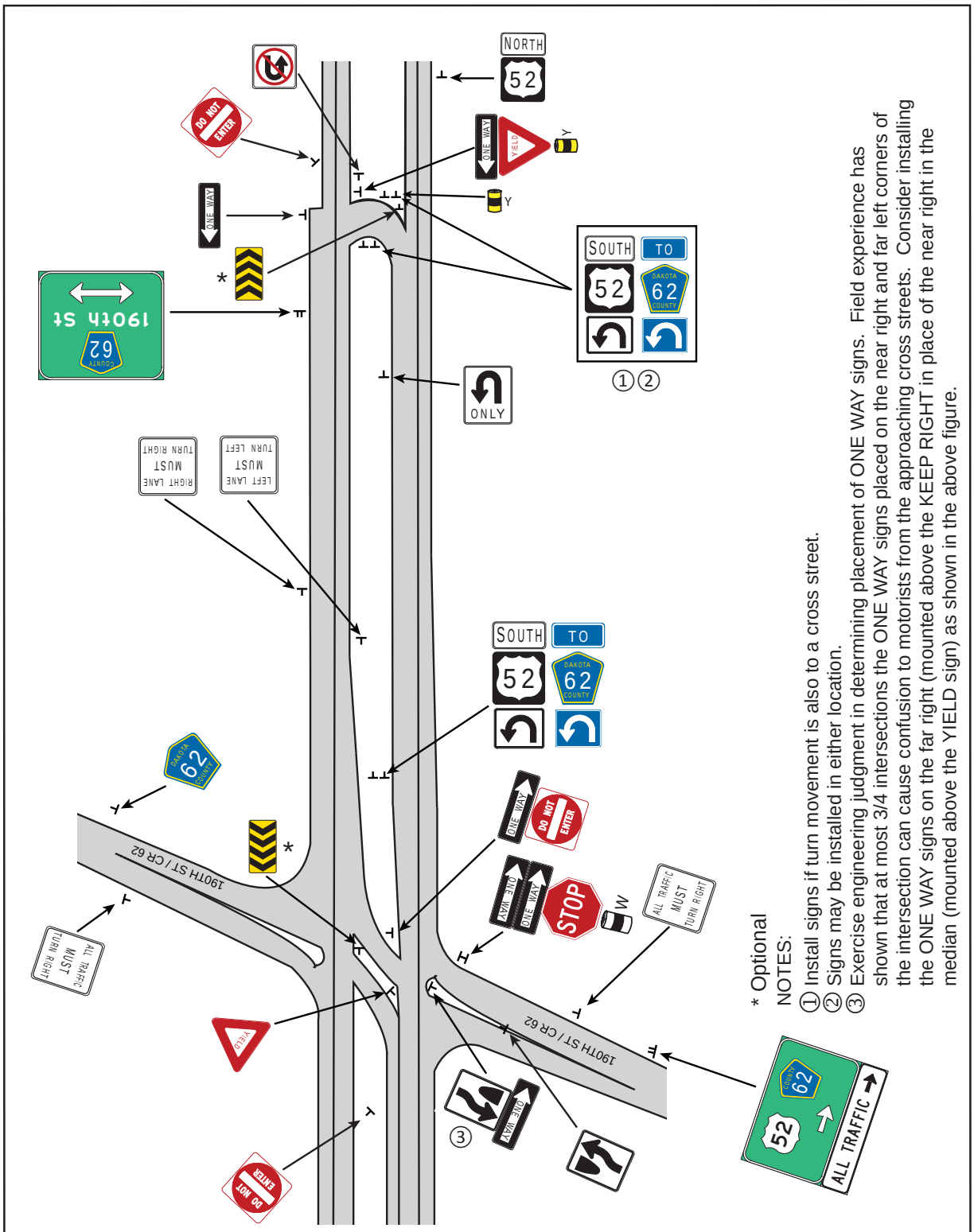
Text Ref.: 6-7.01, 6-7.04

May 2015	**SINGLE LANE ROUNDABOUT**	FIGURE **6.27**



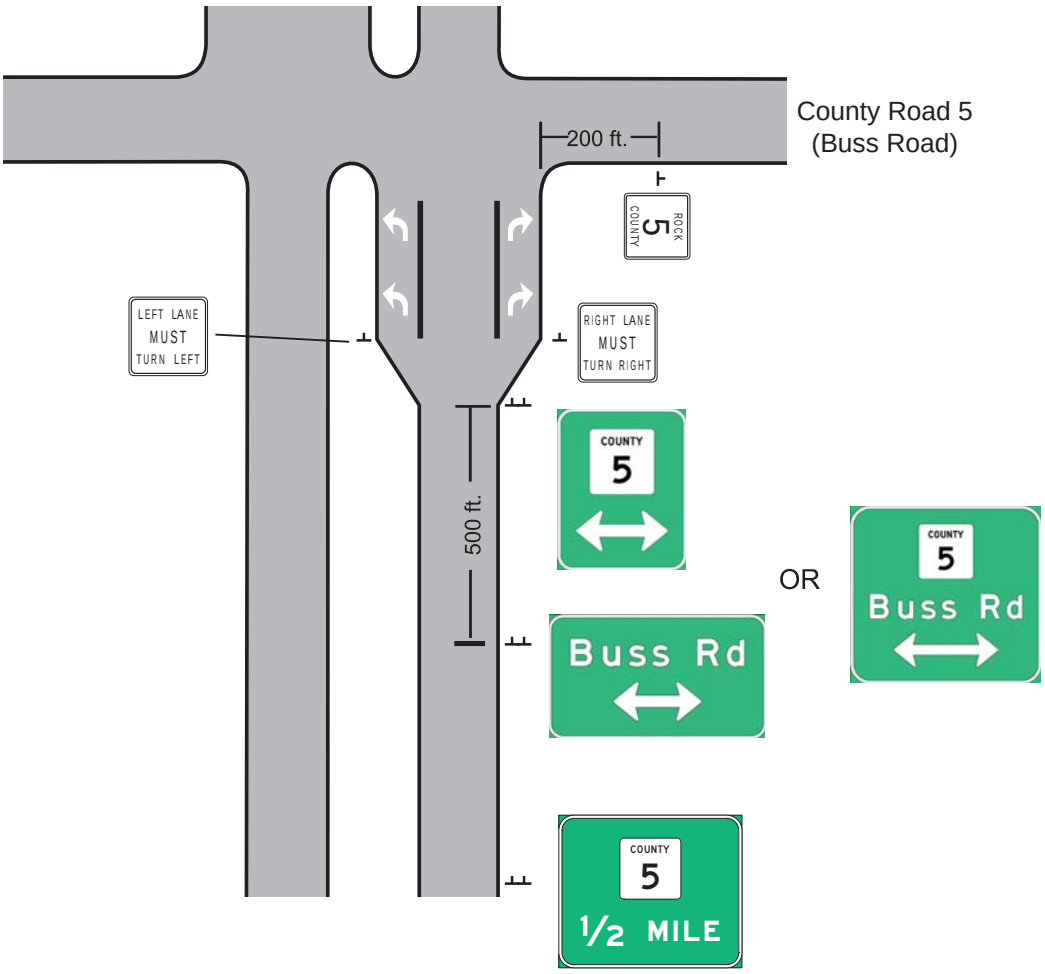
Text Ref.: 6-7.01, 6-7.04

March 2017	**REDUCED CONFLICT INTERSECTION > 1000 FT**	FIGURE **6.28A**



Text Ref.: 6-7.01, 6-7.04

March 2017	**REDUCED CONFLICT INTERSECTION < 1000 FEET**	FIGURE **6.28B**



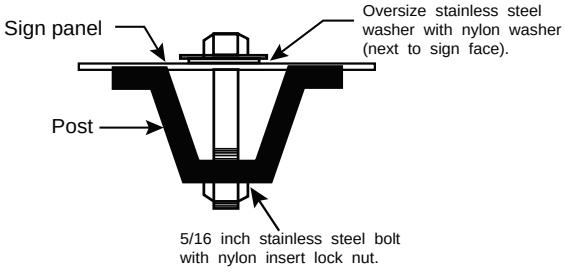
NOTE:
The signing is the same for both approaches to the intersection.

Text Ref.: 6-7.01, 6-7.04, 6-7.06.03

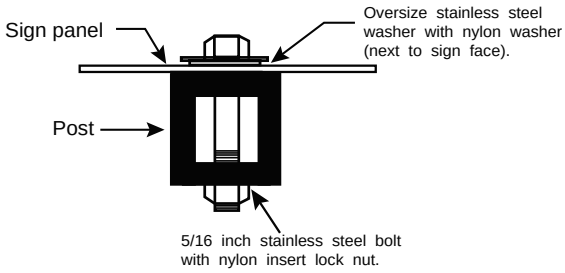
May 2015	NAMED COUNTY ROAD SIGNING ON AN EXPRESSWAY	FIGURE 6.29

TYPICAL MOUNTING

SIGN PANEL ATTACHMENT DETAIL



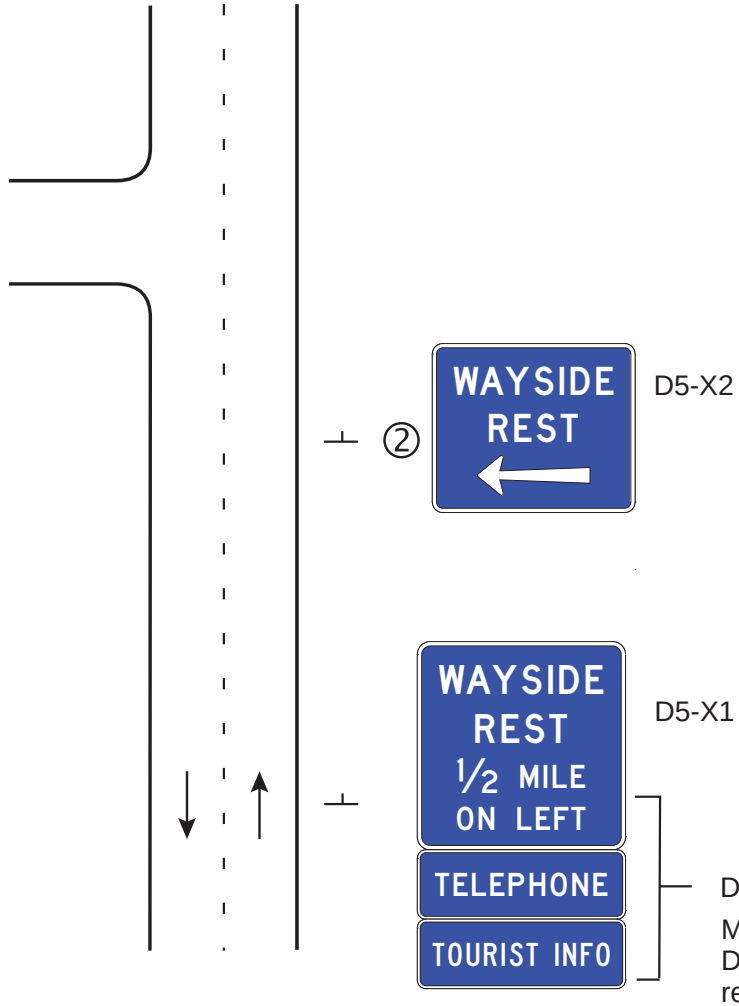
U-POST MOUNTING



SQUARE TUBE MOUNTING

Text Ref.: 6-7.07.02

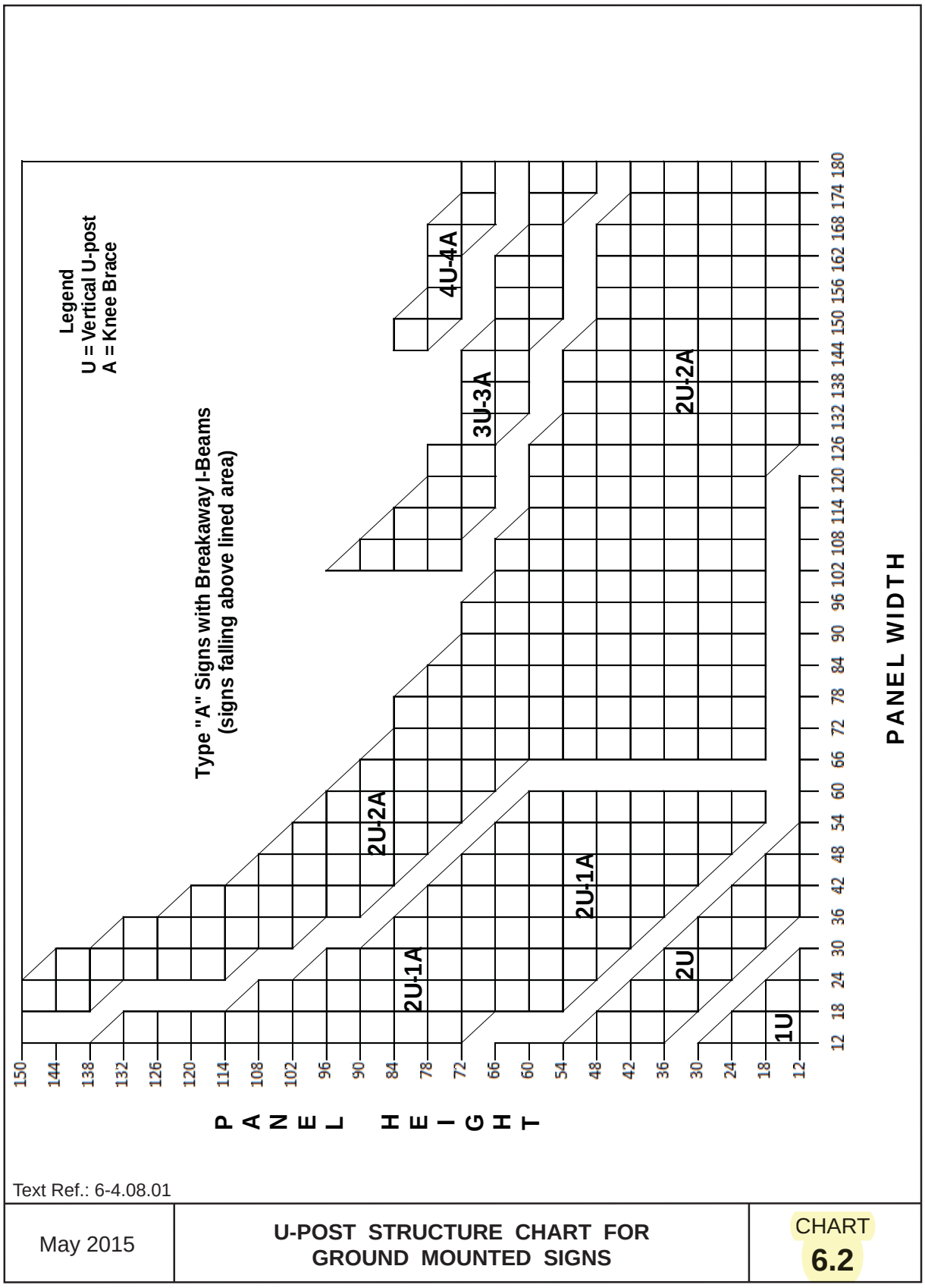
May 2015	COMMUNITY RECOGNITION SIGNING	FIGURE 6.35



NOTES:
1. The signing is the same for both approaches to the intersection.
② Install prior to the point of turn.

Text Ref.: 6-8.06.03

May 2015	**WAYSIDE REST SIGNING**	FIGURE **6.37**



Text Ref.: 6-4.08.01

May 2015	U-POST STRUCTURE CHART FOR GROUND MOUNTED SIGNS	CHART 6.2

PANEL WIDTH (inches)	POST SPACING		
	2 POSTS (inches)	3 POSTS (inches)	4 POSTS (inches)
36	24	---	---
42	30	---	---
48	30	---	---
54	30	---	---
60	36	---	---
66	42	---	---
72	42	---	---
78	54	---	---
84	54	---	---
90	54	---	---
96	54	---	---
102	60	45	---
108	66	45	---
114	66	45	---
120	72	45	---
126	78	45	---
132	78	45	---
138	78	48	---
144	90	51	45
150	90	54	45
156	90	54	45
162	96	57	48
168	96	60	48
174	102	63	54
180	108	63	54

Use this chart if punch codes cannot be found in the Standard Signs and Markings Manual.

Text Ref.: 6-4.08.01

May 2015	**TYPE D SIGN POST SPACING CHART**	CHART **6.3**

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 distance for an alignment warning symbol sign. For Condition A and B, warning signs with less than a 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.

May 2015	**WARNING SIGNS ADVANCE PLACEMENT CHART**	CHART **6.4**

5. MN MUTCD PART 2

5.1 MN MUTCD Part 2A Handout - General

The information on the following pages are a handout from the 2011 MN MUTCD, Chapter 2A through 2D. 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.

PART 2. SIGNS

Chapter 2A. General

TABLE OF CONTENTS

MN Rev. 1

FIGURES

Figure 2A-4 Relative Locations of Regulatory, Warning, and Guide Signs on an Intersection Approach

TABLES

2A.5 Classification of Signs

STANDARD:

Signs shall be defined by their function as follows:

A. Regulatory signs give notice of traffic laws or regulations.
B. Warning signs give notice of a situation that might not be readily apparent.
C. Guide signs show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information.

SUPPORT:

Object markers are defined in Section 2C.63.

2A.6 Design of Signs

SUPPORT:

This Manual shows many typical standard signs and object markers approved for use on streets, highways, bikeways, and pedestrian crossings.

In the specifications for individual signs and object markers, the general appearance of the legend, color, and size are shown in the accompanying tables and illustrations, and are not always detailed in the text.

Detailed drawings of standard signs, object markers, alphabets, symbols and arrows (see Figure 2D-2) are shown in the MnDOT "Standard Signs Manual" and the Federal "Standard Highway Signs and Markings" book. Section 1A.11 contains information regarding how to obtain these publications.

The basic requirements of a sign are that it be legible to those for whom it is intended and that it be understandable in time to permit a proper response. Desirable attributes include:

A. High visibility by day and night; and
B. High legibility (adequately sized letters, symbols, or arrows, and a short legend for quick comprehension by a road user approaching a sign).

Standardized colors and shapes are specified so that the several classes of traffic signs can be promptly recognized. Simplicity and uniformity in design, position, and application are important.

STANDARD:

The term legend shall include all word messages and symbol designs that are intended to convey specific meanings.

Uniformity in design shall include shape, color, dimensions, legends, borders, and illumination or retroreflectivity.

Standardization of these designs does not preclude further improvement by minor changes in the proportion or orientation of symbols, width of borders, or layout of word messages, but all shapes and colors shall be as indicated.

All symbols shall be unmistakably similar to or mirror images of the adopted symbol signs, all of which are shown in the the MnDOT Standard Signs Manual and the Federal "Standard Highway Signs" book (see Section 1A.11). Symbols and colors shall not be modified unless otherwise stated herein. All symbols and colors for signs not shown in the "Standard Highway Signs" book shall follow the procedures for experimentation and change described in Section 1A.10.

OPTION:

Although the standard design of symbol signs cannot be modified, the orientation of the symbol may be changed to better reflect the direction of travel, if appropriate.

STANDARD:

Where a standard word message is applicable, the wording shall be as herein provided in this Manual.

In situations where word messages are required other than those provided in this Manual, the signs shall be of the same shape and color as standard signs of the same functional type.

OPTION:

State and local highway agencies may develop special word message signs in situations where roadway conditions make it necessary to provide road users with additional regulatory, warning, or guidance information, such as when road users need to be notified of special regulations or warned about a situation that might not be readily apparent. Unlike colors that have not been assigned or symbols that have not been approved for signs, new word message signs may be used without the need for experimentation.

STANDARD:

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.

SUPPORT:

As a quick reference, common uses of sign colors are shown in Table 2A-5. Color schemes on specific signs are shown in the illustrations located in each appropriate Chapter.

Whenever white is specified in this Manual, the MnDOT "Standard Signs Manual", or in the Federal "Standard Highway Signs and Markings" book (see Section 1A.11) as a color, it is understood to include silver-colored retroreflective coatings or elements that reflect white light.

The colors coral and light blue are being reserved for uses that will be determined in the future by the Federal Highway Administration.

Information regarding color coding of destinations on guide signs, including community wayfinding signs, is contained in Chapter 2D.

OPTION:

The approved fluorescent version of the standard red, yellow, green, or orange color may be used as an alternative to the corresponding standard color.

2A.11 Dimensions

SUPPORT:

The MnDOT "Standard Signs Manual" and the Federal "Standard Highway Signs and Markings" book (see Section 1A.11) prescribe design details for up to five different sizes depending on the type of traffic facility, including bikeways. Smaller sizes are designed to be used on bikeways and some other off-road applications. Larger sizes are designed for use on freeways and expressways, and can also be used to enhance road user safety and convenience on other facilities, especially on multi-lane divided highways and on undivided highways having five or more lanes of traffic and/or high speeds. The intermediate sizes are designed to be used on other highway types.

STANDARD:

The standard sign dimensions prescribed in Appendix C of this Manual and in the Federal "Standard Highway Signs" book (see Section 1A.11) shall be used unless engineering judgment determines that other sizes are appropriate. Except as provided in the option below, where engineering judgment determines that sizes smaller than the prescribed dimensions are appropriate for use, the sign dimensions shall not be less than the minimum dimensions specified in Appendix C of this Manual. The sizes shown in the Minimum columns that are smaller than the sizes shown in the Conventional Road columns in the various sign size tables in this Manual shall only be used on low-speed roadways, alleys, and private roads open to public travel where the reduced legend size would be adequate for the regulation or warning or where physical conditions preclude the use of larger sizes.

OPTION:

For alleys with restrictive physical conditions and vehicle usage that limits installation of the minimum size sign (or the Conventional Road size sign if no Minimum size is shown), both the sign height and the sign width may be decreased by up to 6 inches.

GUIDANCE:

The sizes shown in the Freeway and Expressway columns in the various sign size tables in this Manual should be used on freeways and expressways, and for other higher-speed applications based upon engineering judgment, to provide larger signs for increased visibility and recognition.

The sizes shown in the Oversized columns in the various sign size tables in this Manual size should be used for those special applications where speed, volume, or other factors result in conditions where increased emphasis, improved recognition, or increased legibility is needed, as determined by engineering judgment or study.

Increases above the prescribed sizes should be used where greater legibility or emphasis is needed. If signs larger than the prescribed sizes are used, the overall sign dimensions should be increased in 6-inch increments.

STANDARD:

Where engineering judgment determines that sizes that are different than the prescribed dimensions are appropriate for use, standard shapes and colors shall be used and standard proportions shall be retained as much as practical.

GUIDANCE:

When supplemental plaques are installed with larger sized signs, a corresponding increase in the size of the plaque and its legend should also be made. The resulting plaque size should be approximately in the same relative proportion to the larger sized sign as the conventional sized plaque is to the conventional sized sign.

2A.12 Symbols

STANDARD:

Symbol designs shall in all cases be unmistakably similar to those shown in this Manual, the MnDOT "Standard Signs Manual", and the Federal "Standard Highway Signs and Markings" book (see Section 1A.11).

New symbol designs shall be submitted to the Federal Highway Administration for adoption based on research evaluations to determine road user comprehension, sign conspicuity, and sign legibility.

SUPPORT:

Sometimes a change from word messages to symbols requires significant time for public education and transition. Therefore, this Manual sometimes includes the practice of using educational plaques to accompany new symbol signs.

GUIDANCE:

New warning or regulatory symbol signs not readily recognizable by the public should be accompanied by an educational plaque.

OPTION:

Educational plaques may be left in place as long as they are in serviceable condition.

State and/or local highway agencies may conduct research studies to determine road user comprehension, sign conspicuity, and sign legibility.

GUIDANCE:

Although most standard symbols are oriented facing left, mirror images of these symbols should be used where the reverse orientation might better convey to road users a direction of movement.

STANDARD:

A symbol used for a given category of signs (regulatory, warning, or guide) shall not be used for a different category of signs, except as specifically authorized in this Manual.

Except as provided in the following option, a recreational and cultural interest area symbol (see Chapter 2M) shall not be used on streets or highways outside of recreational and cultural interest areas.

A recreational and cultural interest area guide sign symbol (see Chapter 2M) shall not be used on any regulatory or warning sign on any street, road, or highway.

OPTION:

A recreational and cultural interest area guide sign symbol (see Section 2M.04) may be used on a highway guide sign outside of a recreational and cultural interest area to supplement a comparable word message for which there is no approved symbol for that message in Chapters 2B through 2I or 2N.

SUPPORT:

Section 2M.07 contains provisions for the use of recreational and cultural interest area symbols to indicate prohibited activities or items in non-road applications.

2A.13 Word Messages

STANDARD:

Except as provided in Section 2A.6, all word messages shall use standard wording and letters as shown in this Manual, the MnDOT "Standard Signs Manual", and the Federal "Standard Highway Signs and Markings" book (see Section 1A.11).

GUIDANCE:

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

Abbreviations (see Section 1A.15) should be kept to a minimum.

Word messages should not contain periods, apostrophes, question marks, or other punctuation or characters that are not letters, numerals, or hyphens unless necessary to avoid confusion.

The solidus (slanted line or forward slash) is intended to be used for fractions only and should not be used to separate words on the same line of legend. Instead, a hyphen should be used for this purpose, such as "TRUCKS - BUSES."

STANDARD:

Fractions shall be displayed with the numerator and denominator diagonally arranged about the solidus (slanted line or forward slash). The overall height of the fraction is measured from the top of the numerator to the bottom of the denominator, each of which is vertically aligned with the upper and lower ends of the solidus. The overall height of the fraction shall be determined by the height of the numerals within the fraction, and shall be 1.5 times the height of an individual numeral within the fraction.

SUPPORT:

The MnDOT "Standard Signs Manual" and the Federal "Standard Highway Signs and Markings" book (see Section 1A.11) contain details regarding the layouts of fractions on signs.

GUIDANCE:

When initials are used to represent an abbreviation for separate words (such as "U S" for a United States route), the initials should be separated by a space of between 1/2 and 3/4 of the letter height of the initials.

When an Interstate route is displayed in text form instead of using the route shield, a hyphen should be used for clarity, such as "I-50."

STANDARD:

All sign lettering shall be in upper-case letters as provided in the MnDOT "Standard Signs Manual" and the Federal "Standard Highway Signs and Markings" book (see Section 1A.11)), unless otherwise provided in this Manual for a particular sign or type of message.

The sign lettering for names of places, streets, and highways shall be composed of a combination of lower-case letters with initial upper-case letters.

SUPPORT:

Letter height is expressed in terms of the height of an upper-case letter. For mixed-case legends (those composed of an initial upper-case letter followed by lower-case letters), the height of the lower-case letters is derived from the specified height of the initial upper-case letter based on a prescribed ratio. Letter heights for mixed-case legends might be expressed in terms of both the upper- and lower-case letters, or in terms of the initial upper-case letter alone. When the height of a lower-case letter is specified or determined from the prescribed ratio, the reference is to the nominal loop height of the letter. The term loop height refers to the portion of a lower-case letter that excludes any ascending or descending stems or tails of the letter, such as with the letters "d" or "q." The nominal loop height is equal to the actual height of a non-rounded lower-case letter whose form does not include ascending or descending stems or tails, such as the letter "x." The rounded portions of a lower-case letter extend slightly above and below the baselines projected from the top and bottom of such a non-rounded letter so that the appearance of a uniform letter height within a word is achieved. The actual loop height of a rounded lower-case letter is slightly greater than the nominal loop height and this additional height is excluded from the expression of the lower-case letter height.

STANDARD:

When a mixed-case legend is used, the height of the lower-case letters shall be 3/4 of the height of the initial upper-case letter.

The unique letter forms for each of the Standard Alphabet series shall not be stretched, compressed, warped, or otherwise manipulated.

SUPPORT:

Section 2D.4 contains information regarding the acceptable methods of modifying the length of a word for a given letter height and series.

2A.14 Sign Borders

STANDARD:

Unless otherwise provided, each sign illustrated in this Manual shall have a border of the same color as the legend, at or just inside the edge.

The corners of the sign shall be rounded, except for STOP signs.

GUIDANCE:

A dark border on a light background should be set in from the edge, while a light border on a dark background should extend to the edge of the sign. A border for 30-inch signs with a light background should be from 1/2 to 3/4 inch in width, 1/2 inch from the edge. For similar signs with a light border, a width of 1 inch should be used. For other sizes, the border width should be of similar proportions, but should not exceed the stroke-width of the major lettering of the sign. On signs exceeding 72 x 120 inches in size, the border should be 2 inches wide, or on larger signs, 3 inches wide. Except for STOP signs and as otherwise provided in Section 2E.16, the corners of the sign should be rounded to a radius that is concentric with that of the border.

2A.15 Enhanced Conspicuity for Standard Signs

OPTION:

Based upon engineering judgment, where the improvement of the conspicuity of a standard regulatory, warning, or guide sign is desired, any of the following methods may be used, as appropriate, to enhance the sign's conspicuity (see Figure 2A-1):

A. Increasing the size of a standard regulatory, warning, or guide sign.
B. Doubling-up of a standard regulatory, warning, or guide sign by adding a second identical sign on the left-hand side of the roadway.
C. Adding a solid yellow or fluorescent yellow rectangular "header panel" above a standard regulatory sign, with the width of the panel corresponding to the width of the standard regulatory sign. A legend of "NOTICE," "STATE LAW," or other appropriate text may be added in black letters within the header panel for a period of time determined by engineering judgment.

2A.16 Standardization of Location

SUPPORT:

Standardization of position cannot always be attained in practice. Examples of heights and lateral locations of signs for typical installations are illustrated in Figure 2A-2, and examples of locations for some typical signs at intersections are illustrated in Figures 2A-3 and 2A-4.

Examples of advance signing on an intersection approach are illustrated in Figure 2A-4. Chapters 2B, 2C, and 2D contain provisions regarding the application of regulatory, warning, and guide signs, respectively.

STANDARD:

Signs requiring separate decisions by the road user shall be spaced sufficiently far apart for the appropriate decisions to be made. One of the factors considered when determining the appropriate spacing shall be the posted or 85th-percentile speed

GUIDANCE:

Signs should be located on the right-hand side of the roadway where they are easily recognized and understood by road users. Signs in other locations should be considered only as supplementary to signs in the normal locations, except as otherwise provided in this Manual.

Signs should be individually installed on separate posts or mountings except where:

A. One sign supplements another;
B. Route or directional signs are grouped to clarify information to motorists;
C. Regulatory signs that do not conflict with each other are grouped, such as turn prohibition signs posted with one way signs or a parking regulation sign posted with a speed limit sign; or
D. Street name signs are posted with a stop or yield sign.

Signs should be located so that they:

A. Are outside the clear zone unless placed on a breakaway or yielding support (see Section 2A.19),
B. Optimize nighttime visibility,
C. Minimize the effects of mud splatter and debris,
D. Do not obscure each other,
E. Do not obscure the sight distance to approaching vehicles on the major street for drivers who are stopped on minor-street approaches, and
F. Are not hidden from view.

SUPPORT:

The clear zone is the total roadside border area, starting at the edge of the traveled way, available for use by errant vehicles. The width of the clear zone is dependent upon traffic volumes, speeds, and roadside geometry. Additional information can be found in the "AASHTO Roadside Design Guide" (see Section 1A.11).

GUIDANCE:

With the increase in traffic volumes and the desire to provide road users regulatory, warning, and guidance information, an order of priority for sign installation should be established.

SUPPORT:

An order of priority is especially critical where space is limited for sign installation and there is a demand for several different types of signs. Overloading road users with too much information is not desirable.

GUIDANCE:

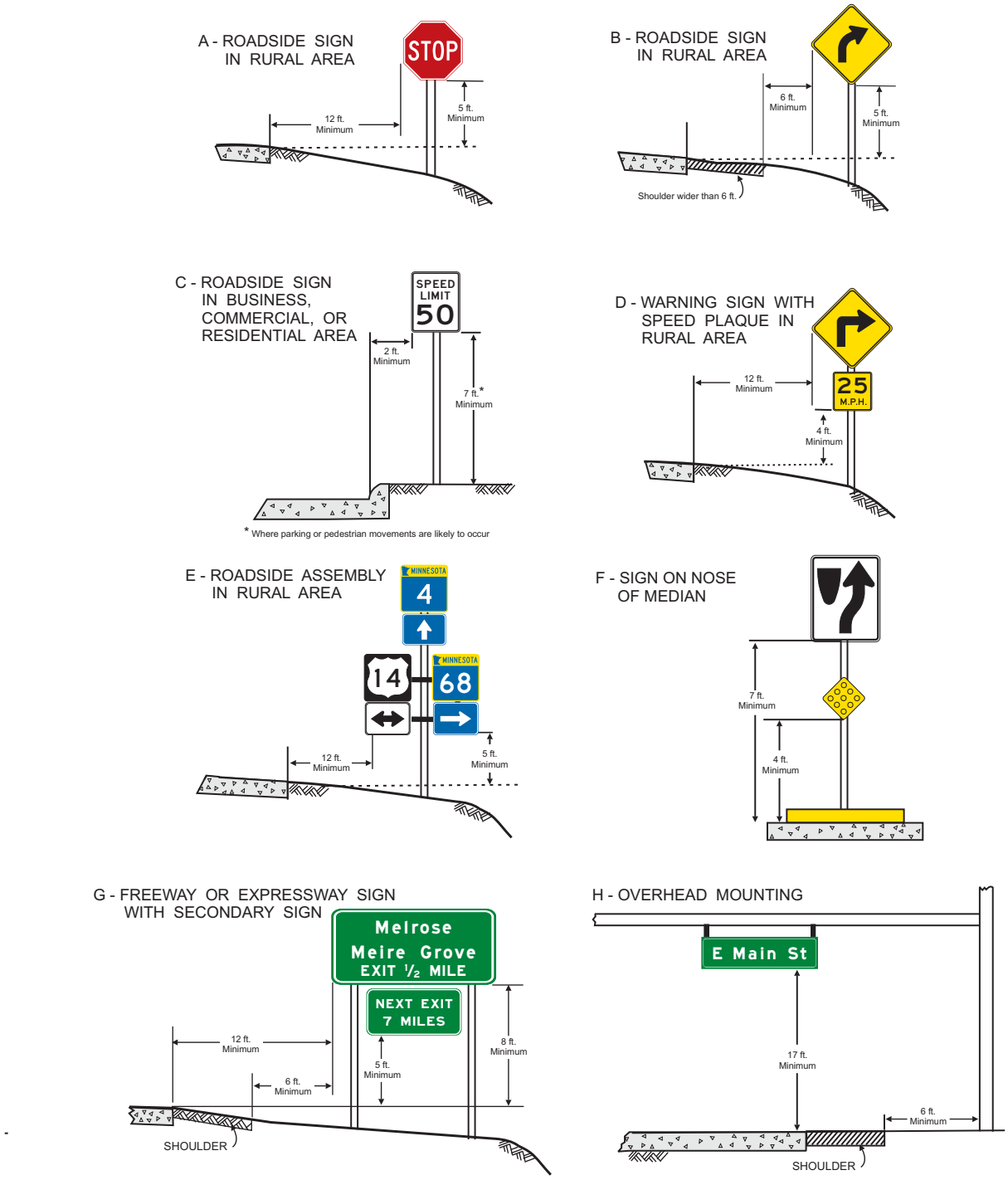
Because regulatory and warning information is more critical to the road user than guidance information, regulatory and warning signing whose location is critical should be displayed rather than guide signing in cases where conflicts occur. Community wayfinding and acknowledgment guide signs should have a lower priority as to placement than other guide signs. Information of a less critical nature should be moved to less critical locations or omitted.

OPTION:

Under some circumstances, such as on curves to the right, signs may be placed on median islands or on the left-hand side of the road. A supplementary sign located on the left-hand side of the roadway may be used on a multi-lane road where traffic in a lane to the right might obstruct the view to the right.

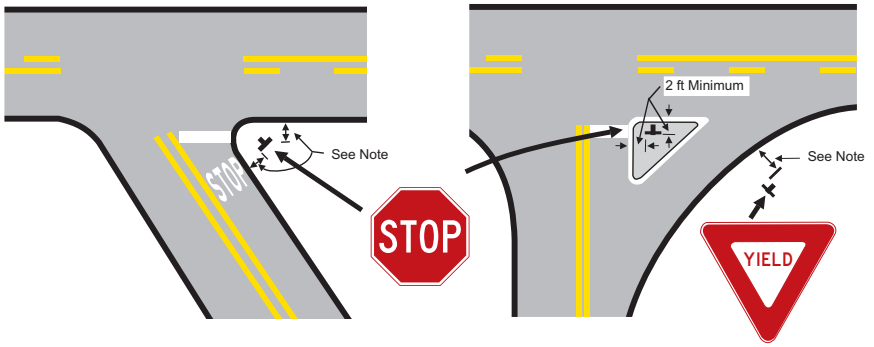
At wide-throat intersections with corner radii over 40 feet, a STOP sign may be placed up to 50 feet from the major roadway. Consider increasing the size of the STOP sign and adding a stop bar closer to the major roadway.

When the corner radii exceeds 90 feet, consider redesigning the intersection in order to provide a free right turn lane and a raised island (see Figure 2A.2) with the STOP sign installed on the island.



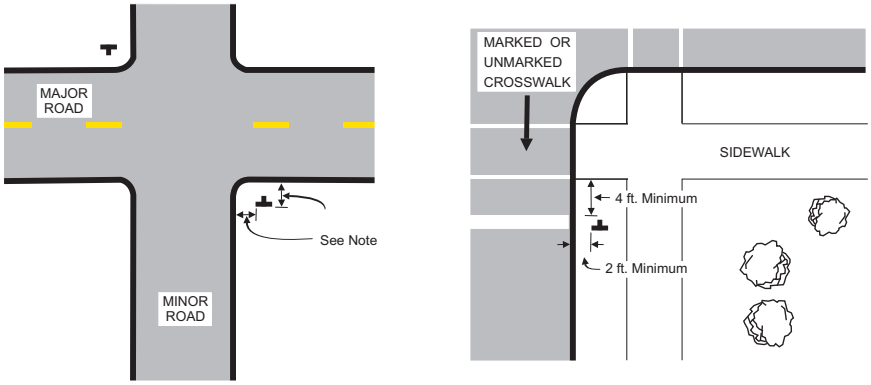
Note:
See Section 2A.19 for reduced lateral offset distances that may be used in areas where lateral offsets are limited, and in business, commercial, or residential areas where sidewalk width is limited or where existing poles are close to the curb.

Figure 2A-2 Examples of Heights and Lateral Locations of Sign Installations



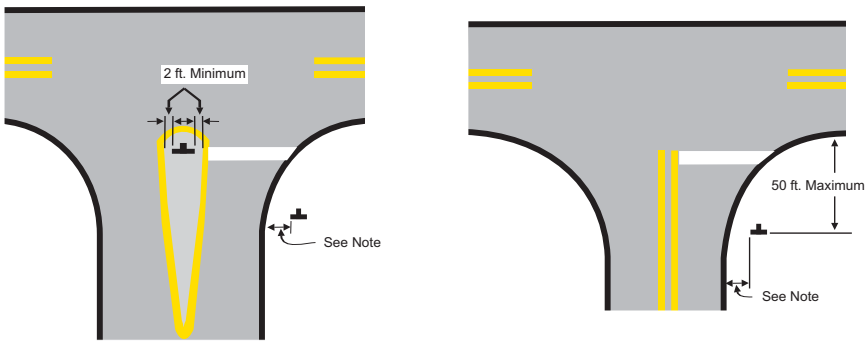
A - ACUTE ANGLE INTERSECTION

B - CHANNELIZED INTERSECTION



C - MINOR CROSSROAD

D - URBAN INTERSECTION

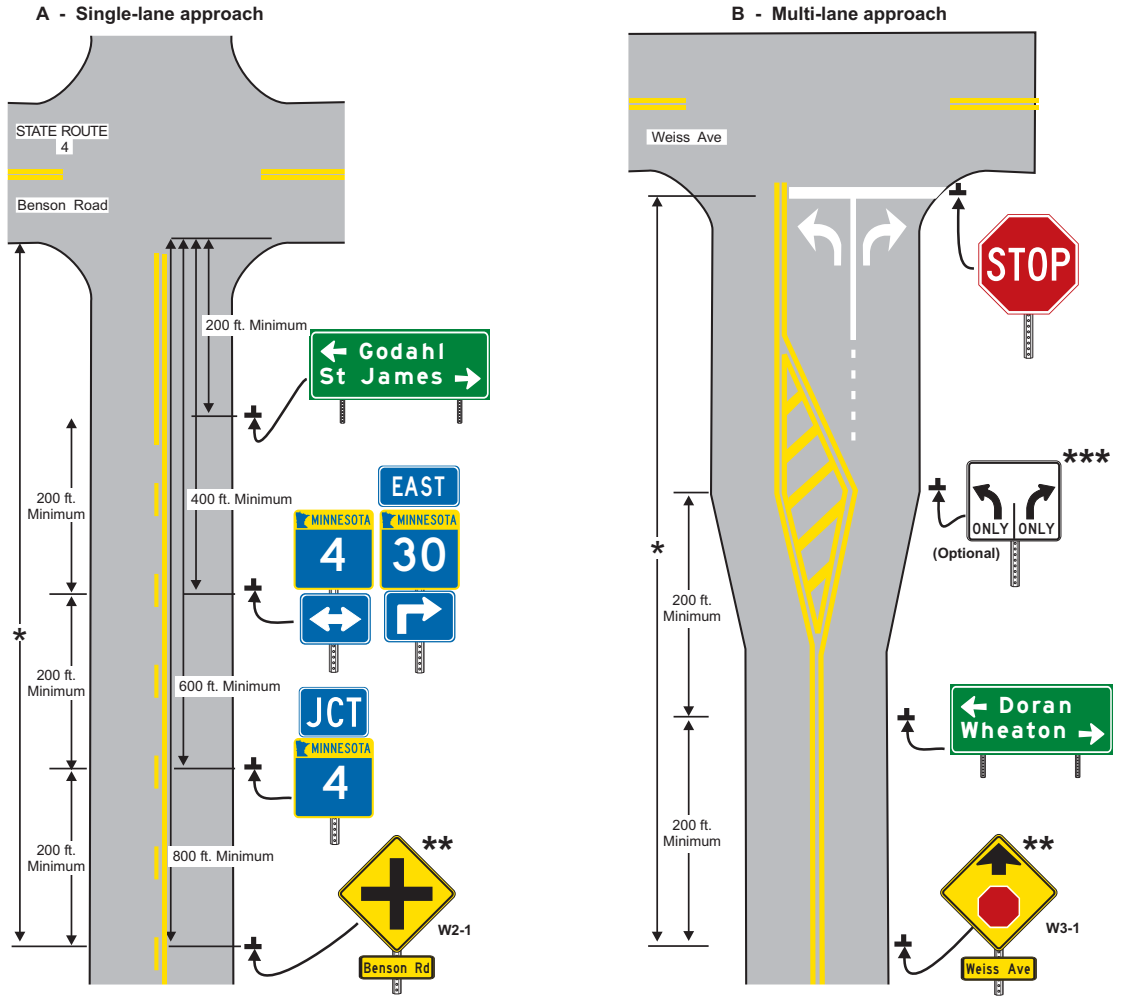


E - DIVISIONAL ISLAND

F - WIDE THROAT INTERSECTION

Note: Lateral offset is a minimum of 6 feet measured from the edge of the shoulder, or 12 feet measured from the edge of the traveled way. See Section 2A.19 for lower minimums that may be used in urban areas, or where lateral offset space is limited.

Figure 2A-3 Examples of Locations for Some Typical Signs at Intersections



Notes: See Chapter 2D for information on guide signs and Part 3 for information on pavement markings

*See Table 2C-4 for the recommended minimum distance
**See Section 2C.46 for the application of the W2-1 sign and Section 2C.36 for the application of the W3-1 signs
***See Section 2B.22 for the application of Intersection Lane Control signs

Figure 2A-4 Relative Locations of Regulatory, Warning, and Guide Signs on an Intersection Approach

SUPPORT:

STOP signs are typically located within 6 to 12 feet of the edge of the traveled portion of intersecting roadways (see Figure 2A-2) in order to place vehicles stopped on the minor road in a location that optimizes sight lines to the major roadway. At wide throat intersections with large corner radii (over 40 feet), this optimum sign location would result in the STOP sign being placed in the paved part of the road. In these cases, the 50 foot major road offset should be maintained because a larger offset would require drivers on the minor road to either stop twice or look for a longer gap. When corner radii exceeds 90 feet, it is not possible to comply with both the minor and major road offsets. Redesigning the intersection in order to provide a free right turn island would provide a protected location for the STOP sign consistent with the optimum major and minor road offsets.

GUIDANCE:

In urban areas where crosswalks exist, signs should not be placed within 4 feet in advance of the crosswalk (see Drawing D in Figure 2A-3).

2A.17 Overhead Sign Installations

GUIDANCE:

Overhead signs should be used on freeways and expressways, where some degree of lane-use control is desirable, or where space is not available at the roadside.

SUPPORT:

The operational requirements of the present highway system are such that overhead signs have value at many locations. The factors to be considered for the installation of overhead sign displays are not definable in specific numerical terms.

OPTION:

The following conditions (not in priority order) may be considered in an engineering study to determine if overhead signs would be beneficial:

A. Traffic volume at or near capacity;
B. Complex interchange design;
C. Three or more lanes in each direction;
D. Restricted sight distance;
E. Closely spaced interchanges;
F. Multi-lane exits;
G. Large percentage of trucks;
H. Street lighting background;
I. High-speed traffic;
J. Consistency of sign message location through a series of interchanges;
K. Insufficient space for post-mounted signs;
L. Junction of two freeways; and
M. Left exit ramps.

Over-crossing structures may be used to support overhead signs.

SUPPORT:

Under some circumstances, the use of over-crossing structures as sign supports might be the only practical solution that will provide adequate viewing distance. The use of such structures as sign supports might eliminate the need for the foundations and sign supports along the roadside.

2A.18 Mounting Height

STANDARD:

The provisions of this Section shall apply unless specifically stated otherwise for a particular sign elsewhere in this Manual.

SUPPORT:

The mounting height requirements for object markers are provided in Chapter 2C.

In addition to the provisions of this Section, information affecting the minimum mounting height of signs as a function of crash performance can be found in AASHTO's "Roadside Design Guide" (see Section 1A.11).

STANDARD:

The minimum height, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement, of signs installed at the side of the road in rural areas shall be 5 feet (see Figure 2A-2).

The minimum height, measured vertically from the bottom of the sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way, of signs installed at the side of the road in business, commercial, or residential areas where parking or pedestrian movements are likely to occur directly below the sign, or where the view of the sign might be obstructed, shall be 7 feet (see Figure 2A-2).

The minimum height, measured vertically from the bottom of the sign to the sidewalk, of signs installed above sidewalks shall be 7 feet. If the bottom of a secondary sign that is mounted below another sign is mounted lower than 7 feet above a pedestrian sidewalk or pathway (see Section 6D.02), the secondary sign shall not project more than 4 inches into the pedestrian facility (see Figure 2A-2, Example C).

Directional signs on freeways and expressways shall be installed with a minimum height of 7 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement. All route signs, warning signs, and regulatory signs on freeways and expressways shall be installed with a minimum height of 7 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement. If a secondary sign is mounted below another sign on a freeway or expressway, the major sign shall be installed with a minimum height of 8 feet and the secondary sign shall be installed with a minimum height of 5 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement.

Where large signs having an area exceeding 50 square feet are installed on multiple breakaway posts, the clearance from the ground to the bottom of the sign shall be at least 7 feet.

OPTION:

The height to the bottom of a secondary sign mounted below another sign may be 1 foot less than the height specified above.

Signs that are placed 30 feet or more from the edge of the traveled way may be installed with a minimum height of 5 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement.

A route sign assembly consisting of a route sign and auxiliary signs (see Section 2D.12) may be treated as a single sign for the purposes of this Section.

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The mounting height may be adjusted when supports are located near the edge of the right-of-way on a steep backslope in order to avoid the sometimes less desirable alternative of placing the sign closer to the roadway.

STANDARD:

Overhead mounted signs shall provide a vertical clearance of not less than 17 feet to the sign, light fixture, or sign bridge, over the entire width of the pavement and shoulders except where a lesser vertical clearance is used for the design of other structures.

OPTION:

If the vertical clearance of other structures along the roadway near the sign structure is less than 16 feet, the vertical clearance to an overhead sign structure or support may be as low as 1 foot higher than the vertical clearance of the other structures in order to improve the visibility of the overhead signs.

In special cases it may be necessary to reduce the clearance to overhead signs because of substandard dimensions in tunnels and other major structures such as double-deck bridges.

SUPPORT:

Figure 2A-2 illustrates some of the mounting height requirements contained in this Section.

2A.19 Lateral Offset

STANDARD:

For overhead sign supports, the minimum lateral offset from the edge of the shoulder (or if no shoulder exists, from the edge of the pavement) to the near edge of overhead sign supports (cantilever or sign bridges) shall be 6 feet. Overhead sign supports shall have a barrier or crash cushion to shield them if they are within the clear zone.

Post-mounted sign and object marker supports shall be crashworthy (breakaway, yielding, or shielded with a longitudinal barrier or crash cushion) if within the clear zone.

Compliance Date: January 17, 2013

The compliance date applies only to those roads with posted or statutory speed limits 50 mph and greater. All other roads with speed limits less than 50 mph are to comply through attrition.

GUIDANCE:

For post-mounted signs, the minimum lateral offset should be 12 feet from the edge of the travel way. If a paved shoulder wider than 6 feet exists, the minimum lateral offset for post-mounted signs should be 6 feet from the edge of the shoulder.

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SUPPORT:

The minimum lateral offset requirements for object markers are provided in Chapter 2C.

The minimum lateral offset is intended to keep trucks and cars that use the shoulders from striking the signs or supports.

GUIDANCE:

All supports should be located as far as practical from the edge of the shoulder. Advantage should be taken to place signs behind existing roadside barriers, on over-crossing structures, or other locations that minimize the exposure of the traffic to sign supports.

SUPPORT:

Where permitted, signs may be placed on existing supports used for other purposes, such as highway traffic signal supports, highway lighting supports, and utility poles.

STANDARD:

If signs are placed on existing supports, they shall meet other placement criteria contained in this Manual.

OPTION:

Lesser lateral offsets may be used on connecting roadways or ramps at interchanges, but not less than 6 feet from the edge of the traveled way.

On conventional roads in areas where it is impractical to locate a sign with the lateral offset prescribed by this Section, a lateral offset of at least 2 feet may be used.

A lateral offset of at least 1 foot from the face of the curb may be used in business, commercial or residential areas where sidewalk width is limited or where existing poles are close to the curb.

GUIDANCE:

Overhead sign supports and post-mounted sign and object marker supports should not intrude into the usable width of a sidewalk or other pedestrian facility.

SUPPORT:

Figures 2A-2 and 2A-3 illustrate some examples of the lateral offset requirements contained in this Section.

2A.20 Orientation

GUIDANCE:

Unless otherwise provided in this Manual, signs should be vertically-mounted at right angles to the direction of, and facing, the traffic that they are intended to serve.

Where mirror reflection from the sign face is encountered to such a degree as to reduce legibility, the sign should be turned slightly away from the road. Signs that are placed 30 feet or more from the pavement edge should be turned toward the road. On curved alignments, the angle of placement should be determined by the direction of approaching traffic rather than by the roadway edge at the point where the sign is located.

OPTION:

On grades, sign faces may be tilted forward or back from the vertical position to improve the viewing angle.

2A.21 Posts and Mountings

STANDARD:

Sign posts, foundations, and mountings shall be so constructed as to hold signs in a proper and permanent position, and to resist swaying in the wind or displacement by vandalism.

SUPPORT:

The latest edition of AASHTO's "Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" contains additional information regarding posts and mounting (see Page i for AASHTO's address).

OPTION:

Where engineering judgment indicates a need to draw attention to the sign during nighttime conditions, a strip of retroreflective material may be used on regulatory and warning sign supports.

STANDARD:

If a strip of retroreflective material is used on the sign support, it shall be at least 2 inches in width, it shall be placed for the full length of the support from the sign to within 2 feet above the edge of the roadway, and its color shall match the background color of the sign, except that the color of the strip for the YIELD and DO NOT ENTER signs shall be red.

2A.22 Maintenance

GUIDANCE:

Maintenance activities should consider proper position, cleanliness, legibility, and daytime and nighttime visibility (see Section 2A.8). Damaged or deteriorated signs, gates, or object markers should be replaced.

To assure adequate maintenance, a schedule for inspecting (both day and night), cleaning, and replacing signs, gates, and object markers should be established. Employees of highway, law enforcement, and other public agencies whose duties require that they travel on the roadways should be encouraged to report any damaged, deteriorated, or obscured signs, gates, or object markers at the first opportunity.

Steps should be taken to see that weeds, trees, shrubbery, and construction, maintenance, and utility materials and equipment do not obscure the face of any sign or object marker.

A regular schedule of replacement of lighting elements for illuminated signs should be maintained.

2A.23 Median Opening Treatments for Divided Highways with Wide Medians

GUIDANCE:

Where two roadways are separated by a median and the median width at the intersection is 30 feet or more, the intersection should be signed as two separate intersections. [Minnesota Statute 169.011, Subd. 36, (b)] (see Figures 2B-12 and 2B-15).

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Chapter 2B. REGULATORY SIGNS

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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.

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Stop	R1-1	2B.5	30 x 30	36 x 36	36 x 36	---	30 x 30*	48 x 48
Yield	R1-2	2B.8	36 x 36 x 36	48 x 48 x 48	48 x 48 x 48	60 x 60 x 60	30 x 30 x 30*	---
To Oncoming Traffic (plaque)	R1-2aP	2B.10	24 x 18	24 x 18	36 x 30	48 x 36	24 x 18	---
All Way (plaque)	R1-3P	2B.5	18 x 6	18 x 6	---	---	---	30 x 12
Stop Here for Peds	R1-5b	2B.11	---	36 x 36	---	---	---	36 x 36
Stop Here for Pedestrians	R1-5c	2B.11	---	36 x 48	---	---	---	36 x 48
In-Street Ped Crossing	R1-6a,b,c	2B.12	12 x 36	12 x 36	---	---	---	---
Overhead Ped Crossing	R1-9a	2B.12	90 x 24	90 x 24	---	---	---	---
Overhead Stop for Ped	R1-9b	2B.12	90 x 30	90 x 30	---	---	---	---
Except Right Turn (plaque)	R1-10P	2B.5	24 x 18	24 x 18	---	---	---	---
Speed Limit	R2-1	2B.13	24 x 30*	30 x 36	36 x 48	48 x 60	18 x 24*	30 x 36
Truck Speed Limit (plaque)	R2-2P	2B.14	24 x 24	24 x 24	36 x 36	48 x 48	---	36 x 36
Night Speed Limit (plaquer)	R2-3P	2B.15	24 x 24	24 x 24	36 x 36	48 x 48	---	36 x 36
Minimum Speed Limit (plaque)	R2-4P	2B.16	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
Combined Speed Limit	R2-4b	2B.16	24 x 48	24 x 48	36 x 72	48 x 96	---	36 x 72
End XX Mile Speed Limit	R2-6b	2B.16.1	24 x 30	24 x 30	---	---	---	---
End Work Speed Zone	R2-6c	2B.16.2	24 x 30	24 x 30	24 x 30	24 x 30	---	---
Fines Higher (plaque)	R2-6P	2B.17	24 x 18	24 x 18	36 x 24	48 x 36	---	36 x 24
Fines Double (plaque)	R2-6aP	2B.17	24 x 18	24 x 18	36 x 24	48 x 36	---	36 x 24
$XX Fine (plaque)	R2-6bP	2B.17	24 x 18	24 x 18	36 x 24	48 x 36	---	36 x 24
Begin Higher Fines Zone	R2-10	2B.17	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
End Higher Fines Zone	R2-11	2B.17	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
Bridge Speed Limit	R2-X5	2B.13.1	24 x 36	24 x 36	---	---	---	---
Movement Prohibition	R3-1,2,3, 4,18,27	2B.18	24 x 24*	36 x 36	36 x 36	---	---	48 x 48
Mandatory Movement Lane Control	R3-5, 5a	2B.20	30 x 36	30 x 36	---	---	---	---
Left Lane (plaque)	R3-5bP	2B.20	30 x 12	30 x 12	---	---	---	---
HOV 2+ (plaque)	R3-5cP	2B.20	24 x 12	24 x 12	---	---	---	---
Taxi Lane (plaque)	R3-5dP	2B.20	30 x 12	30 x 12	---	---	---	---
Center Lane (plaque)	R3-5eP	2B.20	30 x 12	30 x 12	---	---	---	---
Right Lane (plaque)	R3-5fP	2B.20	30 x 12	30 x 12	---	---	---	---
Bus Lane (plaque)	R3-5gP	2B.20	30 x 12	30 x 12	---	---	---	---
Optional Movement Lane Control	R3-6	2B.21	30 x 36	30 x 36	---	---	---	---
Right (Left) Lane Must Turn Right (Left)	R3-7	2B.20	30 x 30*	36 x 36	---	---	---	---
Two-Way Left Turn Only (overhead)	R3-9a	2B.24	30 x 36	30 x 36	---	---	---	---
Two-Way Left Turn Only (post-mounted)	R3-9b	2B.24	24 x 36	24 x 36	---	---	---	36 x 48
BEGIN	R3-9cP	2B.25	30 x 12	30 x 12	---	---	---	---
END	R3-9dP	2B.25	30 x 12	30 x 12	---	---	---	---
Reversible Lane Control (symbol)	R3-9e	2B.26	108 x 48	108 x 48	---	---	---	---
Reversible Lane Control (post-mounted)	R3-9f	2B.26	30 x 42*	36 x 54	---	---	---	---
Advance Reversible Lane Control Transition Signing	R3-9g,9h	2B.26	108 x 36	108 x 36	---	---	---	---
End Reverse Lane	R3-9i	2B.26	108 x 48	108 x 48	---	---	---	---
All Turns (U Turn) from Right Lane	R3-23,23a	2B.27	60 x 36	60 x 36	---	---	---	---
All Turns (U Turn) with Arrow	R3-24,24b, 25,25b,26a	2B.27	72 x 18	72 x 18	---	---	---	---

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Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 1 of 5)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized	
			Single Lane	Multi-Lane					
U and Left Turns with Arrow	R3-24a,25a,26	2B.27	60 x 24	60 x 24	---	---	---	---	
Advance Intersection Lane Control	R3-30 series	2B.22	Varies x 30	Varies x 30	---	---	---	Varies x 30	MN Rev. 1
Right Lane Must Exit	R3-33	2B.23	---	---	78 x 36	78 x 36	---	---	
Do Not Pass	R4-1	2B.28	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48	
Pass With Care	R4-2	2B.29	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48	
Slower Traffic Keep Right	R4-3	2B.30	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48	
Trucks Use Right Lane	R4-5	2B.31	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48	
Keep Right	R4-7,7a,7b	2B.32	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48	
Narrow Keep Right	R4-7c	2B.32	18 x 30	18 x 30	---	---	---	---	
Keep Left	R4-8,8a,8b	2B.32	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24	36 x 48	MN Rev. 1
Narrow Keep Left	R4-8c	2B.32	18 x 30	18 x 30	---	---	---	---	
Stay in Lane	R4-9	2B.33	24x 30	24 x 30	36 x 48	48 x 60	18 x 24	36 x 48	
Runaway Vehicles Only	R4-10	2B.34	48 x 48	48 x 48	---	---	---	---	
Slow Vehicles with XX or More Following Vehicles Must Use Turn-Out	R4-12	2B.35	42 x 24	42 x 24	---	---	---	---	
Slow Vehicles Must Use Turn-Out Ahead	R4-13	2B.35	42 x 24	42 x 24	---	---	---	---	
Slow Vehicles Must Turn Out	R4-14	2B.35	30 x 42	30 x 42	---	---	---	---	
Keep Right Except to Pass	R4-16	2B.30	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48	
No Driving on Shoulder	R4-17a	2B.36	30 x 36	30 x 36	48 x 54	48 x 54	---	---	
No Passing on Shoulder	R4-18a	2B.36	30 x 36	30 x 36	48 x 54	48 x 54	---	---	
State Law	R4-X5	2B.66.2	30 x 24	36 x 24	48 x 36	48 x 36	---	---	
Do Not Enter	R5-1	2B.37	30 x 30*	36 x 36	36 x 36	48 x 48	---	36 x 36	
Wrong Way	R5-1a	2B.38	36 x 24*	42 x 30	36 x 24*	42 x 30	30 x 18	42 x 30	MN Rev. 1
No Trucks	R5-2,2a	2B.39	24 x 24	24 x 24	30 x 30	36 x 36	---	36 x 36	
No Motor Vehicles	R5-3	2B.39	24 x 24	24 x 24	---	---	24 x 24	---	
No Commercial Vehicles	R5-4	2B.39	24 x 30	24 x 30	36 x 48	36 x 48	---	---	
No Vehicles with Lugs	R5-5	2B.39	24 x 30	24 x 30	36 x 48	48 x 60	---	---	
No Bicycles	R5-6	2B.39	24 x 24	24 x 24	30 x 30	36 x 36	24 x 24*	48 x 48	
No Non-Motorized Traffic	R5-7	2B.39	30 x 24	30 x 24	42 x 24	48 x 30	---	42 x 24	
No Motor-Driven Cycles	R5-8	2B.39	30 x 24	30 x 24	42 x 24	48 x 30	---	42 x 24	MN Rev. 1
No Pedestrians, Bicycles, Motor-Driven Cycles	R5-10a	2B.39	30 x 36	30 x 36	---	---	---	---	
No Pedestrians or Bicycles	R5-10b	2B.39	30 x 18	30 x 18	---	---	---	---	
No Pedestrians	R5-10c	2B.39	24 x 12	24 x 12	---	---	---	---	
Pedestrians, Bicycles, Motorized Bicycles, Non-Motorized Traffic Prohibited	R5-10d	2B.39	18 x 24	18 x 24	---	---	---	---	MN Rev. 2
Authorized Vehicles Only	R5-11	2B.39	30 x 24	30 x 24	---	---	---	---	
No Snowmobiles	R5-X1	2B.39.1	18 x 18	18 x 18	---	---	18 x 18	---	
One Way	R6-1	2B.40	36 x 12	54 x 18	54 x 18	54 x 18	---	54 x 18	
One Way	R6-2	2B.40	24 x 30	30 x 36	36 x 48	48 x 60	18 x 24	36 x 48	
Divided Highway Crossing	R6-3,3a	2B.42	30 x 24	30 x 24	36 x 30	---	---	36 x 30	
Roundabout Directional (2 chevrons)	R6-4	2B.43	30 x 24	30 x 24	---	---	---	---	MN Rev. 1
Roundabout Directional (3 chevrons)	R6-4a	2B.43	48 x 24	48 x 24	---	---	---	---	

Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 2 of 5)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Roundabout Directional (4 chevrons)	R6-4b	2B.43	60 x 24	60 x 24	---	---	---	---
Roundabout Circulation (plaque)	R6-5P	2B.44	30 x 30	30 x 30	---	---	---	---
Begin One Way	R6-6	2B.40	24 x 30	30 x 36	---	---	---	---
End One Way	R6-7	2B.40	24 x 30	30 x 36	---	---	---	---
Parking Restrictions	R7-1, 2,2a,3,4,5,6, 7,8,21,22,23 23a,107,108	2B.46	12 x 18	12 x 18	---	---	---	---
Van Accessible (plaque)	R7-8bP	2B.48.1	12 x 6	12 x 6	---	---	---	---
Disabled Parking	R7-8m	2B.48.1	12 x 18	12 x 18	---	---	---	---
Fee Station	R7-20	2B.46	24 x 18	24 x 18	---	---	---	---
No Parking (with transit logo)	R7-107a	2B.46	12 x 30	12 x 30	---	---	---	---
No Parking/Retsricted Parking (combined sign)	R7-200	2B.46	24 x 18	24 x 18	---	---	---	---
No Parking/Retsricted Parking (combined sign)	R7-200a	2B.46	12 x 30	12 x 30	---	---	---	---
Tow Away Zone (plaque)	R7-201P,201aP	2B.46	12 x 6	12 x 6	---	---	---	---
This Side of Sign (plaque)	R7-202P	2B.46	12 x 6	12 x 6	---	---	---	---
Emergency Snow Route	R7-203	2B.46	18 x 24	18 x 24	---	---	---	24 x 30
No Parking on Pavement	R8-1	2B.46	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
No Parking Except on Shoulder	R8-2	2B.46	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
No Parking (symbol)	R8-3	2B.46	24 x 24	30 x 30	36 x 36	48 x 48	12 x 12	36 x 36
No Parking	R8-3a	2B.46	24 x 30	24 x 30	36 x 36	48 x 48	18 x 24	36 x 36
Except Sundays and Holidays (plaque)	R8-3bP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
On Pavement (plaque)	R8-3cP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
On Bridge (plaque)	R8-3dP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
On Tracks (plaque)	R8-3eP	2B.46	12 x 9	12 x 9	---	---	12 x 9	30 x 24
Except on Shoulder (plaque)	R8-3fP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
Loading Zone (plaque)	R8-3gP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
Times of Day (plaque)	R8-3hP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
Between Signs (plaque)	R8-3mP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
Emergency Parking Only	R8-4	2B.49	30 x 24	30 x 24	30 x 24	48 x 36	---	48 x 36
No Stopping on Pavement	R8-5	2B.46	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
No Stopping Except on Shoulder	R8-6	2B.46	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
Emergency Stopping Only	R8-7	2B.49	30 x 24	30 x 24	48 x 36	48 x 36	---	48 x 36
Do Not Stop on Tracks	R8-8	2B.49	24 x 30	24 x 30	36 x 48	---	---	48 x 60
Walk on Left Facing Traffic	R9-1	2B.50	18 x 24	18 x 24	---	---	---	---
Cross Only at Crosswalks	R9-2	2B.51	12 x 18	12 x 18	---	---	---	---
No Pedestrians	R9-3	2B.51	18 x 18	18 x 18	24 x 24	30 x 30	---	30 x 30
No Pedestrian Crossing	R9-3a	2B.51	12 x 18	12 x 18	---	---	---	---
Use Crosswalk (plaque)	R9-3bP	2B.51	18 x 12	18 x 12	---	---	--	---
No Hitchhiking (symbol)	R9-4	2B.50	18 x 18	18 x 18	---	---	---	24 x 24
No Hitchhiking	R9-4a	2B.50	18 x 24	18 x 24	---	---	12 x 18	---
Sidewalk Closed	R9-9	2B.58.2	30 x 18	30 x 18	---	---	24 x 12	---
Crosswalk Closed Use Other Side	R9-10	2B.58.2	48 x 24	48 x 24	---	---	24 x 12	---
No Skaters	R9-13	2B.39	18 x 18	18 x 18	24 x 24	30 x 30	---	30 x 30
No Equestrians	R9-14	2B.39	18 x 18	18 x 18	24 x 24	30 x 30	---	30 x 30

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Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 3 of 5)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Cross Only on Green	R10-1	2B.52	12 x 18	12 x 18	---	---	---	---
Pedestrian Signs and Plaques	R10.2, 3,3b,3c,3d,4	2B.52	9 x 12	9 x 12	---	---	---	---
Pedestrian Signs	R10-3a,3e,3f 3g,3h,3i,4a	2B.52	9 x 15	9 x 15	---	---	---	---
Left on Green Arrow Only	R10-5	2B.53	30 x 36	30 x 36	48 x 60	---	24 x 30	48 x 60
Stop Here on Red	R10-6	2B.53	24 x 36	24 x 36	---	---	---	36 x 48
Stop Here on Red	R10-6a	2B.53	24 x 30	24 x 30	---	---	---	36 x 42
Do Not Block Intersection	R10-7,7a	2B.53	30 x 30	30 x 30	---	---	---	---
Use Lane with Greed Arrow	R10-8	2B.53	36 x 42	36 x 42	36 x 42	---	---	60 x 72
Left (Right) Turn Signal	R10-10	2B.53	30 x 36	30 x 36	---	---	---	---
No Turn on Red	R10-11	2B.54	24 x 30	36 x 48	---	---	---	36 x 48
No Turn on Red	R10-11a	2B.54	30 x 36	36 x 48	---	---	---	---
No Turn on Red	R10-11b	2B.54	36 x 36	36 x 36	---	---	---	---
No Turn on Red Except from Right Lane	R10-11c	2B.54	30 x 42	30 x 42	---	---	---	---
No Turn on Red from This Lane	R10-11d	2B.54	30 x 42	30 x 42	---	---	---	---
Left Turn Yield on Green	R10-12	2B.53	30 x 36	30 x 36	36 x 48	---	---	---
Emergency Signal	R10-13	2B.53	42 x 30	42 x 30	---	---	---	---
Emergency Signal-Stop on Flashing Red	R10-14	2B.53	36 x 42	36 x 42	---	---	---	---
Emergency Signal-Stop on Flashing Red (overhead)	R10-14a	2B.53	60 x 24	60 x 24	---	---	---	---
Stop Here on Flashing Red Arrow	R10-14b	2B.53	24 x 36	24 x 36	---	---	---	36 x 48
Turning Vehicles Stop for Peds	R10-15a	2B.53	30 x 30	30 x 30	---	---	---	---
U-Turn Yield to Right Turn	R10-16	2B.53	30 x 36	30 x 36	---	---	---	---
Right on Red Arrow After Stop	R10-17a	2B.54	30 x 36	30 x 36	---	---	---	---
Traffic Laws Photo Enforced	R10-18	2B.55	36 x 24	36 x 24	48 x 30	54 x 36	---	54 x 36
Photo Enforced (symbol plaque)	R10-19P	2B.55	24 x 12	24 x 12	36 x 18	48 x 24	---	48 x 24
Photo Enforced (plaque)	R10-19aP	2B.55	24 x 18	24 x 18	36 x 30	48 x 36	---	48 x 36
Mon-Fri (and times) (3 lines) (plaque)	R10-20aP	2B.53	24 x 24	24 x 24	---	---	--	---
Sunday (and times)	R10-20aP	2B.53	24 x 18	24 x 18	30 x 24	---	---	48 x 36
Crosswalk, Stop on Red	R10-23	2B.53	24 x 30	24 x 30	---	---	---	---
Push Button to Turn on Warning Lights	R10-25	2B.52	9 x 12	9 x 12	---	---	---	---
Left Turn Yield on Flashing Red Arrow After Stop	R10-27	2B.53	30 x 36	30 x 36	---	---	---	---
XX Vehicles on Green	R10-28a	2B.56	24 x 30	24 x 30	---	---	---	---
XX Vehicles on Green Each Lane	R10-29a	2B.56	36 x 24	36 x 24	---	---	---	---
Right Turn on Red Must Yield to U-Turn	R10-30	2B.54	30 x 36	30 x 36	---	---	---	---
At Signal (plaque)	R10-31P	2B.54	24 x 9	24 x 9	---	---	---	---
Push Button for 2 Seconds for Extra Crossing Time	R10-32P	2B.52	9 x 12	9 x 12	---	---	---	---
Keep Off Median	R11-1	2B.57	24 x 30	24 x 30	---	---	---	---
Road Closed	R11-2,2a	2B.58	48 x 30	48 x 30	---	---	---	---
Road Closed - Local Traffic Only	R11-3a, 3b,3c,4	2B.58	60 x 30	60 x 30	---	---	---	---
Weight Limit	R12-1,2	2B.59	24 x 30	24 x 30	36 x 48	---	---	36 x 48
Weight Limit	R12-1a,3	2B.59	24 x 36	24 x 36	---	---	---	---
Weight Limit	R12-4	2B.59	36 x 24	36 x 24	---	---	---	---

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Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 4 of 5)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Weight Limit	R12-5	2B.59	24 x 36	24 x 36	36 x 48	48 x 60	---	---
Restricted Bridge XX Miles Ahead Weight Limit XX Tons	R12-X2	2B.59.1	60 x 36	60 x 36	---	---	---	---
Restricted Bridge XX Miles Ahead Permit Weight Limit XX Tons	R12-X2a	2B.59.1	78 x 36	78 x 36	---	---	---	---
Trucks Must not Meet on Bridge	R12-X3	2B.59.1	36 x 24	36 x 24	---	---	---	---
Vehicles Must not Meet on Bridge	R12-X3a	2B.59.1	42 x 24	42 x 24	---	---	---	---
Restricted Bridge - XX Miles Ahead Weight Limit XX Tons, Clearance XX ft XX inches	R12-X4	2B.59.1	60 x 42	60 x 42	---	---	---	---
Restricted Bridge - XX Miles, Clearance XX ft XX inches	R12-X4a	2B.59.1	60 x 36	60 x 36	---	---	---	---
Weigh Station	R13-1	2B.60	72 x 54	72 x 54	96 x 72	120 x 90	---	---
Truck Route	R14-1	2B.61	24 x 18	24 x 18	---	---	---	---
Hazardous Material	R14-2,3	2B.62	24 x 24	24 x 24	30 x 30	36 x 36	---	42 x 42
National Network	R14-4,5	2B.63	30 x 30	30 x 30	36 x 36	36 x 36	---	42 x 42
Fender Bender Move Vehicles	R16-4	2B.65	36 x 24	36 x 24	48 x 36	60 x 48	---	48 x 36
Lights on When Using Wipers or Raining	R16-5,6	2B.64	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
Turn On Headlights Next XX Miles	R16-7	2B.64	48 x 15	48 x 15	72 x 24	96 x 30	---	72 x 24
Turn On, Check Headlights	R16-8,9	2B.64	30 x 15	30 x 15	48 x 24	60 x 30	---	48 x 24
Begin, End Daylight Headlight Section	R16-10,11	2B.64	48 x 15	48 x 15	72 x 24	96 x 30	---	72 x 24
State Law - Stop for School Bus when Red Lights Flashing	R16-X1	2B.66.2	72 x 48	72 x 48	72 x 48	---	---	---
State Law - Trucks and Vehicles with Trailers must Maintain 500 ft Interval	R16-X2	2B.66.2	78 x 48	78 x 48	78 x 48	78 x 48	---	---
Up to $700 Fine for Littering Highways	R16-X3	2B.66.2	48 x 30	48 x 30	48 x 30	48 x 30	---	---
Emergency Stopping Only-Pedestrians, Bicycles, Motorized Bicycles, Non-Motorized Traffic Prohibited	R16-X4	2B.49	---	---	36 x 36	36 x 36	---	---
Signal Your Turn	R16-X6	2B.66.1	30 x 30	30 x 30	---	---	---	48 x 48
Right (Left) Lane Must Exit	R16-X7	2B.20	48 x 60	48 x 60	---	---	---	---
Rest Stop X Hr Limit - No Camping	R16-X8	2B.66.1	30 x 18	30 x 18	---	---	---	36 x 24
State Law - Unlawful to Pass on Shoulder	R16-X9	2B.66.2	60 x 48	60 x 48	---	---	---	---
No Fishing from Bridge	R16-X10	2B.66.1	18 x 24	18 x 24	---	---	---	24 x 30
State Law - Seat Belt Use Required	R16-X11	2B.66.2	72 x 36	72 x 36	72 x 36	72 x 36	---	---
Seat Belt (symbol) Fastened ?	R16-X12	2B.66.1	18 x 18	18 x 18	---	---	---	36 x 36
Vehicle Noise Laws Enforced	R16-X13	2B.66.1	24 x 24	24 x 24	---	---	---	36 x 42
State Law - Move Over for Stopped Emergency and Maintenance Vehicles	R16-X15	2B.66.2	---	132 x 78	132 x 78	132 x 78	---	---
Do Not Cross Double White Line	R16-X16	2B.33.1	30 x 48	30 x 48	48 x 66	48 x 66	---	48 x 66
Check Your Turn Signal	R16-X33	2B.66.1	24 x 30	24 x 30	---	---	---	---

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* See Table 9B-1 for minimum size required for signs on bicycle facilities,

Notes:

1. Larger signs may be used when appropriate
2. Dimensions in inches are shown as width x height

Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 5 of 5)

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.

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.

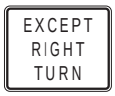
Supplemental plaques with legends such as 2-WAY, 3-WAY, 4-WAY, or other numbers of ways shall not be used with STOP signs.

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.



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.

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.

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.

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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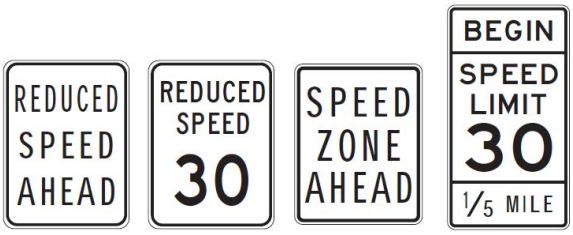
STANDARD:

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

2B.37 DO NOT ENTER Sign (R5-1)

R5-1

STANDARD:

The DO NOT ENTER (R5-1) sign shall be used where traffic is prohibited from entering a restricted roadway.

GUIDANCE:

The DO NOT ENTER sign, if used, should be placed directly in view of a road user at the point where a road user could wrongly enter a divided highway, one-way roadway, or ramp (see Figure 2B-12). The sign should be mounted on the right-hand side of the roadway, facing traffic that might enter the roadway or ramp in the wrong direction.

If the DO NOT ENTER sign would be visible to traffic to which it does not apply, the sign should be turned away from, or shielded from, the view of that traffic.

OPTION:

The DO NOT ENTER sign may be installed where it is necessary to emphasize the one-way traffic movement on a ramp or turning lane.

A second DO NOT ENTER sign on the left-hand side of the roadway may be used, particularly where traffic approaches from an intersecting roadway (see Figure 2B-12).

SUPPORT:

Section 2B.41 contains information regarding an optional lower mounting height for DO NOT ENTER signs that are located along an exit ramp facing a road user who is traveling in the wrong direction.

2B.38 WRONG WAY Sign (R5-1a)

R5-1a

OPTION:

The WRONG WAY (R5-1a) sign may be used as a supplement to the DO NOT ENTER sign where an exit ramp intersects a crossroad or a crossroad intersects a one-way roadway in a manner that does not physically discourage or prevent wrong-way entry (see Figure 2B-12).

GUIDANCE:

If used, the WRONG WAY sign should be placed at a location along the exit ramp or the one-way roadway farther from the crossroad than the DO NOT ENTER sign (see Section 2B.41).

SUPPORT:

Section 2B.41 contains information regarding an optional lower mounting height for WRONG WAY signs that are located along an exit ramp facing a road user who is traveling in the wrong direction.

2B.39 Selective Exclusion Signs

R5-2

R5-3

R5-4

R5-5

R5-6

R5-7

R5-8

R5-10a

R5-10d

R5-10b

R5-10c

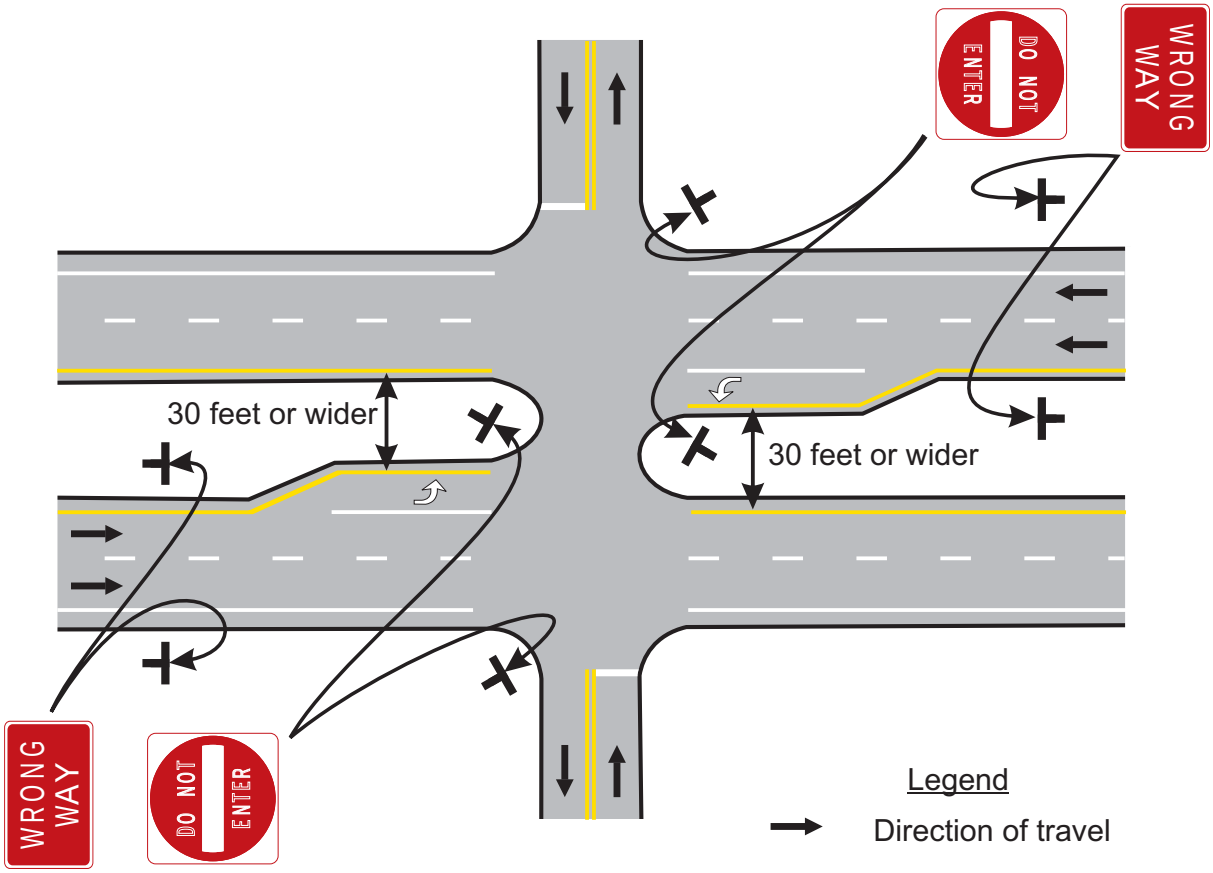


Figure 2B-12. Locations of Wrong-Way Signing for Divided Highways with Medians of 30 Feet or Wider

R9-3 R9-13 R9-14

SUPPORT:

Selective Exclusion signs give notice to road users that State or local statutes or ordinances exclude designated types of traffic from using particular roadways or facilities.

STANDARD:

If used, Selective Exclusion signs shall clearly indicate the type of traffic that is excluded.

SUPPORT:

Typical exclusion messages include:

A. No Trucks (R5-2);
B. NO MOTOR VEHICLES (R5-3);
C. NO COMMERCIAL VEHICLES (R5-4);
D. NO TRUCKS (VEHICLES) WITH LUGS (R5-5);
E. No Bicycles (R5-6);
F. NO NON-MOTORIZED TRAFFIC (R5-7);
G. NO MOTOR-DRIVEN CYCLES (R5-8);
H. No Pedestrians (R9-3),
I. No Skaters (R9-13),
J. No Equestrian (R9-14), and
K. No Hazardous Material (R14-3) (see Section 2B.62).

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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:

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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.

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.

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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).

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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.

Compliance Date: December 31, 2019

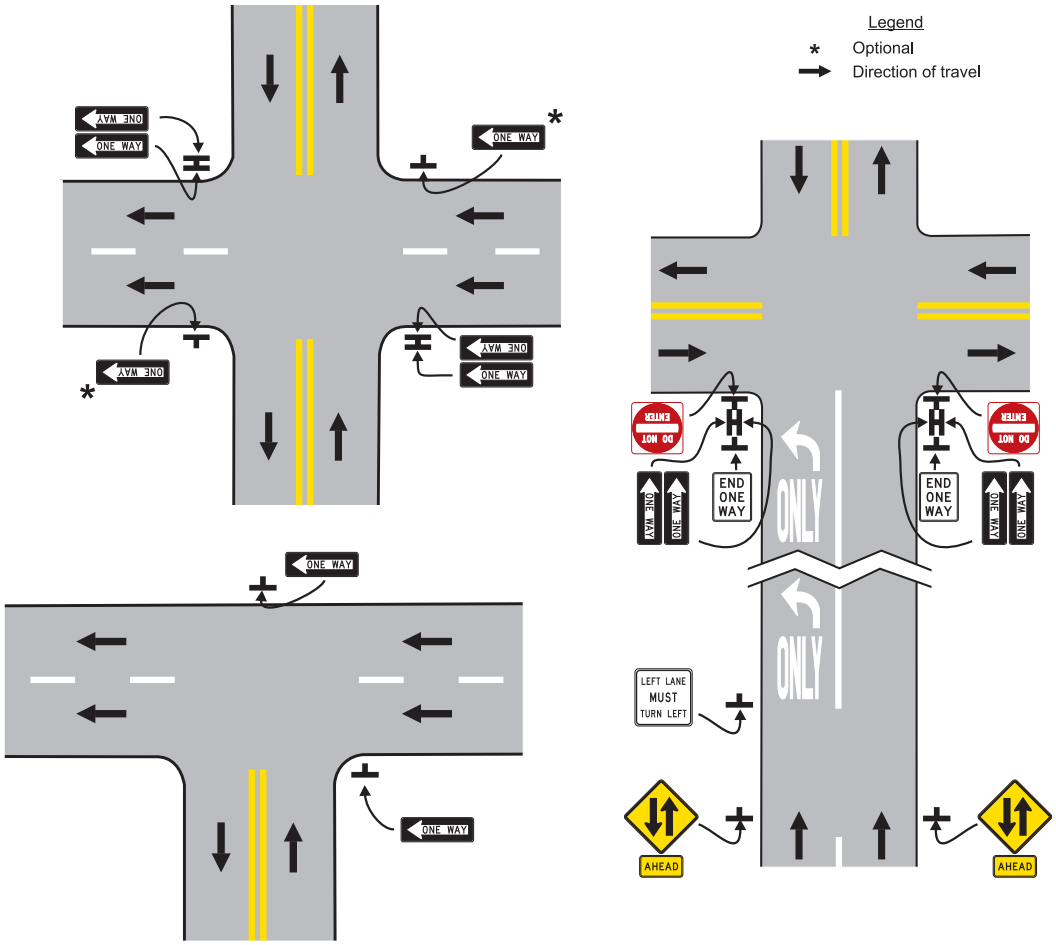


Figure 2B-14. Locations of ONE WAY Signs

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.

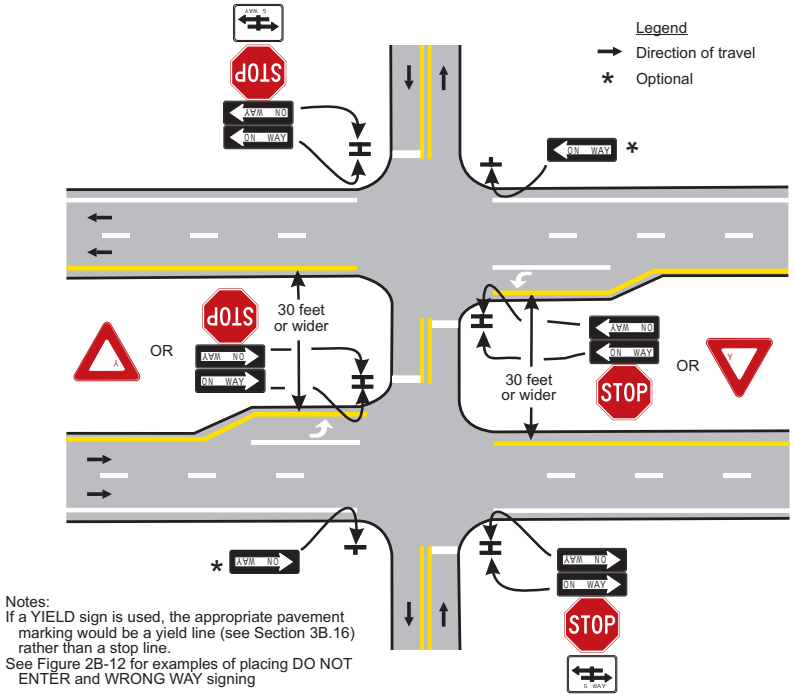
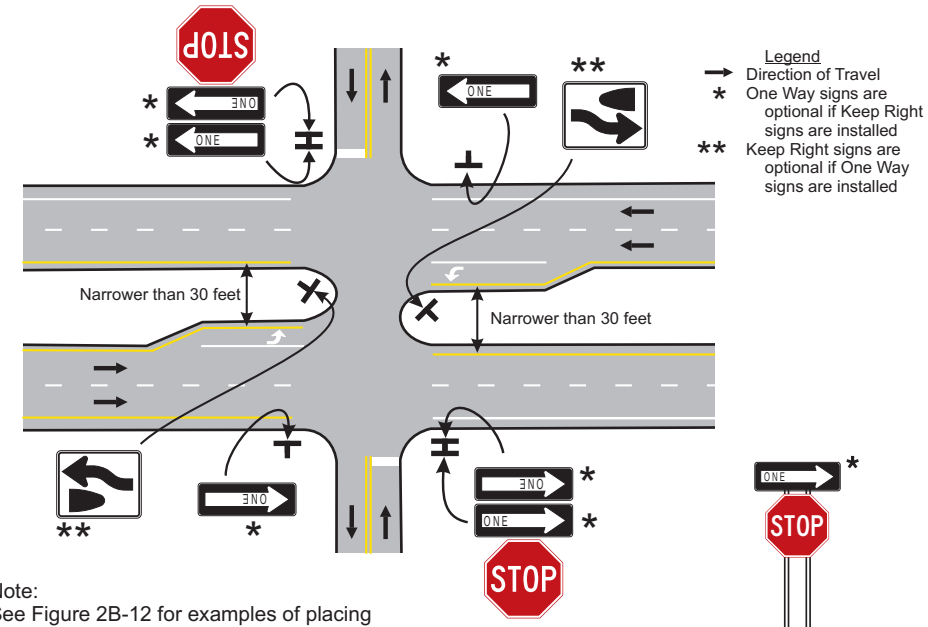


Figure 2B-15. ONE WAY Signing for Divided Highways with Median Widths of 30 Feet or Wider



Note:
See Figure 2B-12 for examples of placing DO NOT ENTER and WRONG WAY signing.
See Figure 2B-15 if median is 30 feet or more in width.

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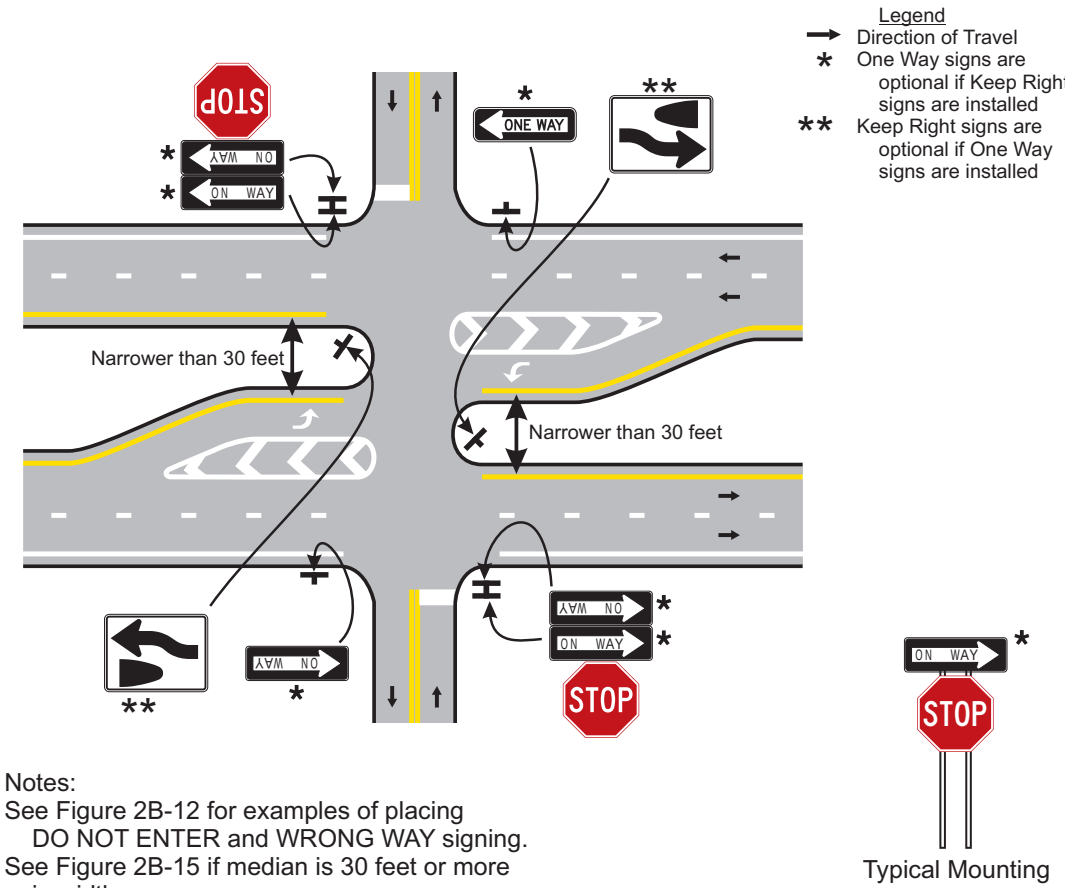
Figure 2B-16. ONE WAY Signing for Divided Highways with Median Widths Narrower Than 30 Feet



Notes:
See Figure 2B-12 for examples of placing DO NOT ENTER and WRONG WAY signing.
See Figure 2B-15 if median is 30 feet or more in width.

Figure 2B-17. ONE WAY Signing for Divided Highways with Median Widths Narrower Than 30 Feet and Separated Left-Turn Lanes

At unsignalized T-intersections where the roadway at the top of the T-intersection is a one-way roadway, ONE WAY signs shall be placed on the near right and the far side of the intersection facing traffic on the stem approach (see Figure 2B-14).

At signalized T-intersections where the roadway at the top of the T-intersection is a one-way roadway, 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.

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OPTION:

Where the central island of a roundabout allows for the installation of signs, ONE WAY signs may be used instead of or in addition to Roundabout Directional Arrow (R6-4 series) signs (see Section 2B.43) to direct traffic counter-clockwise around the central island.

GUIDANCE:

Where used on the central island of a roundabout, the mounting height of a ONE WAY sign should be at least 4 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way.

SUPPORT:

Using ONE WAY signs on the central island of a roundabout might result in some drivers incorrectly concluding that the cross street is a one-way street. Using Roundabout Directional Arrow signs might reduce this confusion. However, using ONE WAY signs might be necessary in States that have defined a roundabout as a series of T-intersections.

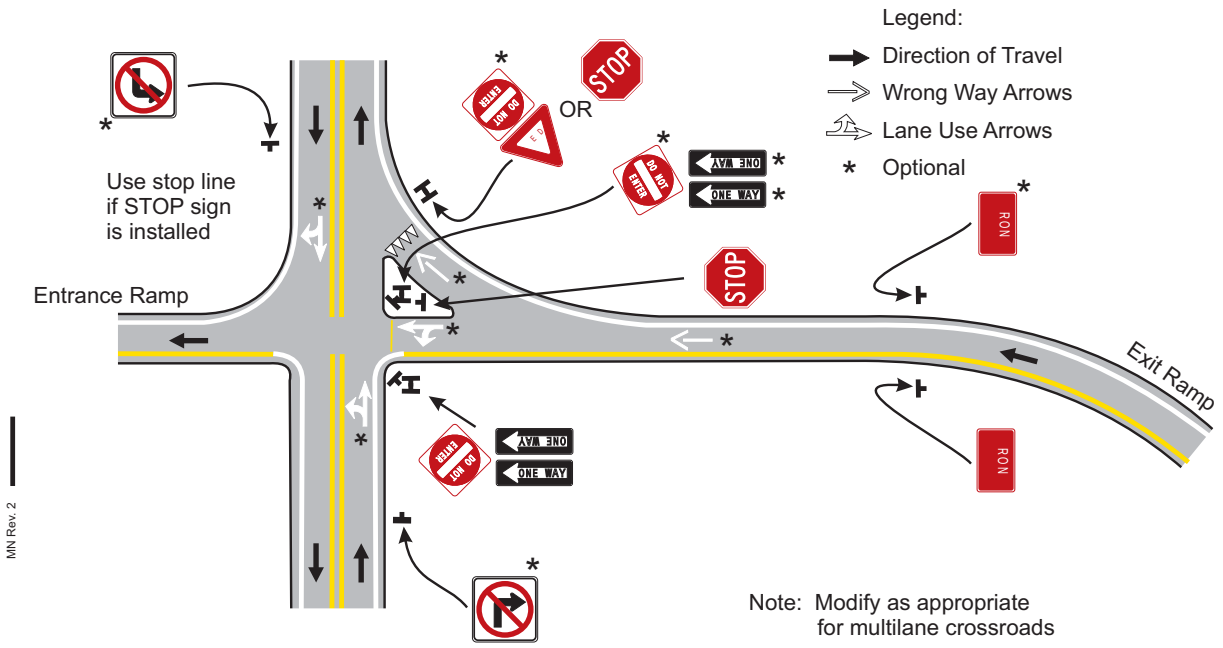

Figure 2B-18. Example of Application of Regulatory Signing and Pavement Markings at an Exit Ramp Termination to Deter Wrong-Way Entry

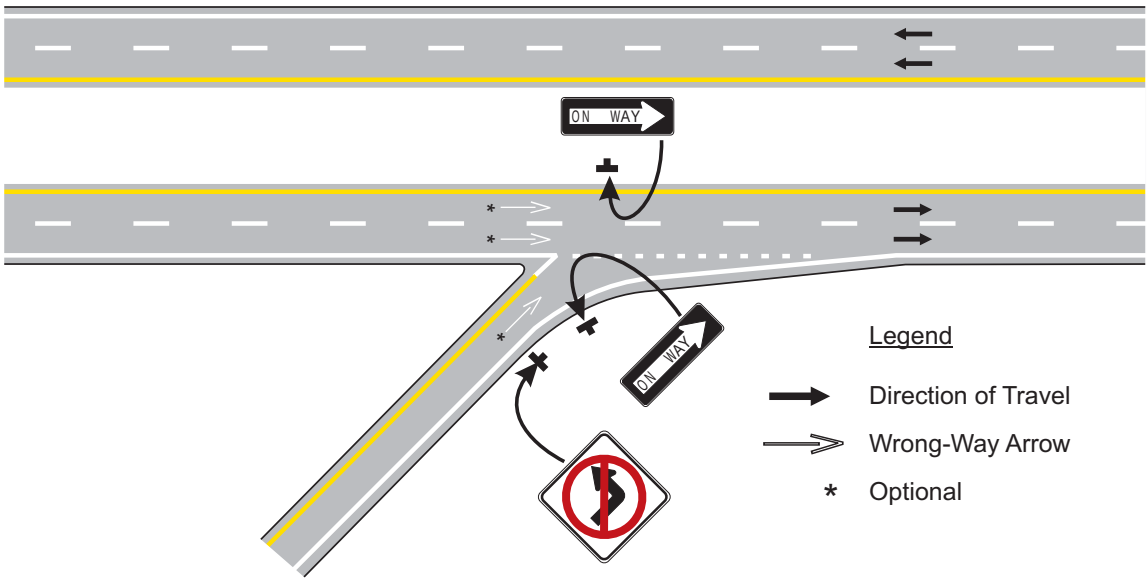

Figure 2B-19. Example of Application of Regulatory Signing and Pavement Markings at an Exit Ramp Termination Where the Design Does Not Clearly Indicate the Direction of Flow

R6-6 R6-7

OPTION:

The BEGIN ONE WAY (R6-6) sign may be used to notify road users of the beginning point of a one direction of travel restriction on the street or roadway. The END ONE WAY (R6-7) sign may be used to notify road users of the ending point of a one direction of travel restriction on the street or roadway.

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STANDARD:

The BEGIN ONE WAY and the END ONE WAY sign shall not be installed on a one-way connecting ramp or at a T-intersection where a one-way roadway terminates.

2B.41 Wrong-Way Traffic Control at Interchange Ramps

STANDARD:

At interchange exit ramp terminals where the ramp intersects a crossroad in such a manner that wrong-way entry could inadvertently be made, the following signs shall be used (see Figure 2B-18):

A. At least one ONE WAY sign for each direction of travel on the crossroad shall be placed where the exit ramp intersects the crossroad.
B. At least one DO NOT ENTER sign shall be conspicuously placed near the downstream end of the exit ramp in positions appropriate for full view of a road user starting to enter wrongly from the crossroad.
C. At least one WRONG WAY sign shall be placed on the exit ramp facing a road user traveling in the wrong direction.

GUIDANCE:

In addition, the following pavement markings should be used (see Figure 2B-18):

A. On two-lane paved crossroads at interchanges, double solid yellow lines should be used as a center line for an adequate distance on both sides approaching the ramp intersections.
B. Where crossroad channelization or ramp geometrics do not make wrong-way movements difficult, a lane-use arrow should be placed in each lane of an exit ramp near the crossroad terminal where it will be clearly visible to a potential wrong-way road user.

OPTION:

The following traffic control devices may be used to supplement the signs and pavement markings described in Paragraphs 1 and 2:

A. Additional ONE WAY signs may be placed, especially on two-lane rural crossroads, appropriately in advance of the ramp intersection to supplement the required ONE WAY sign(s).
B. Additional WRONG WAY signs may be used.
C. Slender, elongated wrong-way arrow pavement markings (see Figure 3B-24) intended primarily to warn wrong-way road users that they are traveling in the wrong direction may be placed upstream from the ramp terminus (see Figure 2B-18) to indicate the correct direction of traffic flow. Wrong-way arrow pavement markings may also be placed on the exit ramp at appropriate locations near the crossroad junction to indicate wrong-way movement. The wrong-way arrow markings may consist of pavement markings or bidirectional red-and-white raised pavement markers or other units that show red to wrong-way road users and white to other road users (see Figure 3B-24).
D. Lane-use arrow pavement markings may be placed on the exit ramp and crossroad near their intersection to indicate the permissive direction of flow.
E. Freeway entrance signs (see Section 2D.46) may be used.

GUIDANCE:

On interchange entrance ramps where the ramp merges with the through roadway and the design of the interchange does not clearly make evident the direction of traffic on the separate roadways or ramps, a ONE WAY sign visible to traffic on the entrance ramp and through roadway should be placed on each side of the through roadway near the entrance ramp merging point as illustrated in Figure 2B-19.

OPTION:

At locations where engineering judgment determines that a special need exists, other standard warning or prohibitive methods and devices may be used as a deterrent to the wrong-way movement.

Where there are no parked cars, pedestrian activity or other obstructions such as snow or vegetation, and if an engineering study indicates that a lower mounting height would address wrong-way movements on freeway or expressway exit ramps, a DO NOT ENTER sign(s) and/or a WRONG WAY sign(s) that is located along the exit ramp facing a road user who is traveling in the wrong direction may be installed at a minimum mounting height of 3 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement.

PART 2. SIGNS

Chapter 2C. Warning Signs and Object Markers

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FIGURES

TABLES

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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).

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.

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.

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

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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.

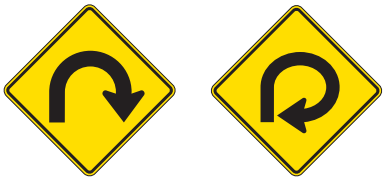
OPTION:

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.

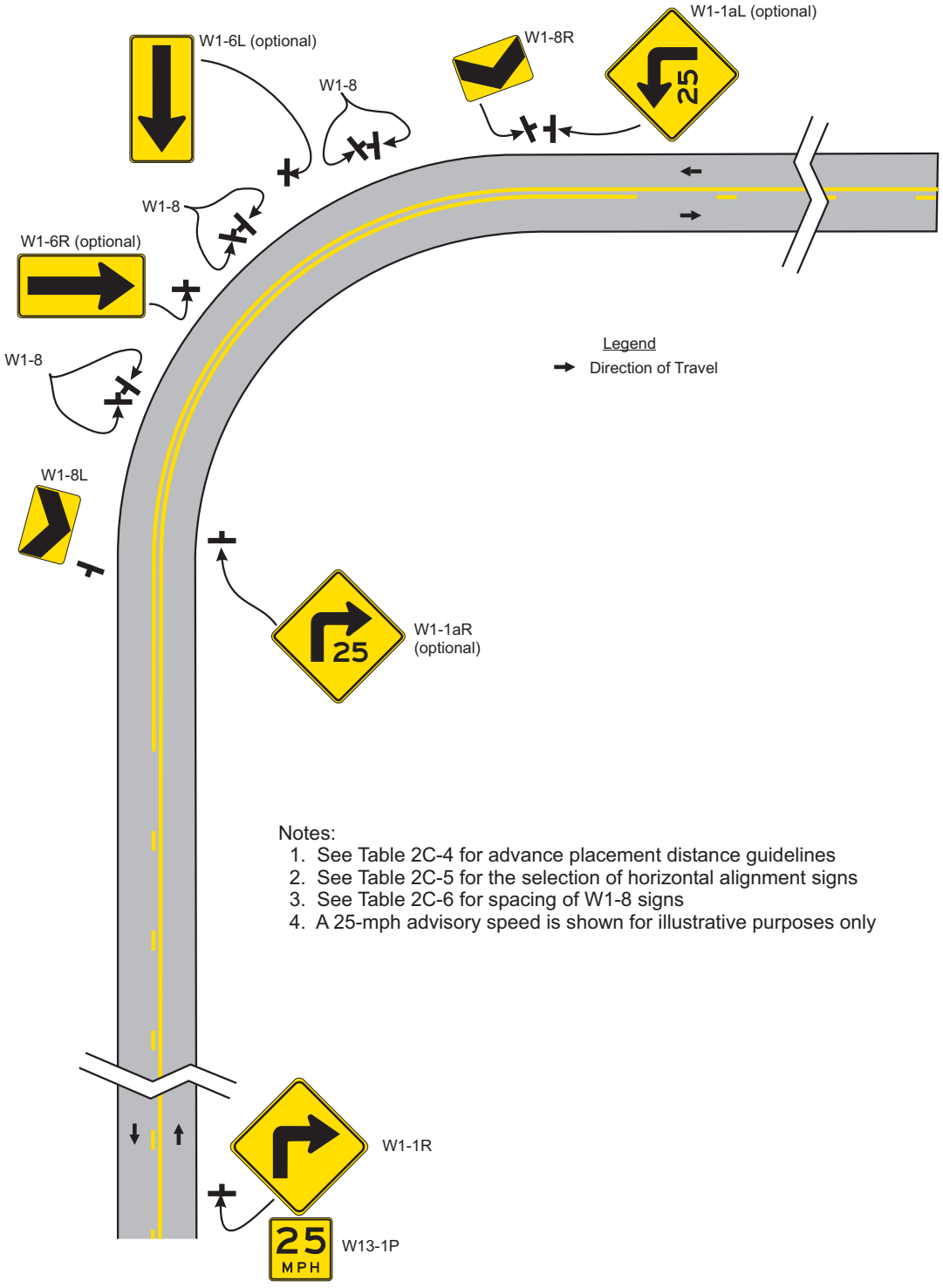
A NEXT XX MILES (W7-3aP) supplemental distance plaque (see Section 2C.55) may be installed below the Winding Road sign where continuous roadway curves exist for a specific distance

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.



Notes:
1. See Table 2C-4 for advance placement distance guidelines
2. See Table 2C-5 for the selection of horizontal alignment signs
3. See Table 2C-6 for spacing of W1-8 signs
4. A 25-mph advisory speed is shown for illustrative purposes only

Figure 2C-2. Example of Warning Signs for a Turn

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

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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.

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.

PART 2. SIGNS

Chapter 2D. Guide Signs - Conventional Roads

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FIGURES

TABLES

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:

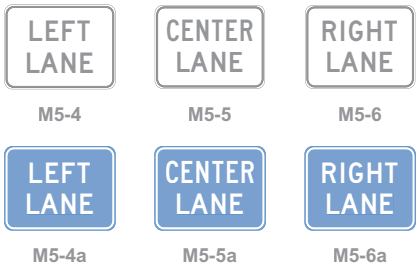
For other guide signs, the legends are so variable that a standardized design or size is not appropriate. The sign size is determined primarily by the length of the message, and the size of lettering and spacing necessary for proper legibility.

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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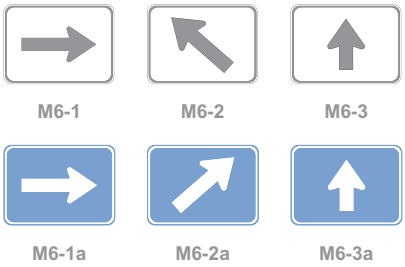
OPTION:

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.

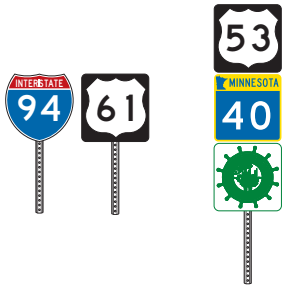
2D.29 Route Sign Assemblies

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.

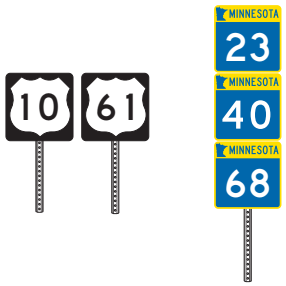
Where two or more routes follow the same section of highway, the route signs for Interstate, U.S., State, and County routes shall be mounted in that order from the left in

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.

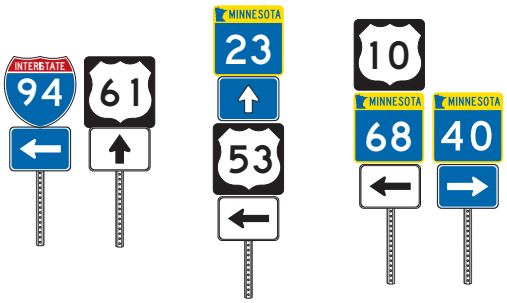


Route Markers Arranged by Class of Highway

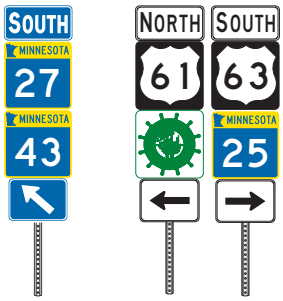
Within groups of assemblies, information for routes intersecting from the left shall be mounted at the left in horizontal arrangements and at the top or center of vertical arrangements. Similarly, information for routes intersecting from the right shall be at the right or bottom, and for straight-through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

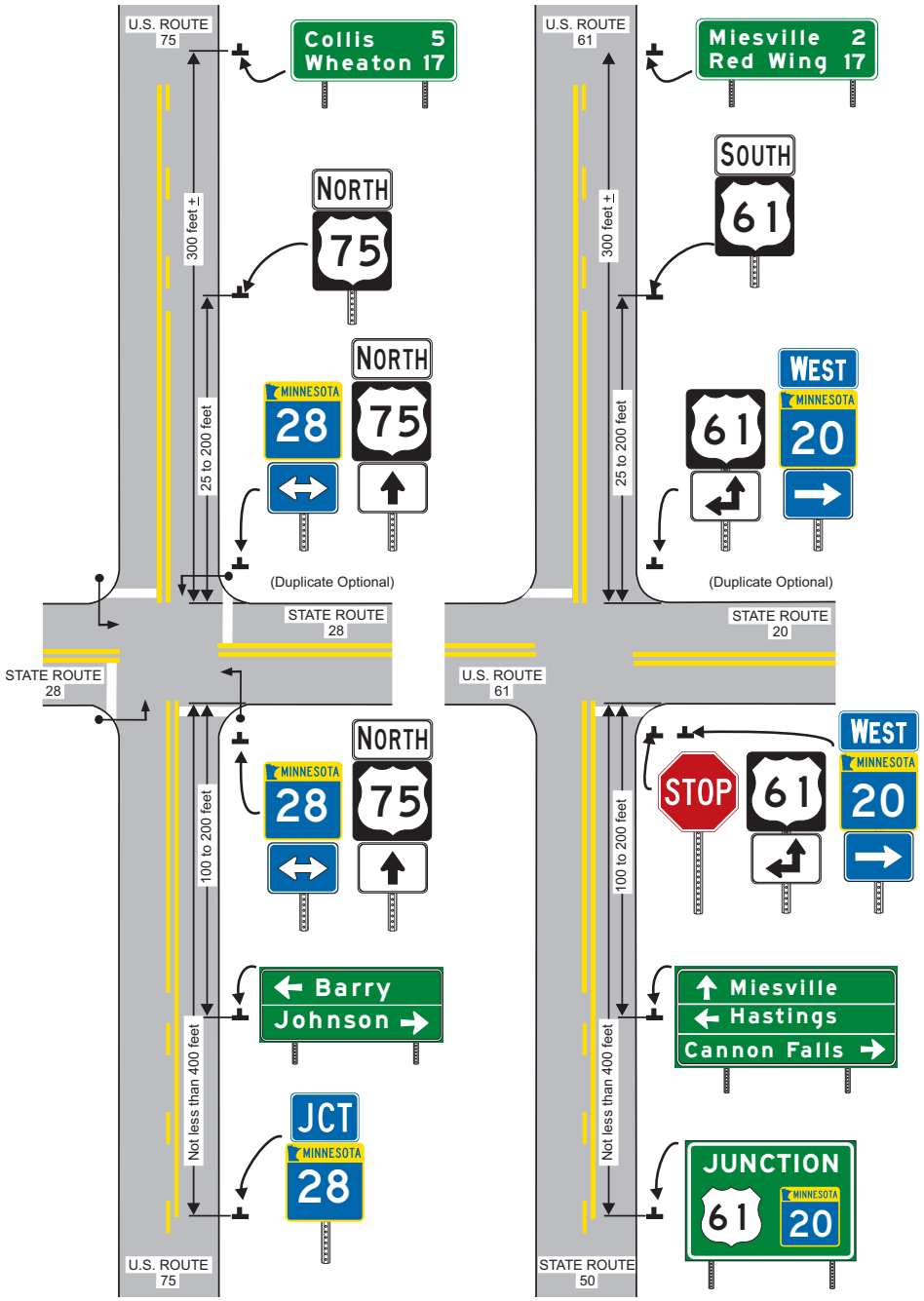
Figure 2D-6 shows typical placements of route signs.

2D.30 Junction Assembly

STANDARD:

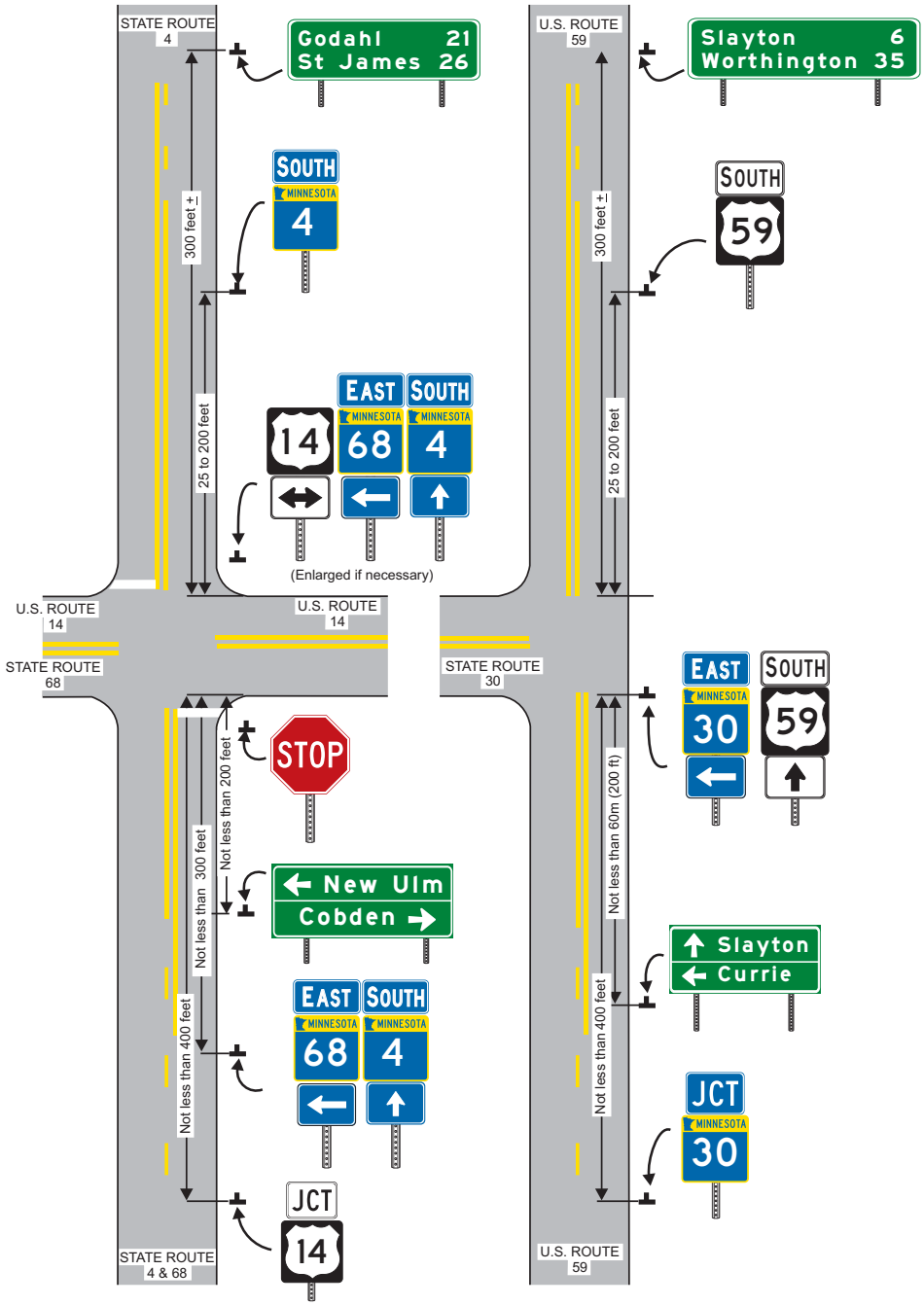
A Junction assembly shall consist of a Junction auxiliary sign and a route sign. The route sign shall carry the number of the intersected or joined route.

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.



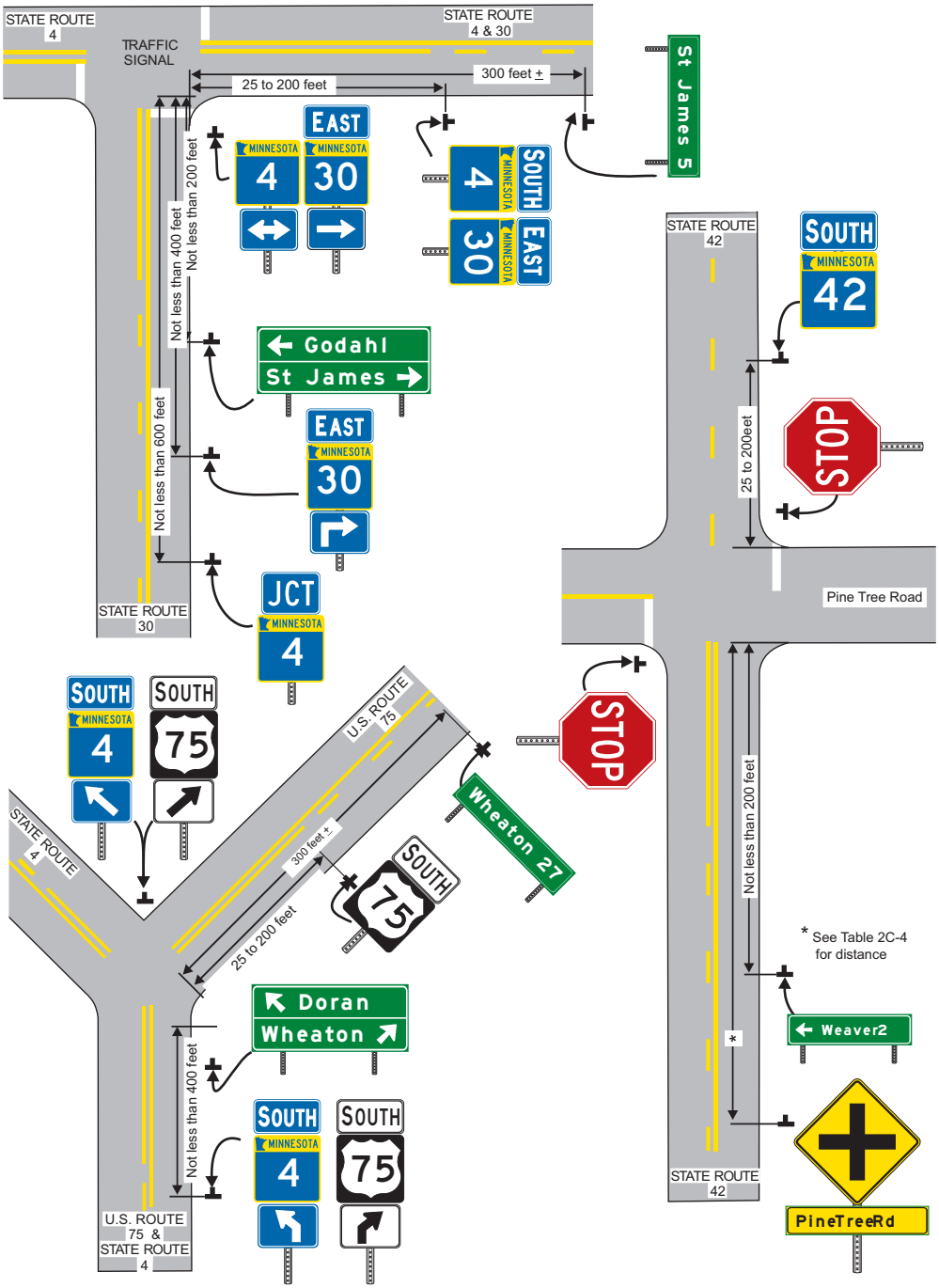
Note: The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions.

Figure 2D-6. Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only)
(Sheet 1 of 4)



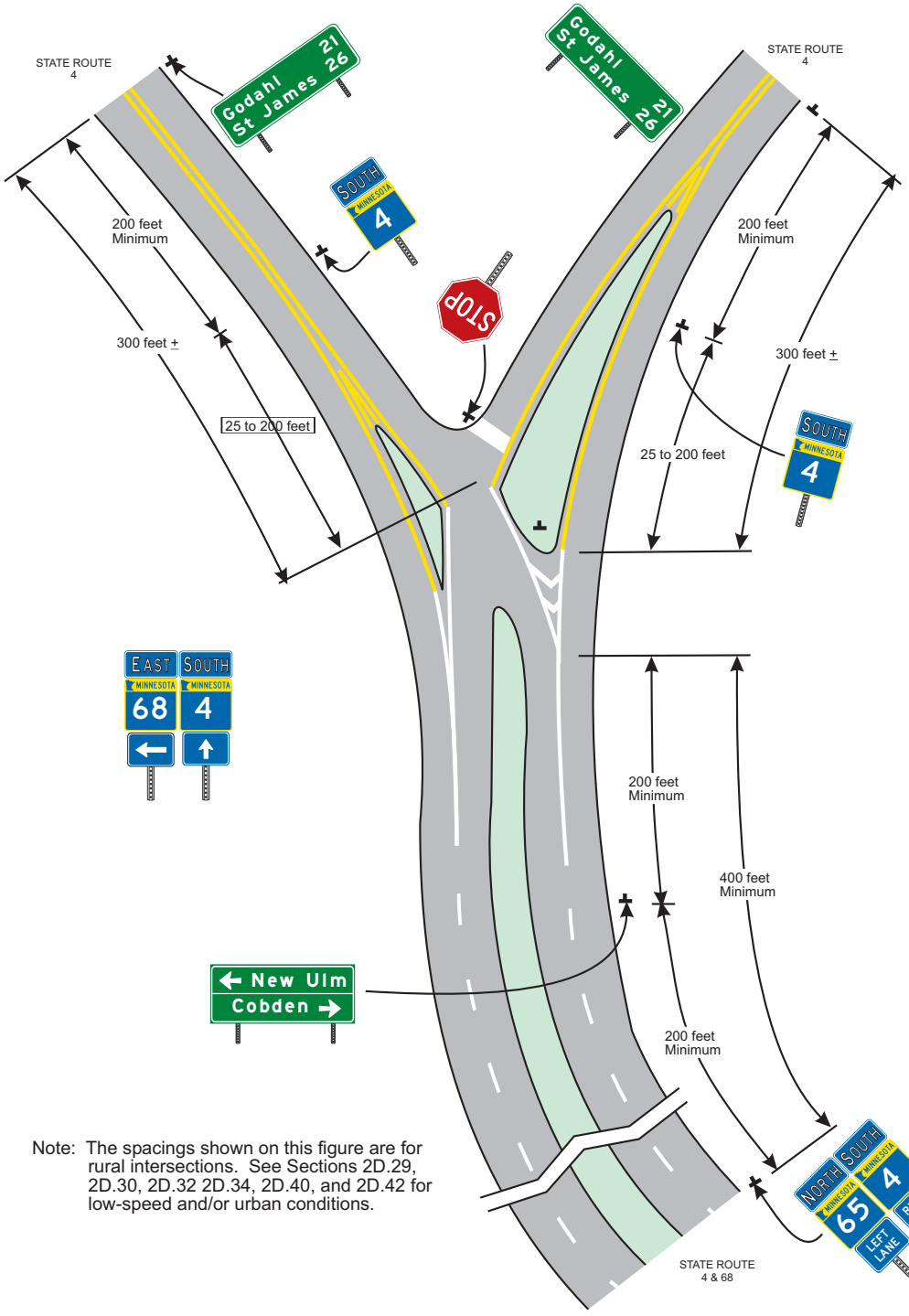
Note: The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions.

Figure 2D-6. Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only)
(Sheet 2 of 4)



Note: The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions.

Figure 2D-6. Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only)
(Sheet 3 of 4)



Note: The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions.

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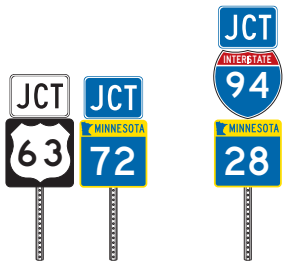
Figure 2D-6. Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only)
(Sheet 4 of 4)



Examples of Junction Assemblies

GUIDANCE:

In urban areas, the Junction assembly should be installed in the block preceding the intersection. In urban areas where speeds are low, the Junction assembly should not be installed more than 300 feet in advance of the intersection.

In rural areas, the Junction assembly should be installed at least 400 feet in advance of the intersection. In rural areas, the minimum distance between a Junction assembly and either a Destination sign or an Advance Route Turn assembly should be 200 feet.

Where speeds are high, greater spacings should be used.

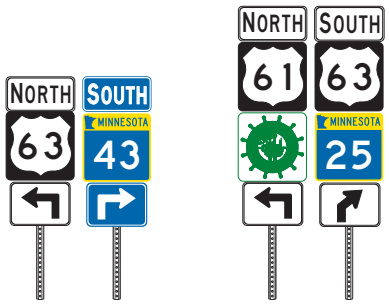
OPTION:

Where two or more routes are to be indicated, a single Junction auxiliary sign may be used for the assembly and all route signs grouped in a single mounting, or a Combination Junction (M2-2) sign (see Section 2D.14) may be used.

2D.31 Advance Route Turn Assembly

STANDARD:

An Advance Route Turn assembly shall consist of a route sign, an Advance Turn Arrow or word message auxiliary sign, and a Cardinal Direction auxiliary sign, if needed. It shall be installed in advance of an intersection where a turn must be made to remain on the indicated route.



Examples of Advance Route Turn Assemblies

OPTION:

The Advance Route Turn assembly may be used to supplement the required Junction assembly in advance of intersecting routes.

GUIDANCE:

Where a multiple-lane highway approaches an interchange or intersection with a numbered route, the Advance Route Turn assembly should be used to pre-position turning vehicles in the correct lanes from which to make their turn.

OPTION:

Lane Designation auxiliary signs (see Section 2D.27) may be used in Advance Route Turn Assemblies in place of the Advance Turn Arrow auxiliary signs where engineering judgment indicates that specific lane information associated with each route is needed and overhead signing is not practical and the designated lane is a mandatory movement lane. An assembly with the Lane Designation auxiliary signs may supplement or substitute for an assembly with Advance Turn Arrow auxiliary signs.

GUIDANCE:

In low-speed areas, the Advance Route Turn assembly should be installed not less than 200 feet in advance of the turn. In high-speed areas, the Advance Route Turn assembly should be installed not less than 300 feet in advance of the turn. In rural areas, the minimum distance between an Advance Route Turn assembly and either a Destination sign or a Junction assembly should be 200 feet.

STANDARD:

An assembly that includes an Advance Turn Arrow auxiliary sign shall not be placed where there is an intersection between it and the designated turn.

GUIDANCE:

Sufficient distance should be allowed between the assembly and any preceding intersection that could be mistaken for the indicated turn.

2D.32 Directional Assembly

STANDARD:

A Directional assembly shall consist of a Cardinal Direction auxiliary sign, if needed; a route sign; and a Directional Arrow auxiliary sign. The various uses of Directional assemblies shall be as provided in Items A through D:

A. Turn movements (indicated in advance by an Advance Route Turn assembly) shall be marked by a Directional assembly with a route sign displaying the number of the turning route and a single-headed arrow pointing in the direction of the turn.

B. The beginning of a route (indicated in advance by a Junction assembly) shall be marked by a Directional assembly with a route sign displaying the number of that route and a single-headed arrow pointing in the direction of the route.

C. An intersected route (indicated in advance by a Junction assembly) on a crossroad where the route is designated on both legs shall be designated by:

1. Two Directional assemblies, each with a route sign displaying the number of the intersected route, a Cardinal Direction auxiliary sign, and a single-headed arrow pointing in the direction of movement on that route; or
2. A Directional assembly with a route sign displaying the number of the intersected route and a double-headed arrow, pointing at appropriate angles to the left, right, or ahead.

D. An intersected route (indicated in advance by a Junction assembly) on a side road or on a crossroad where the route is designated only on one of the legs shall be designated by a Directional assembly with a route sign displaying the number of the intersected route, a Cardinal Direction auxiliary sign, and a single-headed arrow pointing in the direction of movement on that route.

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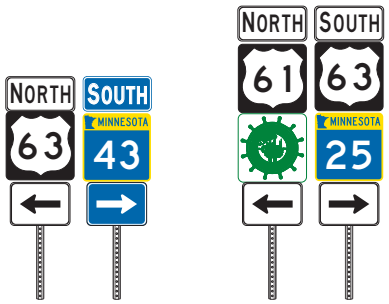


Examples of Directional Assemblies

GUIDANCE:

Straight-through movements should be indicated by a Directional assembly with a route sign displaying the number of the continuing route and a vertical upward pointing arrow. A Directional assembly should not be used for a straight-through movement in the absence of other assemblies indicating right or left turns, as the Confirming assembly sign beyond the intersection normally provides adequate guidance.

Directional assemblies should be located in advance of the intersection or on the near right corner of the intersection if approaching traffic must stop. At major intersections and at Y or offset intersections, additional Directional assemblies should be installed on the far right or left corner to confirm the near-side assemblies. When the near-corner position is not practical for Directional assemblies, the far right corner should be the preferred alternative, with oversized signs, if necessary, for legibility. Where unusual conditions exist, the location of a Directional assembly should be determined by engineering judgment with the goal being to provide the best possible combination of view and safety.

SUPPORT:

It is more important that guide signs be readable, and that the information and direction displayed thereon be readily understood, at the appropriate time and place than to be located with absolute uniformity.

Figure 2D-6 shows typical placements of Directional assemblies.

2D.33 Combination Lane-Use/Destination Overhead Guide Sign (D15-1)

OPTION:

At complex intersection approaches involving multiple turn lanes and destinations, a Combination Lane-Use/Destination (D15-1) overhead guide sign that combines a lane-use regulatory sign with destination information such as a cardinal direction, a route number, a street name, and/or a place name may be used.

SUPPORT:

At such locations, the combined information on the D15-1 signs can be even more effective than separate lane-use and guide signs for conveying to unfamiliar drivers which lane or lanes to use for a particular destination.

Figure 2D-7 shows an example of a D15-1 sign that combines lane-use and route number information and an example of a D15-1 sign that combines lane-use and street name information.

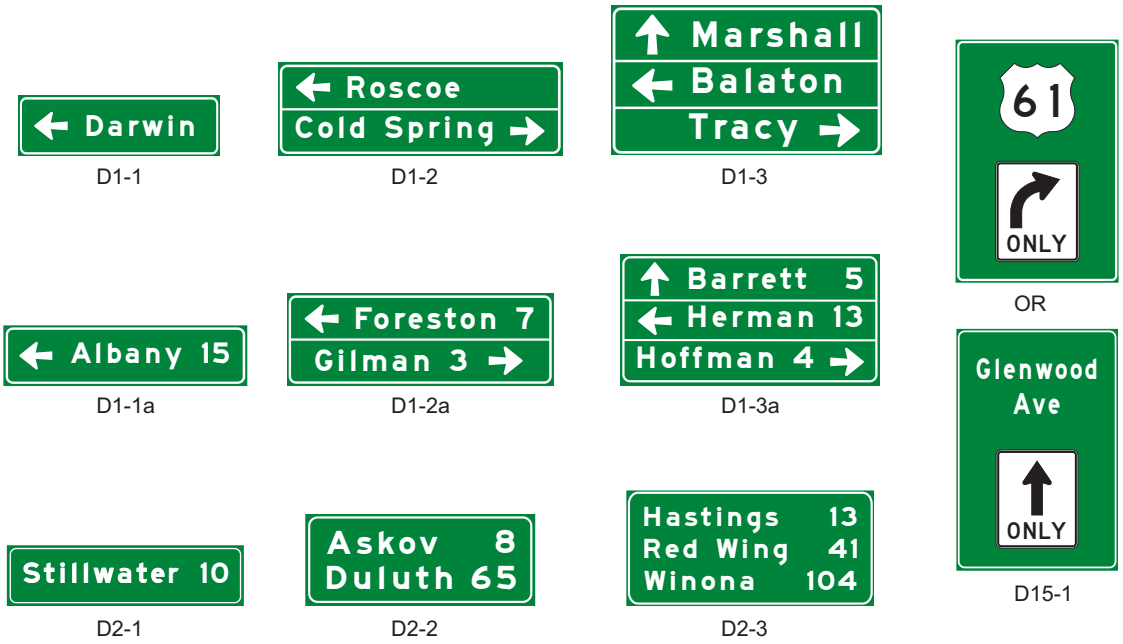


Figure 2D-7. Destination and Distance Signs

STANDARD:

The Combination Lane-Use/Destination (D15-1) overhead guide sign shall be used only where the designated lane is a mandatory movement lane. The D15-1 sign shall not be used for lanes with optional movements.

The D15-1 sign shall have a green background with a white border. As shown in Figure 2D-7, the lane-use sign (see Chapter 2B) shall be placed near the bottom of the sign and the destination information shall be placed near the top of the sign. The D15-1 sign shall be located approximately over the center of the lane to which it applies.

2D.34 Confirming or Reassurance Assemblies

STANDARD:

If used, Confirming or Reassurance assemblies shall consist of a Cardinal Direction auxiliary sign and a route sign. Where the Confirming or Reassurance 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 Confirming or Reassurance Assembly

GUIDANCE:

A Confirming assembly should be installed just beyond intersections of numbered routes. It should be placed 25 to 200 feet beyond the far shoulder or curb line of the intersected highway.

If used, Reassurance assemblies should be installed between intersections in urban areas as needed, and beyond the built-up area of any incorporated city or town.

Route signs for either confirming or reassurance purposes should be spaced at such intervals as necessary to keep road users informed of their routes.

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.

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

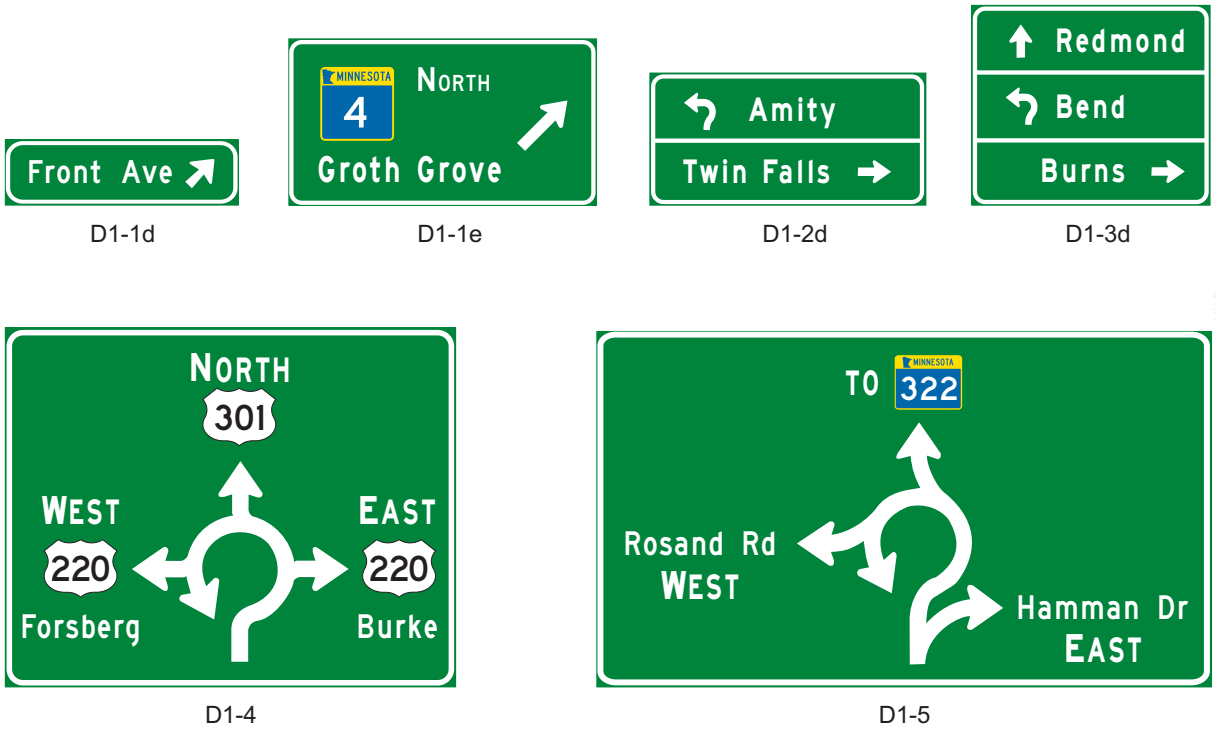


Figure 2D-8. Destination Signs for Roundabouts

intersection is non-typical, such as where more than four legs are present or where the legs are not at approximately 90-degree angles to each other.

STANDARD:

If used, diagrammatic guide signs for circular intersections shall not depict the number of lanes within the intersection circulatory roadway, or on its approaches or exits, through the use of lane lines, multiple arrow shafts for the same movement, or other methods.

SUPPORT:

Chapter 2B contains information regarding regulatory signs at circular intersections, Chapter 2C contains information regarding warning signs at circular intersections, and Chapter 3C contains information regarding pavement markings at circular intersections.

2D.39 Destination Signs at Jughandles

STANDARD:

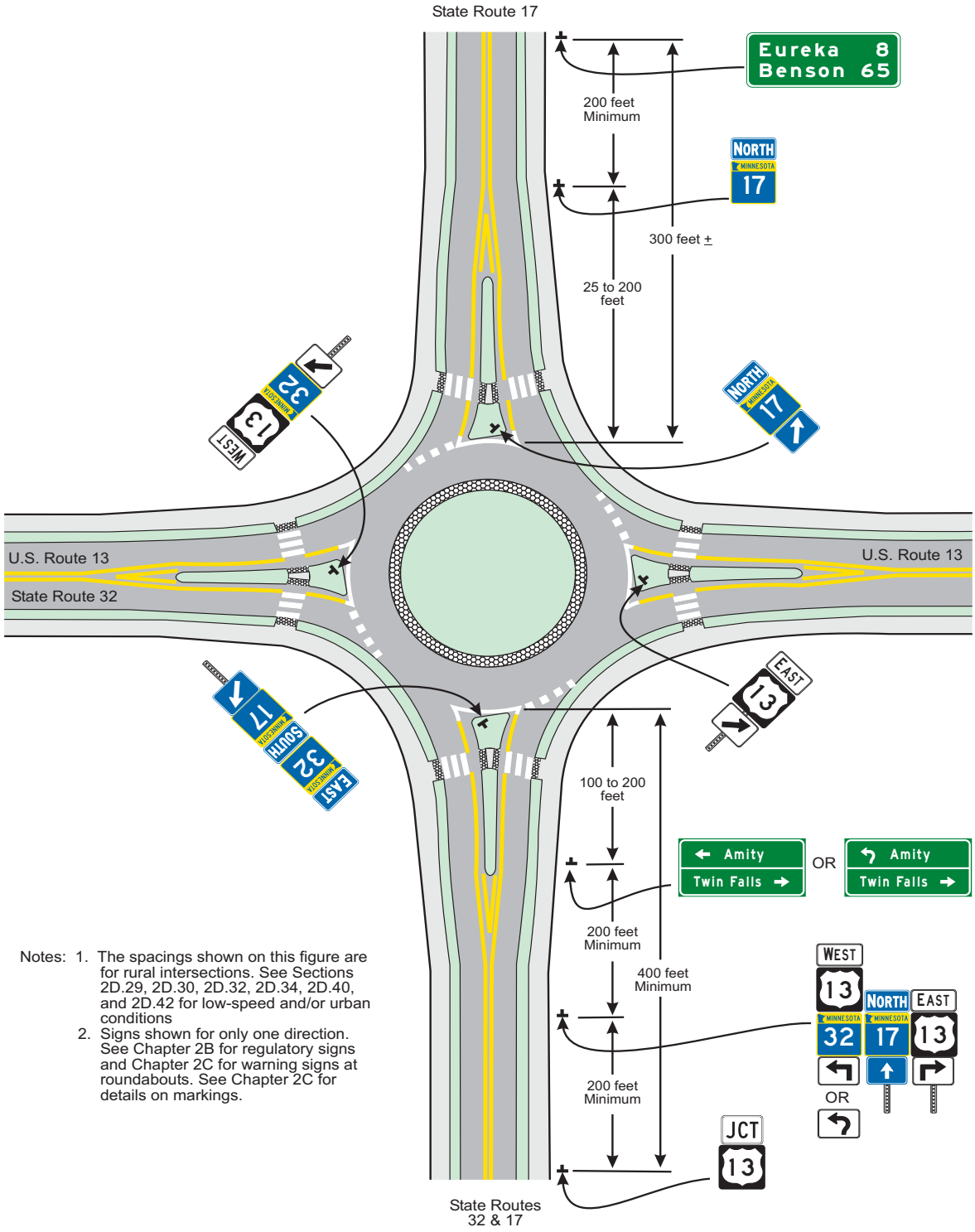
Destination signs that are used at jughandles shall comply with the provisions of Section 2D.37, except as provided in this Section.

OPTION:

If engineering judgment indicates that standard destination signs alone are insufficient to direct road users to their destinations at a jughandle, a diagrammatic guide sign depicting the appropriate geometry may be used to supplement the normal destination signs.

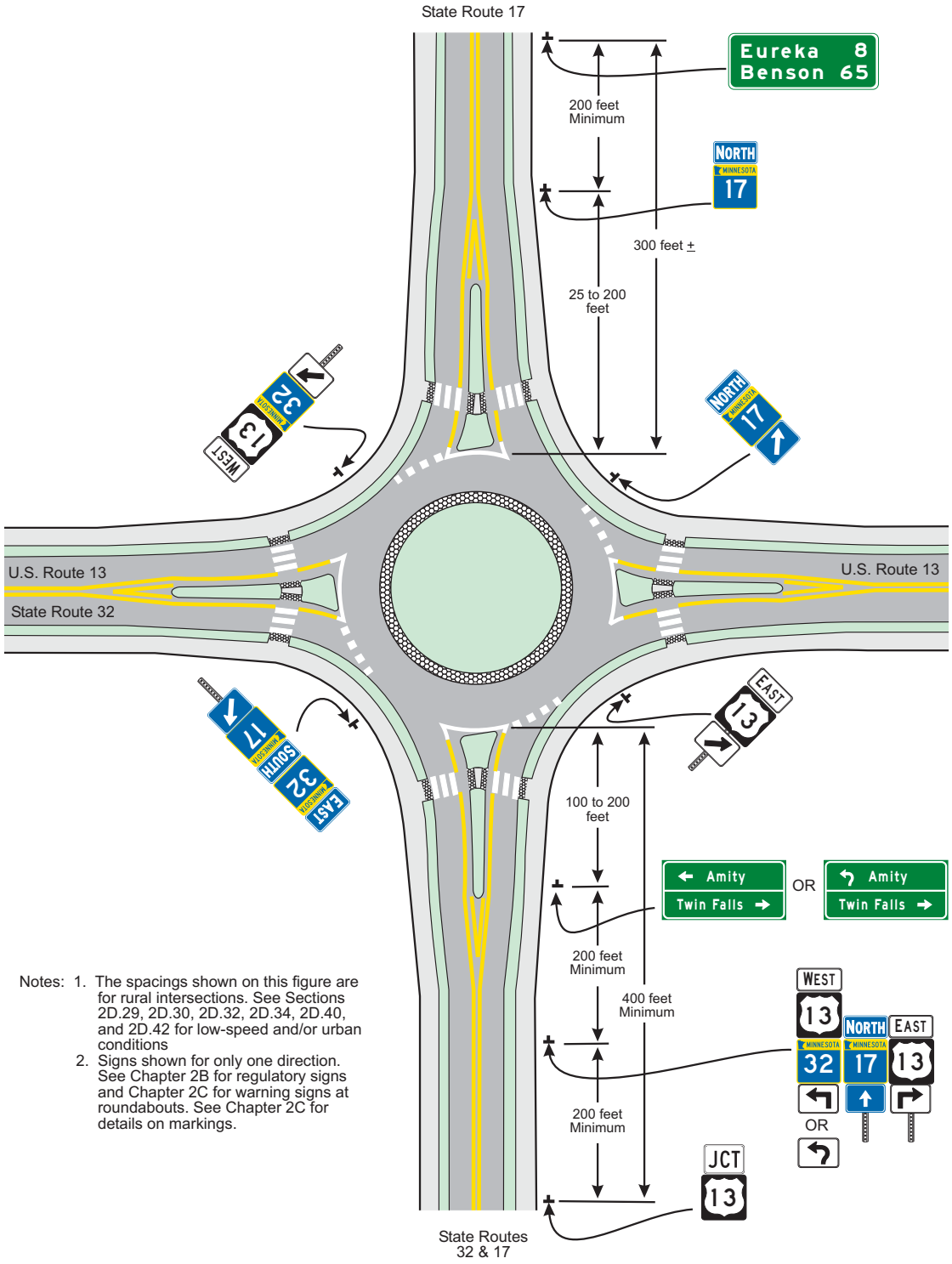
SUPPORT:

Section 2B.27 contains information regarding regulatory signs for jughandle turns. Figure 2B-9 shows examples of regulatory and destination guide signing for various types of jughandle turns.



Notes:
1. The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32, 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions
2. Signs shown for only one direction. See Chapter 2B for regulatory signs and Chapter 2C for warning signs at roundabouts. See Chapter 2C for details on markings.

Figure 2D-9. Examples of Guide Signs for Roundabouts (Sheet 1 of 2)



Notes: 1. The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32, 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions
2. Signs shown for only one direction. See Chapter 2B for regulatory signs and Chapter 2C for warning signs at roundabouts. See Chapter 2C for details on markings.

Figure 2D-9. Examples of Guide Signs for Roundabouts (Sheet 2 of 2)

2D.40 Location of Destination Signs

GUIDANCE:

When used in high-speed areas, Destination signs should be located 200 feet or more in advance of the intersection, and following any Junction or Advance Route Turn assemblies that might be required. In rural areas, the minimum distance between a Destination sign and either an Advance Route Turn assembly or a Junction assembly should be 200 feet.

OPTION:

In urban areas, shorter advance distances may be used.

Because the Destination sign is of lesser importance than the Junction, Advance Route Turn, or Directional assemblies, the Destination sign may be eliminated when sign spacing is critical.

SUPPORT:

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

2D.41 Distance Signs (D2 Series)

STANDARD:

If used, the Distance (D2-1 through D2-3) sign shall be a horizontal rectangle of a size appropriate for the required legend, carrying the names of no more than three cities, towns, junctions, or other traffic generators, and the distance (to the nearest mile) to those places.

The distance numerals shall be placed to the right of the destination names as shown in Figure 2D-7..

D2-1

D2-2

D2-3

GUIDANCE:

The distance displayed should be selected on a case-by-case basis by the jurisdiction that owns the road or by statewide policy. A well-defined central area or central business district should be used where one exists. In other cases, the layout of the community should be considered in relation to the highway being signed and the decision based on where it appears that most drivers would feel that they are in the center of the community in question.

The top name on the Distance sign should be that of the next place on the route having a post office or a railroad station, a route number or name of an intersected highway, or any other significant geographical identity. The bottom name on the sign should be that of the next major destination or control city. If three destinations are displayed, the middle line should be used to indicate communities of general interest along the route or important route junctions.

OPTION:

The choice of names for the middle line may be varied on successive Distance signs to give road users additional information concerning communities served by the route.

GUIDANCE:

The control city should remain the same on all successive Distance signs throughout the length of the route until that city is reached.

OPTION:

If more than one distant point may properly be designated, such as where the route divides at some distance ahead to serve two destinations of similar importance, and if these two destinations cannot appear on the same sign, the two names may be alternated on successive signs.

On a route continuing into another State, destinations in the adjacent State may be displayed.

2D.42 Location of Distance Signs

GUIDANCE:

If used, Distance signs should be installed on important routes leaving municipalities and just beyond intersections of numbered routes in rural areas. If used, they should be placed just outside the municipal limits or at the edge of the built-up area if it extends beyond the limits.

Where overlapping routes separate a short distance from the municipal limits, the Distance sign at the municipal limits should be omitted. The Distance sign should be installed approximately 90 m (300 ft) beyond the separation of the two routes.

Where, just outside of an incorporated municipality, two routes are concurrent and continue concurrently to the next incorporated municipality, the top name on the Distance sign should be that of the place where the routes separate; the bottom name should be that of the city to which the greater part of the through traffic is destined.

SUPPORT:

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

Type of Mounting	Type of Street or Highway	Speed Limit	Recommended Minimum Letter Height	
			Initial Upper-Case	Lower-Case
Overhead	All types	All speed limits	12 inches	9 inches
Post-Mounted	Multi-lane	More than 40 mph	8 inches	6 inches
Post Mounted	Multi-lane	40 mph or less	6 inches	4.5 inches
Post-Mounted	2-lane	All speed limits	6 inches*	4.5 inches*

*On local two-lane streets with speed limits of 25 mph or less, 4-inch initial upper-case letters with 3-inch lower-case letters may be used.

Table 2D-2. Recommended Minimum Letter Heights on Street Name Signs

2D.43 Street Name Sign (D3-1or D3-1a)

GUIDANCE:

Street Name (D3-1 or D3-1a) signs should be installed in urban areas at all street intersections regardless of other route signs that might be present and should be installed in rural areas to identify important roads that are not otherwise signed.

MN Rev. 2

OPTION:

For streets that are part of a U.S., State, or county numbered route, a D3-1a Street Name sign that incorporates a route shield may be used to assist road users who might not otherwise be able to associate the name of the street with the route number.

STANDARD:

The lettering for names of streets and highways on Street Name signs shall be composed of a combination of lower-case letters with initial upper-case letters (see Section 2A.13).

GUIDANCE:

Lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 6 inches in height and lower-case letters at least 4.5 inches in height.

MN Rev. 1

On multi-lane streets with speed limits greater than 40 mph, the lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 8 inches in height and lower-case letters at least 6 inches in height.

MN Rev. 1

D3-1

D3-1a

OPTION:

For local roads with speed limits of 25 mph or less, the lettering on post-mounted Street Name signs may be composed of initial upper-case letters at least 4 inches in height and lower-case letters at least 3 inches in height.

GUIDANCE:

If overhead Street Name signs are used, the lettering should be composed of initial upper-case letters at least 12 inches in height and lower-case letters at least 9 inches in height.

SUPPORT:

The recommended minimum letter heights for Street Name signs are summarized in Table 2D-2.

OPTION:

Supplementary lettering to indicate the type of street (such as Street, Avenue, or Road) or the section of the city (such as NW) on the D3-1 and D3-1a signs may be in smaller lettering, composed of initial upper-case letters at least 3 inches in height and lower-case letters at least 2.25 inches in height. Conventional abbreviations (see Section 1A.15) may be used except for the street name itself.

A pictograph (see definition in Section 1A.13) may be used on a D3-1 sign.

STANDARD:

Pictographs shall not be displayed on D3-1a or Advance Street Name (D3-2) signs (see Section 2D.44).

If a pictograph is used on a D3-1 sign, the height and width of the pictograph shall not exceed the upper-case letter height of the principal legend of the sign.

GUIDANCE:

The pictograph should be positioned to the left of the street name.

STANDARD:

The Street Name sign shall be retroreflective or illuminated to show the same shape and similar color both day and night. The color of the legend (and border, if used) shall contrast with the background color of the sign.

OPTION:

The border may be omitted from a Street Name sign.

An alternative background color other than the normal guide sign color of green may be used for Street Name (D3-1 or D3-1a) signs where the highway agency determines this is necessary to assist road users in determining jurisdictional authority for roads.

STANDARD:

Alternative background colors shall not be used for Advance Street Name (D3-2) signs (see Section 2D.44).

The only acceptable alternative background colors for Street Name (D3-1 or D3-1a) signs shall be blue, brown, or white. Regardless of whether green, blue, or brown is used as the background color for Street Name (D3-1 or D3-1a) signs, the legend (and border, if used) shall be white. For Street Name signs that use a white background, the legend (and border, if used) shall be black.

GUIDANCE:

An alternative background color for Street Name signs, if used, should be applied to the Street Name (D3-1 or D3-1a) signs on all roadways under the jurisdiction of a particular highway agency.

In business or commercial areas and on principal arterials, Street Name signs should be placed at least on diagonally opposite corners. In residential areas, at least one Street Name sign should be mounted at each intersection. Signs naming both streets should be installed at each intersection. They should be mounted with their faces parallel to the streets they name.

OPTION:

To optimize visibility, Street Name signs may be mounted overhead. Street Name signs may also be placed above a regulatory or STOP or YIELD sign with no required vertical separation.

GUIDANCE:

In urban or suburban areas, especially where Advance Street Name signs for signalized and other major intersections are not used, the use of overhead Street Name signs should be strongly considered.

OPTION:

At intersection crossroads where the same road has two different street names for each direction of travel, both street names may be displayed on the same sign along with directional arrows.

On lower speed roadways, historic street name signs within locally identified historic districts that are consistent with the criteria contained in 36 CFR 60.4 for such structures and districts may be used without complying with the provisions of the 1st Standard; 2nd Guidance, 1st paragraph; 2nd Option; 3rd Option, 1st paragraph; 2nd Standard, 2nd paragraph; 4th Guidance; 3rd Standard; 4th Standard, 2nd paragraph; and 5th Guidance of this section.

SUPPORT:

Information regarding the use of street names on supplemental plaques for use with intersection-related warning signs is contained in Section 2C.58.

MN Rev. 1

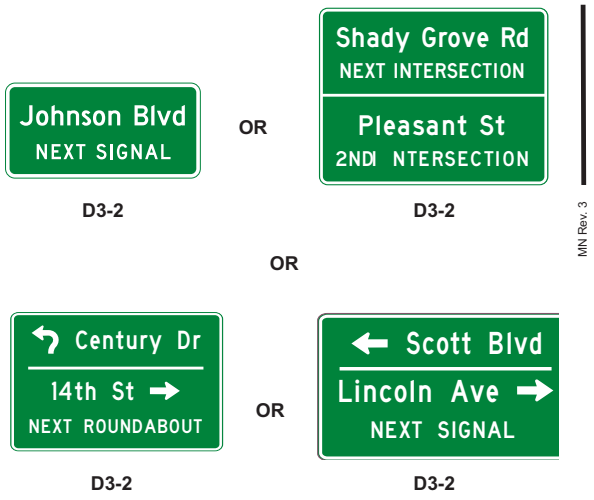
2D.44 Advance Street Name Sign (D3-2)

SUPPORT:

Advance Street Name (D3-2) signs identify an upcoming intersection. Although this is often the next intersection, it could also be several intersections away in cases where the next signalized intersection is referenced.

STANDARD:

Advance Street Name (D3-2) signs, if used, shall supplement rather than be used instead of the Street Name (D3-1) signs at the intersection.



MN Rev. 3

OPTION:

Advance Street Name (D3-2) signs may be installed in advance of signalized or unsignalized intersections to provide road users with advance information to identify the name(s) of the next intersecting street to prepare for crossing traffic and to facilitate timely deceleration and/or lane changing in preparation for a turn.

GUIDANCE:

On arterial highways in rural areas, Advance Street Name signs should be used in advance of all signalized intersections and in advance of all intersections with exclusive turn lanes.

In urban areas, Advance Street Name signs should be used in advance of all signalized intersections on major arterial streets, except where signalized intersections are so closely spaced that advance placement of the signs is impractical.

The heights of the letters on Advance Street Name signs should be the same as those used for Street Name signs (see Section 2D.43).

STANDARD:

If used, Advance Street Name signs shall have a white legend and border on a green background.

If used, Advance Street Name signs shall provide the name(s) of the intersecting street(s) on the top line(s) of the legend and the distance to the intersecting streets or messages such as NEXT SIGNAL, NEXT INTERSECTION, NEXT ROUNDABOUT, or directional arrow(s) on the bottom line of the legend.

Pictographs shall not be displayed on Advance Street Name signs.

OPTION:

Directional arrow(s) may be placed to the right or left of the street name or message such as NEXT SIGNAL, as appropriate, rather than on the bottom line of the legend. Curved-stem arrows may be used on Advance Street Name signs on approaches to circular intersections.

For intersecting crossroads where the same road has a different street name for each direction of travel, the different street names may be displayed on the same Advance Street Name sign along with directional arrows.

In advance of two closely-spaced intersections where it is not practical to install separate Advance Street Name signs, the Advance Street Name sign may include the street names for both intersections along with appropriate supplemental legends for both street names, such as NEXT INTERSECTION, 2ND INTERSECTION, or NEXT LEFT and NEXT RIGHT, or directional arrows.

GUIDANCE:

If two street names are used on the Advance Street Name sign, the street names should be displayed in the following order:

A. For a single intersection where the same road has a different street name for each direction of travel, the name of the street to the left should be displayed above the name of the street to the right; or
B. for two closely-spaced intersections, the name of the first street encountered should be displayed above the name of the second street encountered, and the arrow associated with the second street encountered should be an advance arrow, such as the arrow shown on the W16-6P arrow plaque (see Figure 2C-12).

OPTION:

An Advance Street Name (W16-8P or W16-8aP) plaque (see Section 2C.58) with black legend on a yellow background, installed supplemental to an Intersection (W2 series) or Advance Traffic Control (W3 series) warning sign may be used instead of an Advance Street Name guide sign.

2D.45 Signing on Conventional Roads on Approaches to Interchanges

MN Rev. 1

SUPPORT:

Because there are a number of different ramp configurations that are commonly used at interchanges with conventional roads, drivers on the conventional road cannot reliably predict whether they will be required to turn left or right in order to enter the correct ramp to access the freeway or expressway in the desired direction of travel. Consistently applied signing for conventional road approaches to freeway or expressway interchanges is highly desirable.

STANDARD:

On multi-lane conventional roads approaching an interchange, guide signs shall be provided to identify which direction of turn is to be made and/or which specific lane to use for ramp access to each direction of the freeway or expressway.

GUIDANCE:

The signing of conventional roads with one lane of traffic approaching an interchange should consist of a sequence containing the following signs (see Figure 2D-11):

A. Junction Assembly
B. Destination sign
C. Directional Assembly or Entrance Direction sign for the first ramp
D. Advance Route Turn Assembly or Advance Entrance Direction sign with an advance turn arrow
E. Directional Assembly or Entrance Direction sign for the second ramp

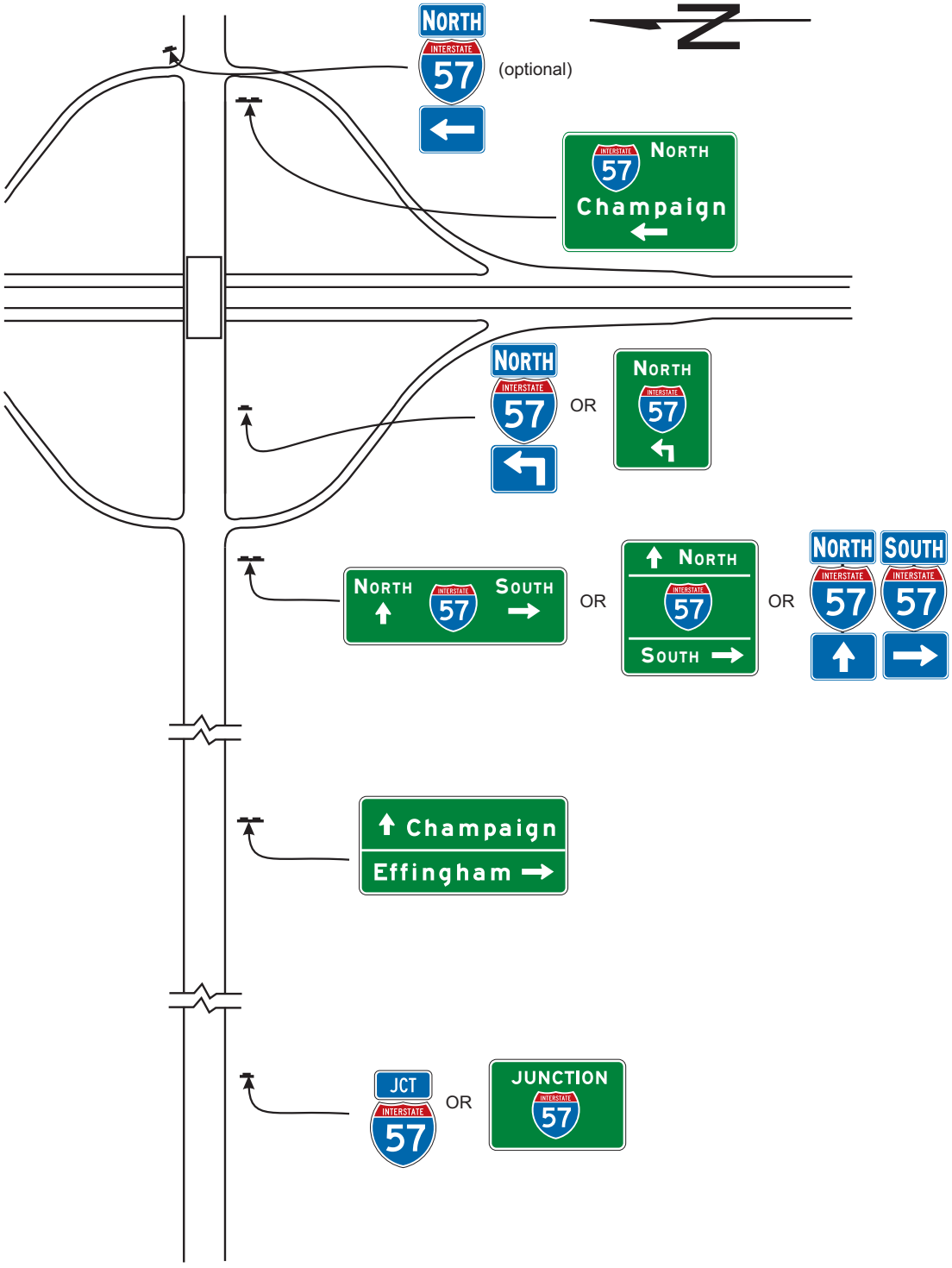


Figure 2D-11. Example of Interchange Crossroad Signing for a One-Lane Approach

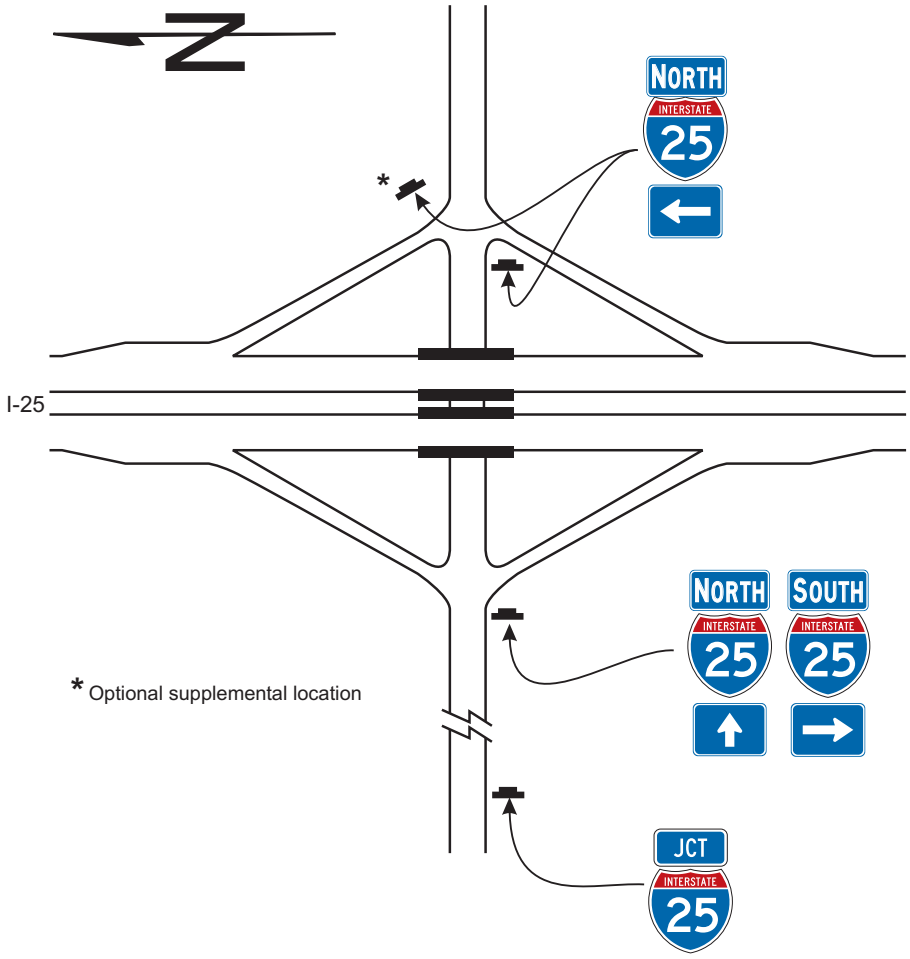


Figure 2D-12. Example of Minor Interchange Crossroad Signing

STANDARD:

If used, the Entrance Direction sign shall consist of a white legend and border on a green background. It shall contain the freeway or expressway route shield(s), cardinal direction, and directional arrow(s).

OPTION:

The Entrance Direction sign may contain a destination(s) and/or an action message such as NEXT RIGHT.

At minor interchanges, the following sequence of signs may be used (see Figure 2D-12):

A. Junction Assembly
B. Directional Assembly for the first ramp
C. Directional Assembly for the second ramp

GUIDANCE:

On multi-lane conventional roads approaching an interchange, the sign sequence should contain the following signs (see Figures 2D-13 through 2D-15):

A. Junction Assembly
B. Advance Entrance Direction sign(s) for both directions (if applicable) of travel on the freeway or expressway
C. Entrance Direction sign for first ramp
D. Advance Turn Assembly
E. Entrance Direction sign for the second ramp

SUPPORT:

Advance Entrance Direction signs are used to direct road users to the appropriate lane(s).

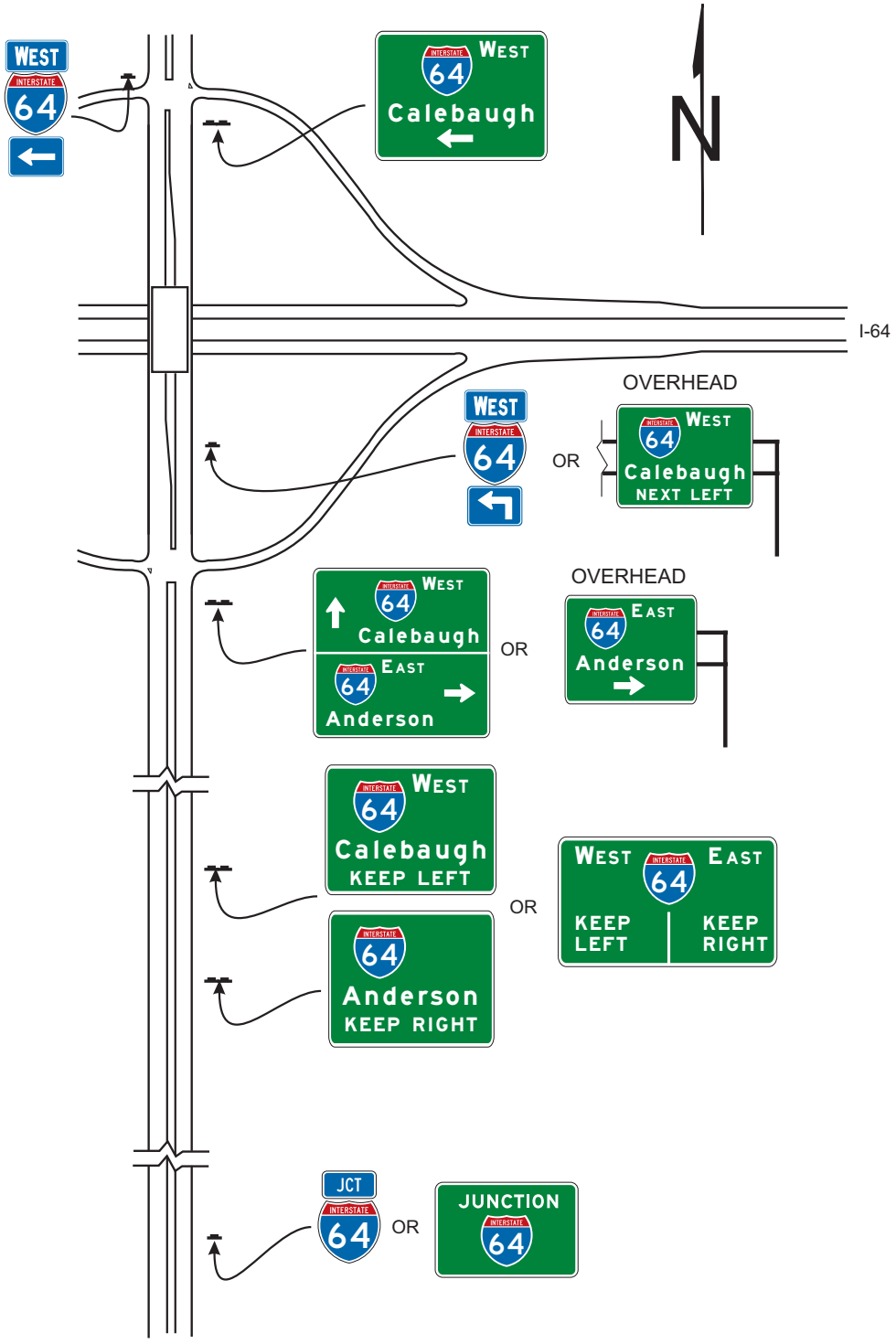


Figure 2D-13. Example of Multi-Lane Crossroad Signing for a Diamond Interchange

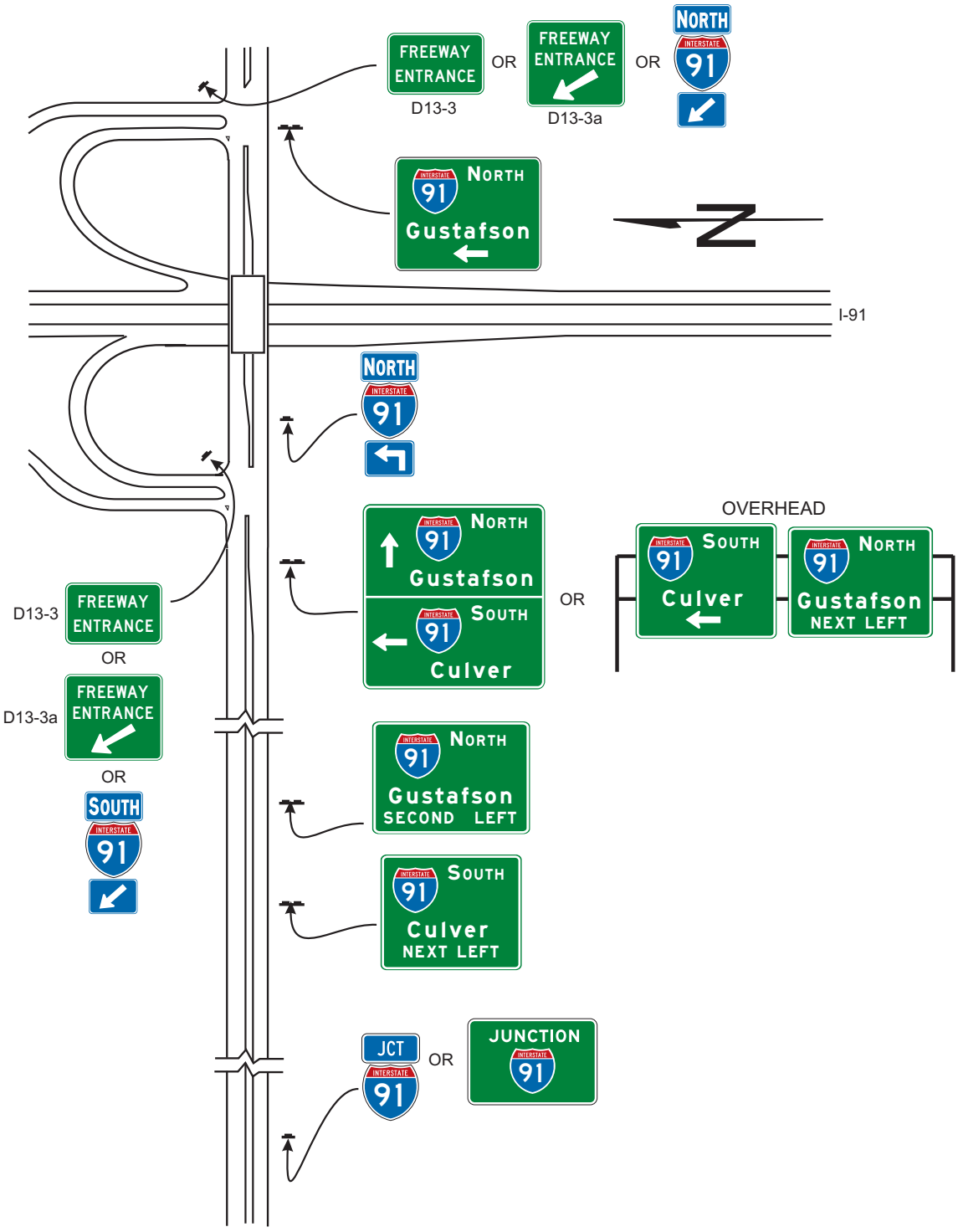


Figure 2D-14. Example of Multi-Lane Crossroad Signing for a Partial Cloverleaf Interchange

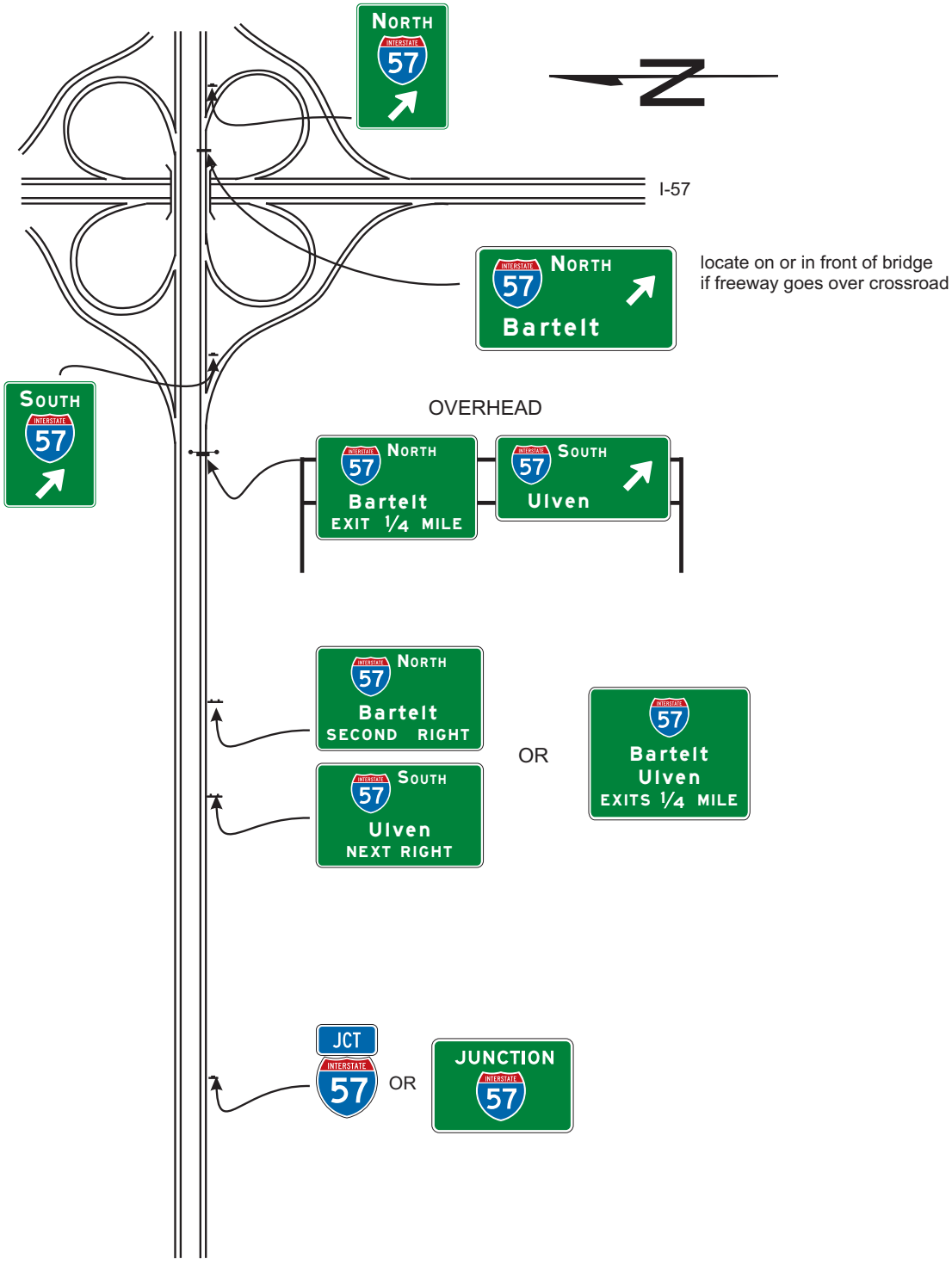


Figure 2D-15. Examples of Multi-Lane Crossroad Signing for a Cloverleaf Interchange

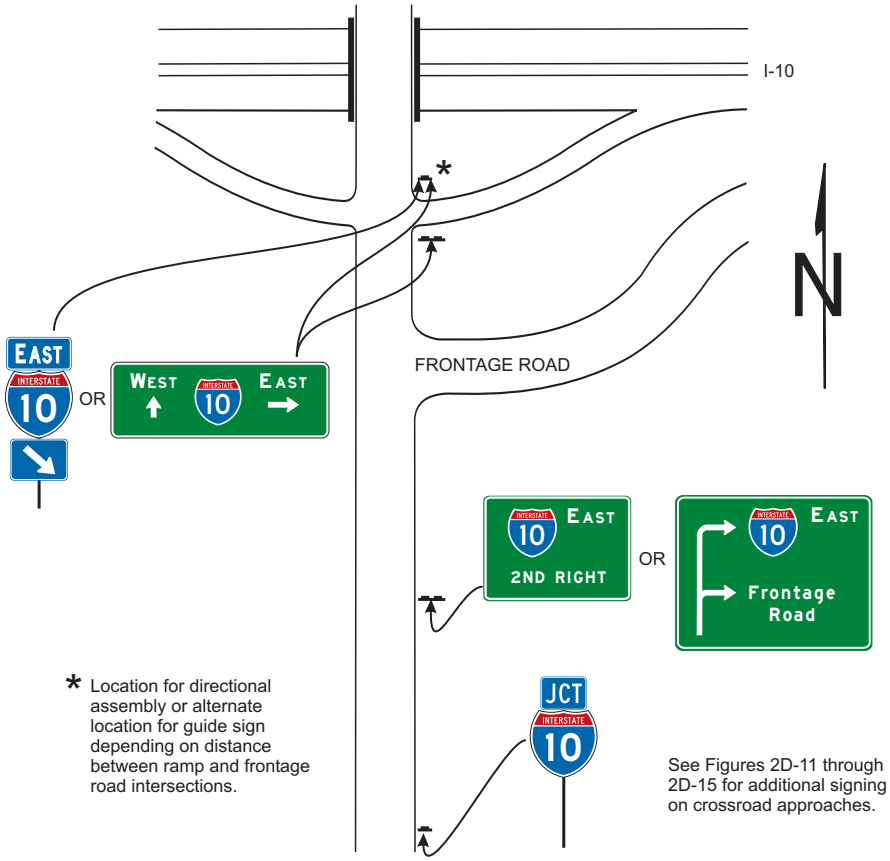


Figure 2D-16 Example of Crossroad Signing for an Entrance Ramp with a Nearby Frontage Road

STANDARD:

The Advance Entrance Direction sign shall consist of a white legend and border on a green background. It shall contain the freeway or expressway route shield(s) and cardinal direction(s).

OPTION:

The Advance Entrance Direction sign may have destinations, directional arrows, and/or an action message such as KEEP LEFT, NEXT LEFT, or SECOND RIGHT. Signs in this sequence may be mounted overhead to improve visibility as shown in Figures 2D-13 through 2D-15.

SUPPORT:

A post-mounted Advance Entrance Direction diagrammatic guide sign (see Figure 2D-16), within the sequence of approach guide signing described in Paragraphs 3, 6, and 7, might be helpful in depicting the location of a freeway or expressway entrance ramp that is in close proximity to an intervening intersection on the same side of the approach roadway and where signing for only the ramp might cause confusion to road users.

STANDARD:

If used, the post-mounted Advance Entrance Direction diagrammatic guide sign shall display only the two successive turns from the same side of the roadway, one of which shall be the entrance ramp. The post-mounted Advance Entrance Direction sign shall depict only the successive turns and shall not depict lane use with lane lines, multiple arrow shafts for the approach roadway, action messages, or other representations.

SUPPORT:

Section 2D.46 contains information regarding the use of a Directional assembly or a FREEWAY ENTRANCE sign to mark the entrance to a freeway or expressway at the far corner of an intersection.

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6. SIGNING PLAN DESIGN AND PLAN SETS

6.1 Signing Plan Assembly Steps

The sample plan set is included in Chapter **7**. The sample plan has been organized to follow an established format. As the designer progresses through the following numbered sequential steps in assembling a complete signing plan, refer to the appropriate sheets in the Sample Signing Plan for clarification. The Sample Signing Plan may be downloaded from the MnDOT OTST website in whole or in parts (e.g. the entire plan is saved in Adobe Reader Format .pdf and portions of the plan are available in Microstation Design File Format .dgn, such that these sheets may be included directing into a new sign plan).

1. Begin with a Microstation seed file.
   For seed files, cell libraries, CADD standards and file naming conventions see MnDOT web site: http://www.dot.state.mn.us/caes/cadd/

   Name the file (see MNDOT-CDStds-a4-FILENM.PDF for naming conventions)

   Example CT2785-459_ps.dgn (Consultant Signing plan for SP 2785-459)

2. Attach coordinate correct reference files (roadway mapping and alignments)
3. Place all signs on roadway plan sheet for each direction of travel. Orient the sign cells so they face the appropriate direction of traffic (see sample plans)
   - See MUTCD and TEM for placement and spacing of signs
   - Design all necessary guide signs in SignCAD. Refer to MnDOT "Traffic Guide Sign Design Manual" for standards, policies and procedures.

   NOTE: For signing plans involving replacement of existing signs, a complete field review is required to document sign legends, sign sizes and existing sign structures.

4. Label signs in an orderly fashion beginning at the left edge of the first sheet and progressing through the last roadway sheet. It is acceptable to have minor disruptions in the orderly labelling sequence.
   NOTE: refer to the TEM Chapter 6 section 6-4 for information on how MnDOT classifies signs by design type (A, C, D, EA, EO and OH).
   - New signs get labeled with their sign type and a unique A type number similar to an OH sign number. Type A signs have a unique numbers assigned to them. Contact the OTST Signing Unit to obtain new OH sign numbers (Brian Barrett 651-234-7374)

   EXAMPLE: A I94-001, A I94-002, A MN280-001 etc. for new A signs. C-1, C-2, C-3 etc. for new C signs. D-1, D-2, for new D signs
   - Existing signs being removed are labeled with their sign type and a sequential number beginning with 101
   - Except Type C signs and Delineators and Markers

EXAMPLE: A I94-101, A I04-102, A MN280-101 etc. for Type A signs being removed. D-101, D-102, for Type D signs being removed. * C signs being removed DO NOT NEED TO BE LABELLED THIS WAY. C signs are shown on the roadway and totaled in the Statement of Estimated quantities, but do not need to be labelled C-101, C102) *See sample Signing plans.

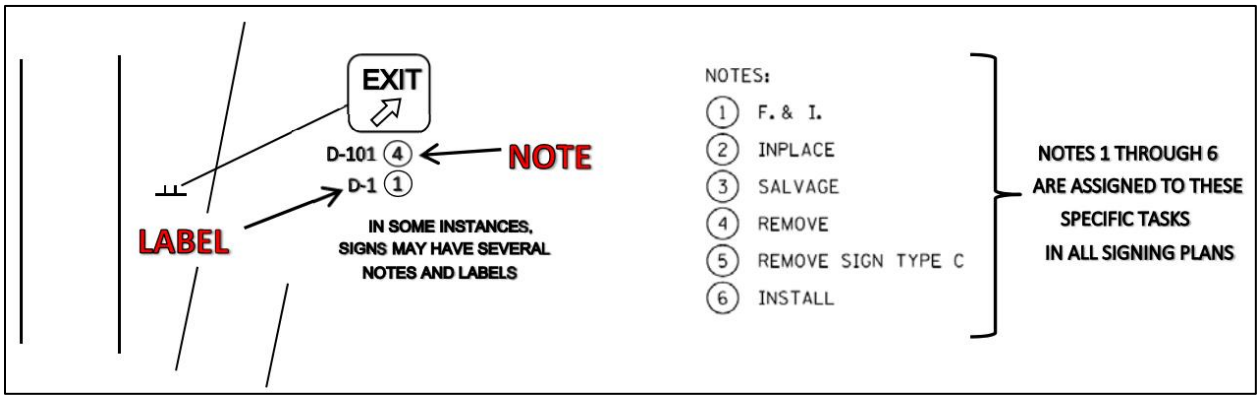
- Existing signs being Salvaged are labelled with their sign type and a sequential number beginning with 201

EXAMPLE: A I94-201, A I94-202. C-201, C-202 etc.

All completely identical Type C, D, EA, and EO signs receive the same label throughout the plan.

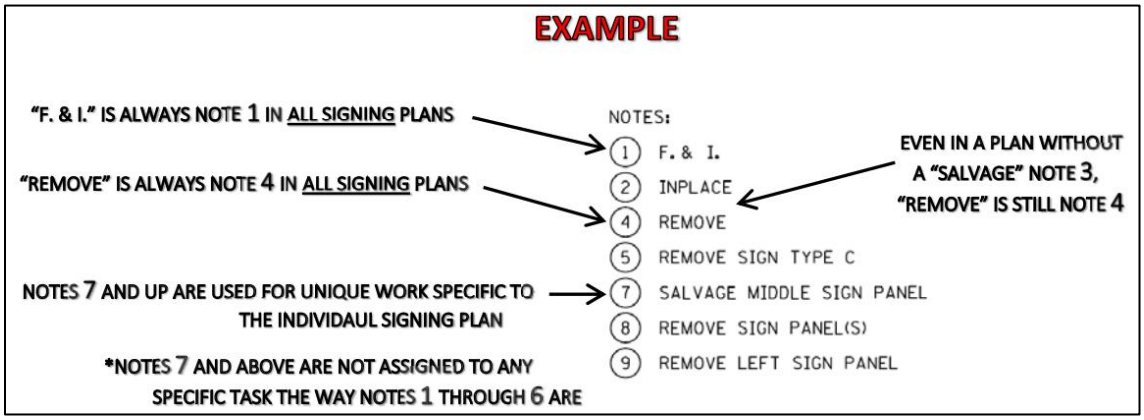
NOTE: Different labels are required if the signs have differences in mounting, size, etc. (for example, a 36" x 36" STOP sign needs a different label than a 48" x 48" STOP sign, or a 36" x 36" R5-1 sign mounted on U posts in dirt would get a different label than a 36" x 36" R5-1 mounted on a square tube post in concrete)

- Circled numbers (notes) describing the work to be done to the sign follow the label



Notes 1 through 6 describe common signing situations or tasks and are consistent in all signing plans.

Notes 7 and beyond will vary by plan depending on the work required in the individual signing plan



Type OH signs have a unique numbers assigned to them. Contact the OTST Signing Unit to obtain new OH sign numbers (Brian Barrett 651-234-7374)

5. Show appropriate delineation and markers. See TEM Chapter 6 for details. A note may be used to indicate standard delineation at standard exit ramp/loops. See sample Signing plans.
6. Organize roadway into plan sheets:
    - Begin with mainline roadway from start to finish of the project.
    - Stationing generally increasing from left to right
    - Interchange/intersections follow mainline roadway
    - Label all roadways, cross streets and bridges
    - Place “north” arrow and scale on all sheets
    - Eliminate all unnecessary elements in the file

When all the sign panels, delineators and markers are placed on the roadway layouts, with labels and notes, and the roadway layouts are organized into plan sheets, the plan is considered 60% complete. It is ready for initial review. Print outs of these roadway layouts, and Type A, D, EA, EO and OH panel designs should be submitted to MnDOT for review.

7. Utilities: Compile a list of the utility companies within the project limits for inclusion in the plan.
8. Design Type A and OH sign structures following the cross section format in the sample plan.
9. Create estimated quantities tabulation and appropriate data boxes for each sign type and the work being done to the sign. See Master tabs and sample plan.
10. Assemble all necessary structural and detail sheets.
11. Complete the title sheet (if signing plan is not part of a larger construction project)
12. Assemble all plan sheets in their proper order (see sample plan)
13. Number all plan sheets
14. Verify all cross sheet referencing in the plan.

6.2 Plan Set

Standard detail sheets for signing plans can be found on the OTST website:

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

The at-grade sign plan format and sequence of details shall, generally, be as follows:

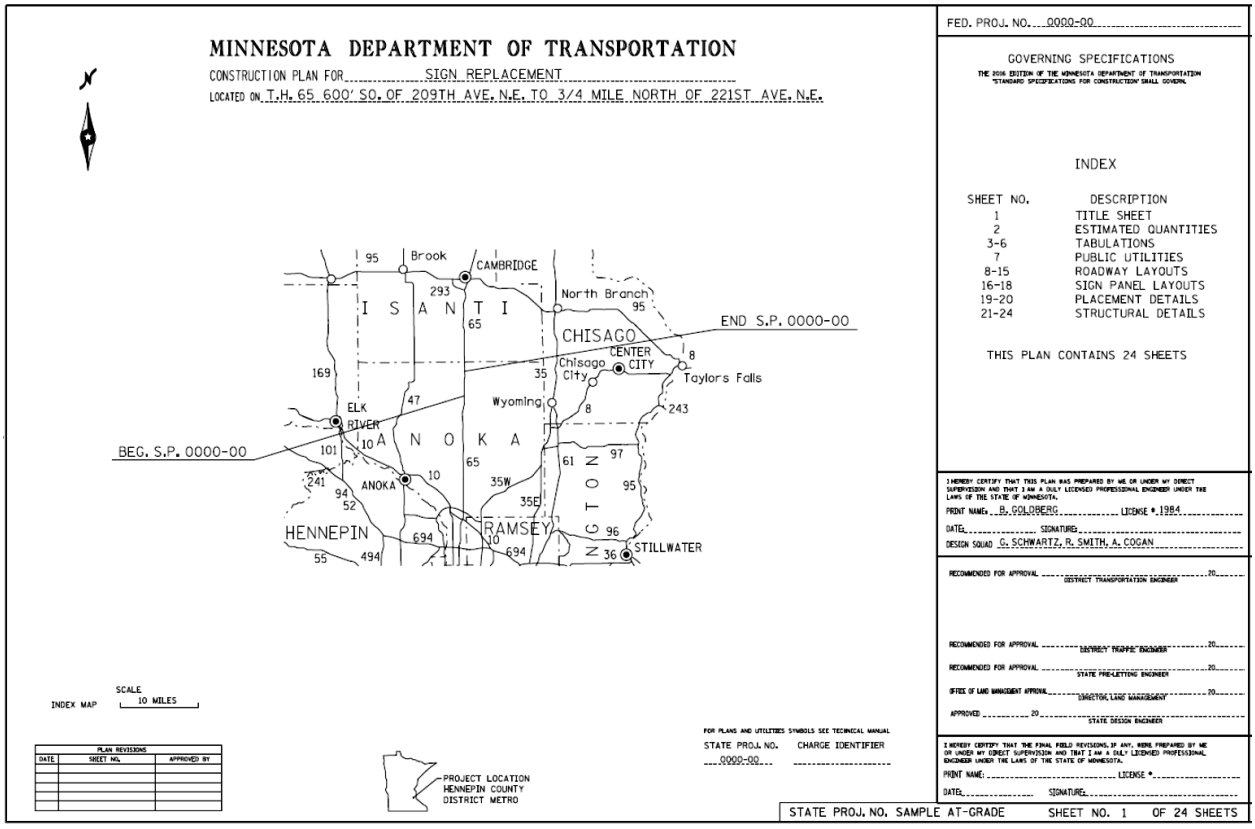
1. Title sheet.
2. Estimated quantities.
3. Sign data sheets giving pertinent information for each sign.
4. Public utilities
5. Roadway plan sheets showing signing for mainline and interchanges.
6. Sign panel drawings for all non-standard signs.
7. Placement details.
8. Structural details.

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.

6.3 Title Sheet

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 (see Chapter **7** for a larger format).



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 2016 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	ESTIMATED QUANTITIES
3-6	TABULATIONS
7	PUBLIC UTILITIES
8-15	ROADWAY LAYOUTS
16-18	SIGN PANEL LAYOUTS
19-20	PLACEMENT DETAILS
21-24	STRUCTURAL DETAILS

THIS PLAN CONTAINS 24 SHEETS

BEG. S.P. 0000-00

END S.P. 0000-00

ISANTI · CHISAGO · ANOKA · HENNEPIN · RAMSEY · WASHINGTON

Brook · CAMBRIDGE · North Branch · CHISAGO CITY · CENTER CITY · Chisago City · Taylors Falls · Wyoming · ELK RIVER · ANOKA · STILLWATER

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 B. GOLDBERG LICENSE # 1984

DATE SIGNATURE

DESIGN SQUAD G. SCHWARTZ, R. SMITH, A. COGAN

RECOMMENDED FOR APPROVAL DISTRICT TRANSPORTATION ENGINEER 20

RECOMMENDED FOR APPROVAL DISTRICT TRAFFIC ENGINEER 20

RECOMMENDED FOR APPROVAL STATE PRE-LETTING ENGINEER 20

OFFICE OF LAND MANAGEMENT APPROVAL DIRECTOR, LAND MANAGEMENT 20

APPROVED 20 STATE DESIGN ENGINEER

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.

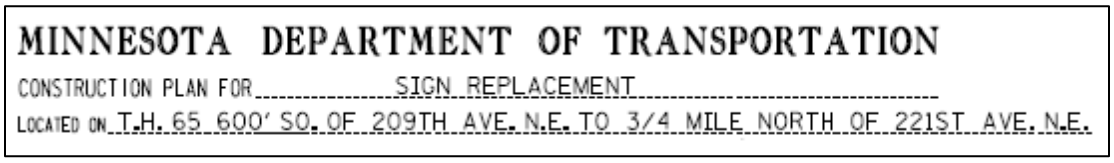
PRINT NAME LICENSE #

DATE SIGNATURE

STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 1 OF 24 SHEETS

6.3.1 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 SIGN REPLACEMENT

LOCATED ON T.H. 65 600' SO. OF 209TH AVE. N.E. TO 3/4 MILE NORTH OF 221ST AVE. N.E.

6.3.2 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 2016 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION 'STANDARD SPECIFICATIONS FOR CONSTRUCTION' SHALL GOVERN.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	ESTIMATED QUANTITIES
3-6	TABULATIONS
7	PUBLIC UTILITIES
8-15	ROADWAY LAYOUTS
16-18	SIGN PANEL LAYOUTS
19-20	PLACEMENT DETAILS
21-24	STRUCTURAL DETAILS

THIS PLAN CONTAINS 24 SHEETS

6.3.3 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 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: B. GOLDBERG LICENSE # 1984

DATE: _____ SIGNATURE: _____

DESIGN SQUAD G. SCHWARTZ, R. SMITH, A. COGAN

6.3.4 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. SAMPLE AT-GRADE	SHEET NO. 1	OF 24 SHEETS

6.3.5 Signature Block

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.

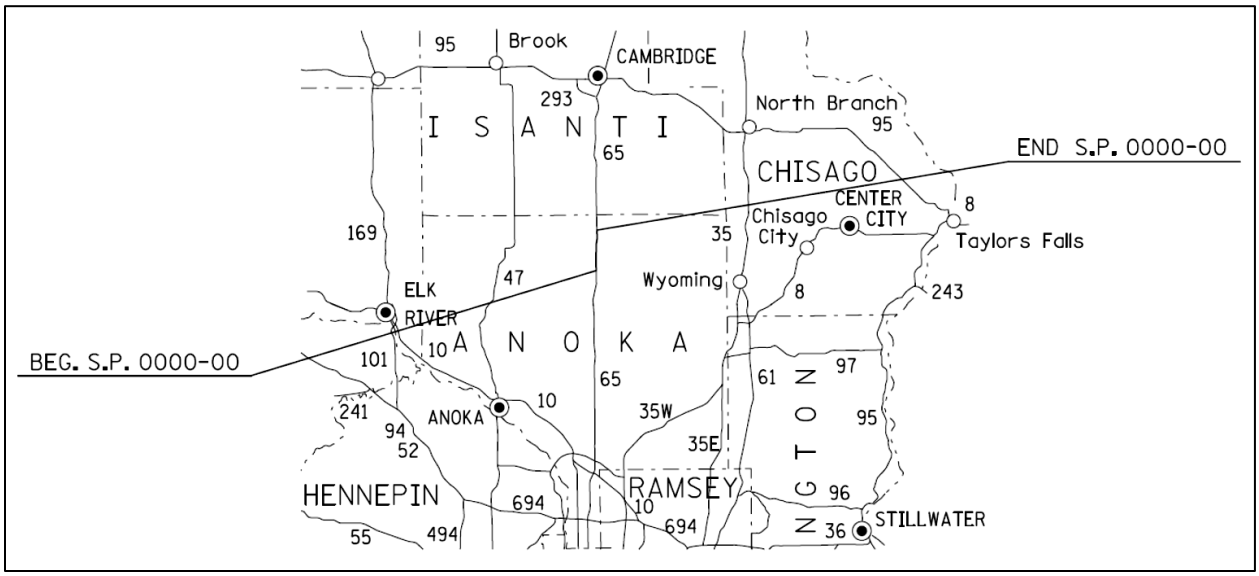
PRINT NAME: _____ LICENSE #_____

DATE:_____ SIGNATURE:_____

6.3.6 Index Map

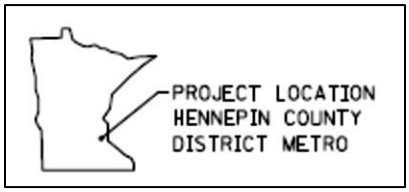
The index map is used to identify the location of the project(s). Provide leader lines from the beginning and end of the project limits to the appropriate points on the map. This is generally located near the center of the title sheet.

If appropriate, identify all State Aid project numbers applicable to the project. Also, label all traffic signal systems.



6.3.7 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.



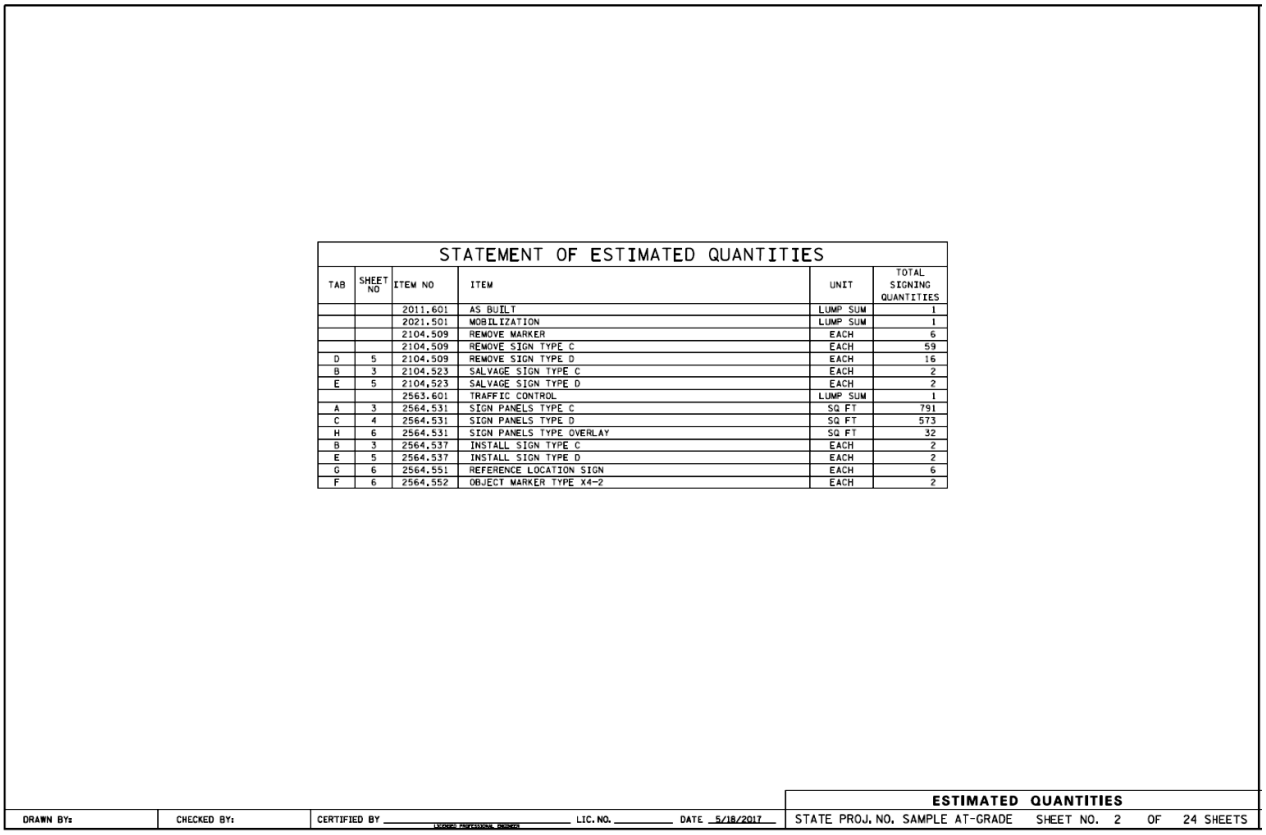
6.3.8 Plan Revisions Block

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

6.4 Estimated Quantities Sheets

Below is an image from the estimated quantities sheets.



STATEMENT OF ESTIMATED QUANTITIES

TAB	SHEET NO	ITEM NO	ITEM	UNIT	TOTAL SIGNING QUANTITIES
		2011.601	AS BUILT	LUMP SUM	1
		2021.501	MOBILIZATION	LUMP SUM	1
		2104.509	REMOVE MARKER	EACH	6
		2104.509	REMOVE SIGN TYPE C	EACH	59
D	5	2104.509	REMOVE SIGN TYPE D	EACH	16
B	3	2104.523	SALVAGE SIGN TYPE C	EACH	2
E	5	2104.523	SALVAGE SIGN TYPE D	EACH	2
		2563.601	TRAFFIC CONTROL	LUMP SUM	1
A	3	2564.531	SIGN PANELS TYPE C	SQ FT	791
C	4	2564.531	SIGN PANELS TYPE D	SQ FT	573
H	6	2564.531	SIGN PANELS TYPE OVERLAY	SQ FT	32
B	3	2564.537	INSTALL SIGN TYPE C	EACH	2
E	5	2564.537	INSTALL SIGN TYPE D	EACH	2
G	6	2564.551	REFERENCE LOCATION SIGN	EACH	6
F	6	2564.552	OBJECT MARKER TYPE X4-2	EACH	2

ESTIMATED QUANTITIES

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017 | STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 2 OF 24 SHEETS

The Statement of Estimated Quantities is finalized after the layouts and data sheets are complete.

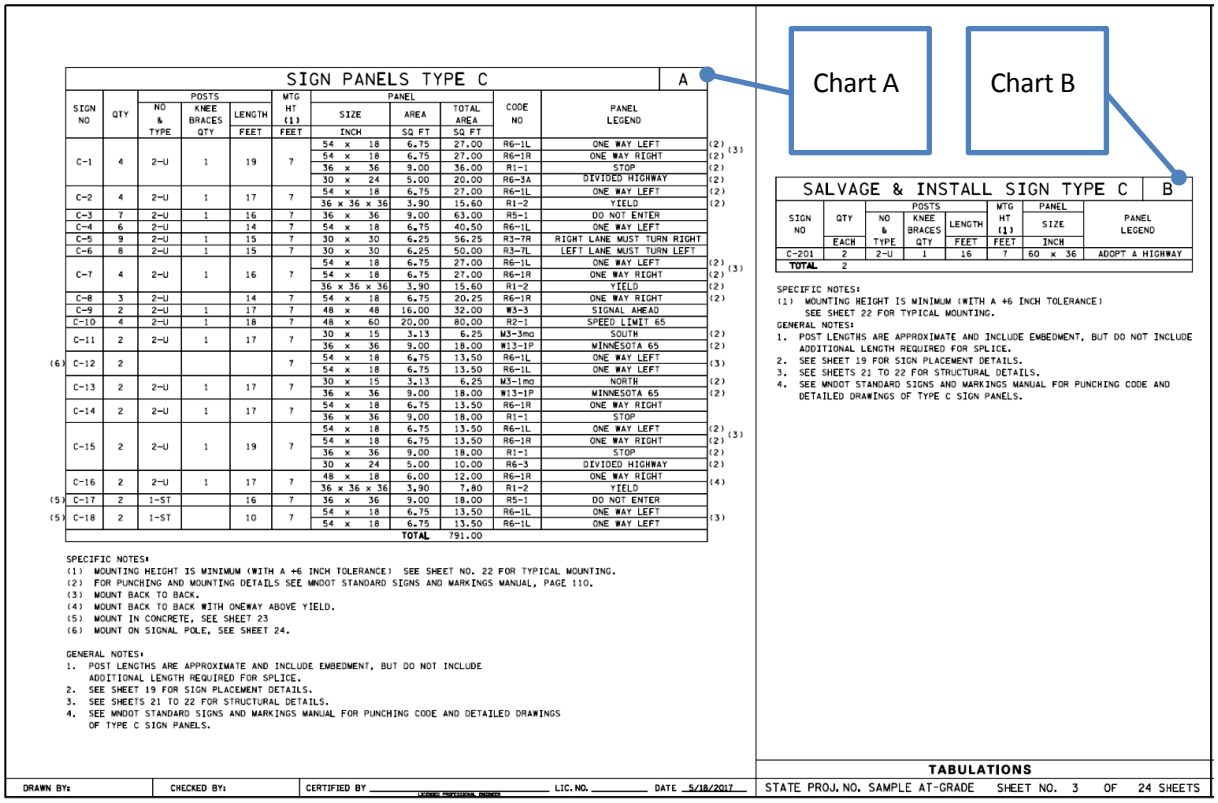
- ✓ The first column (TAB) lists the table that includes the sign data for the given Item.
- ✓ The SHEET NO column indicates the plan set sheet that the table is on.
- ✓ For a list of the appropriate specification item numbers (ITEM NO and ITEM), item descriptions, and units, refer to the MnDOT Standard Specification for Construction Book (Spec Book) – see the image on the right. In addition, refer to the AASHTOware website for details (see Section **8.6**).
- ✓ The unit is the unit of measurement for the line item.
- ✓ The Estimated Quantities are the project quantity totals.

Item No.:	Item:	Unit:
2564.511	Concrete Footings Type ___	cubic yard [cubic meter]
2564.513	Median Barrier Footing	each
2564.515	Sign Support ___	each
2564.518	Overhead Sign Structure Repair	hour
2564.522	Structural Steel - (Specify Item & Use)	pound [kilogram]
2564.524	Modify Post	each
2564.531	Sign Panels Type ___	square foot [square meter]
2564.533	Furnish Sign Panels Type ___	square foot [square meter]
2564.534	Saw Sign Panels Type___	linear foot [meter]
2564.535	Sign Panel Overlay Type ___	square foot [square meter]
2564.536	Install Sign Panel Type ___	each
2564.537	Install Sign Type ___	each
2564.539	Overhead Sign Identification Plate	each
2564.539	Lighting System Identification Plate	each
2564.540	Extend Walkway Support	each
2564.541	Friction Fuse	each
2564.542	Keeper Plate	each
2564.550	Delineator, Type ___	each
2564.551	Reference Location Sign	each
2564.552	Object Marker Type___	each
2564.553	Bridge Number Marker X4-12A	each

6.5 Sign Data Sheets

The sign data sheets include a summary of data that is pertinent to the signs within the project area. These are Sheets 3 through 6 in the sample plan (refer to the sample plan at the back of the chapter).

6.5.1 Chart A and Chart B Sign Data Sheet Tabulations



SIGN PANELS TYPE C — A

SIGN NO	QTY	POSTS NO & TYPE	POSTS KNEE BRACES QTY	POSTS LENGTH FEET	MTG HT (1) FEET	PANEL SIZE INCH	PANEL AREA SQ FT	PANEL TOTAL AREA SQ FT	CODE NO	PANEL LEGEND	
C-1	4	2-U	1	19	7	54 x 18	6.75	27.00	R6-1L	ONE WAY LEFT	(2) (3)
						54 x 18	6.75	27.00	R6-1R	ONE WAY RIGHT	(2)
						36 x 36	9.00	36.00	R1-1	STOP	(2)
						30 x 24	5.00	20.00	R6-3A	DIVIDED HIGHWAY	(2)
C-2	4	2-U	1	17	7	54 x 18	6.75	27.00	R6-1L	ONE WAY LEFT	(2)
						36 x 36 x 36	3.90	15.60	R1-2	YIELD	(2)
C-3	7	2-U	1	16	7	36 x 36	9.00	63.00	R5-1	DO NOT ENTER	
C-4	6	2-U		14	7	54 x 18	6.75	40.50	R6-1L	ONE WAY LEFT	
C-5	9	2-U	1	15	7	30 x 30	6.25	56.25	R3-7R	RIGHT LANE MUST TURN RIGHT	
C-6	8	2-U	1	15	7	30 x 30	6.25	50.00	R3-7L	LEFT LANE MUST TURN LEFT	
C-7	4	2-U	1	16	7	54 x 18	6.75	27.00	R6-1L	ONE WAY LEFT	(2) (3)
						54 x 18	6.75	27.00	R6-1R	ONE WAY RIGHT	(2)
						36 x 36 x 36	3.90	15.60	R1-2	YIELD	(2)
C-8	3	2-U		14	7	54 x 18	6.75	20.25	R6-1R	ONE WAY RIGHT	(2)
C-9	2	2-U	1	17	7	48 x 48	16.00	32.00	W3-3	SIGNAL AHEAD	
C-10	4	2-U	1	18	7	48 x 60	20.00	80.00	R2-1	SPEED LIMIT 65	
C-11	2	2-U	1	17	7	30 x 15	3.13	6.25	W3-3mo	SOUTH	(2)
						36 x 36	9.00	18.00	W13-1P	MINNESOTA 65	(2)
(6) C-12	2				7	54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	(3)
						54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	
C-13	2	2-U	1	17	7	30 x 15	3.13	6.25	W3-1mo	NORTH	(2)
						36 x 36	9.00	18.00	W13-1P	MINNESOTA 65	(2)
C-14	2	2-U	1	17	7	54 x 18	6.75	13.50	R6-1R	ONE WAY RIGHT	
						36 x 36	9.00	18.00	R1-1	STOP	
C-15	2	2-U	1	19	7	54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	(2) (3)
						54 x 18	6.75	13.50	R6-1R	ONE WAY RIGHT	(2)
						36 x 36	9.00	18.00	R1-1	STOP	(2)
						30 x 24	5.00	10.00	R6-3	DIVIDED HIGHWAY	(2)
C-16	2	2-U	1	17	7	48 x 18	6.00	12.00	R6-1R	ONE WAY RIGHT	(4)
						36 x 36 x 36	3.90	7.80	R1-2	YIELD	
(5) C-17	2	1-ST		16	7	36 x 36	9.00	18.00	R5-1	DO NOT ENTER	
(5) C-18	2	1-ST		10	7	54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	(3)
						54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	
						TOTAL		791.00			

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET NO. 22 FOR TYPICAL MOUNTING.
(2) FOR PUNCHING AND MOUNTING DETAILS SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL, PAGE 110.
(3) MOUNT BACK TO BACK.
(4) MOUNT BACK TO BACK WITH ONEWAY ABOVE YIELD.
(5) MOUNT IN CONCRETE, SEE SHEET 23
(6) MOUNT ON SIGNAL POLE, SEE SHEET 24.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEET 19 FOR SIGN PLACEMENT DETAILS.
3. SEE SHEETS 21 TO 22 FOR STRUCTURAL DETAILS.
4. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS OF TYPE C SIGN PANELS.

SALVAGE & INSTALL SIGN TYPE C — B

SIGN NO	QTY	POSTS NO & TYPE	POSTS KNEE BRACES QTY	POSTS LENGTH FEET	MTG HT (1) FEET	PANEL SIZE INCH	PANEL LEGEND
	EACH						
C-201	2	2-U	1	16	7	60 x 36	ADOPT A HIGHWAY
TOTAL	2						

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET 22 FOR TYPICAL MOUNTING.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEET 19 FOR SIGN PLACEMENT DETAILS.
3. SEE SHEETS 21 TO 22 FOR STRUCTURAL DETAILS.
4. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS OF TYPE C SIGN PANELS.

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017

TABULATIONS

STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 3 OF 24 SHEETS

Chart A is for signs to be furnished and installed. Chart B is for signs to be salvaged and installed. The columns in the charts include:

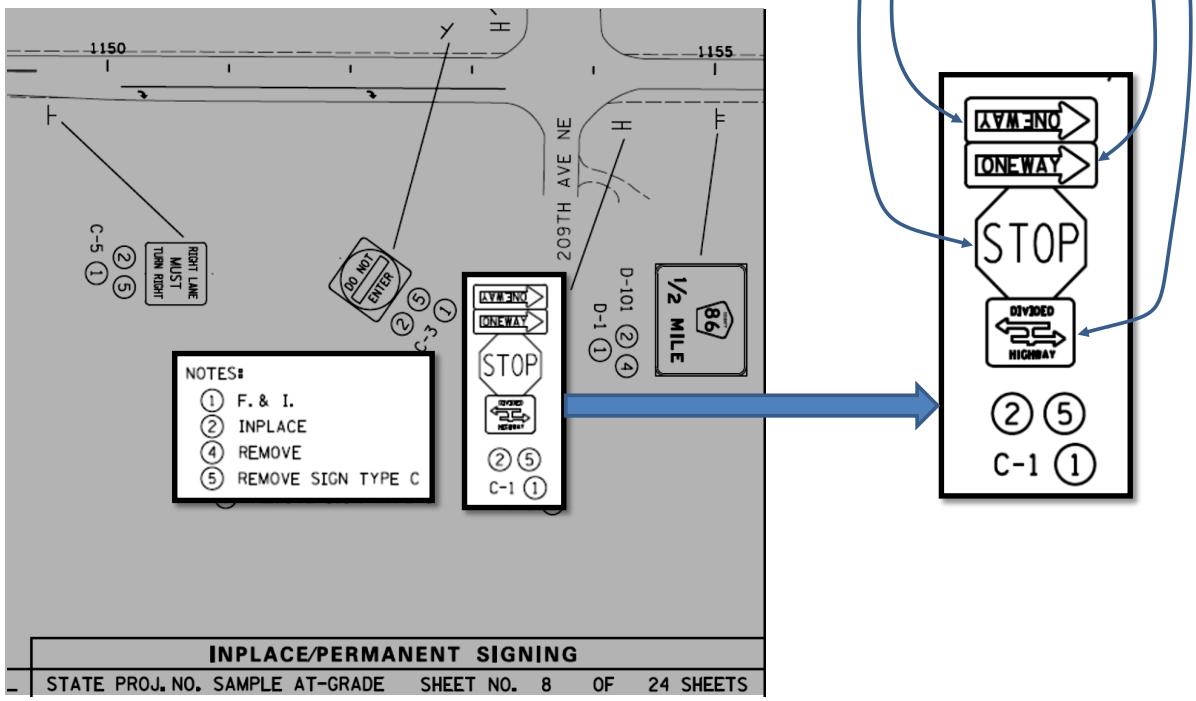
- ✓ SIGN NO. is the number of the sign . Note that each SIGN NO. could include multiple signs.
  - Order in accordance with the Standard Signs Summary
    - Regulatory
    - Warning
    - Route Markers and Auxiliaries
- ✓ QTY: is the total quantity of signs found in the plan set.
- ✓ POST: NO. & TYPE is the number of posts and type
  - TEM Chart 6.2 (U-POST STRUCTURE CHART FOR GROUND MOUNTED SIGNS)
- ✓ POST: KNEE BRACES QUANT. Is the quantity of knee braces used
  - TEM Chart 6.2
- ✓ POST: LEN. (FT.) is the length of the post
  - See Chapter **Exhibit 2-12** for post length determination
- ✓ MTG. HT. is the mounting height of the sign. This is the minimum mounting height.

- ✓ PANEL: SIZE (IN.) is the size of the panel in length and height
  - Specified in the Standard Sign Summary (see the Appendix)
- ✓ PANEL: AREA (SQ. FT.) is the area of the sign (not used for Chart B)
- ✓ PANEL: TOTAL AREA (SQ. FT.) is the total area of the sign group (not used for Chart B)
- ✓ CODE NO. is the nomenclature name of the sign (not used for Chart B)
  - Specified in the Standard Sign Summary (see the Appendix)
- ✓ PANEL LEGEND is the legend text found on the sign

The image below shows a sample of sign C-1 on Chart A as laid out on Sheet 8 of the sample plan layout sheets.

SIGN PANELS TYPE C — A

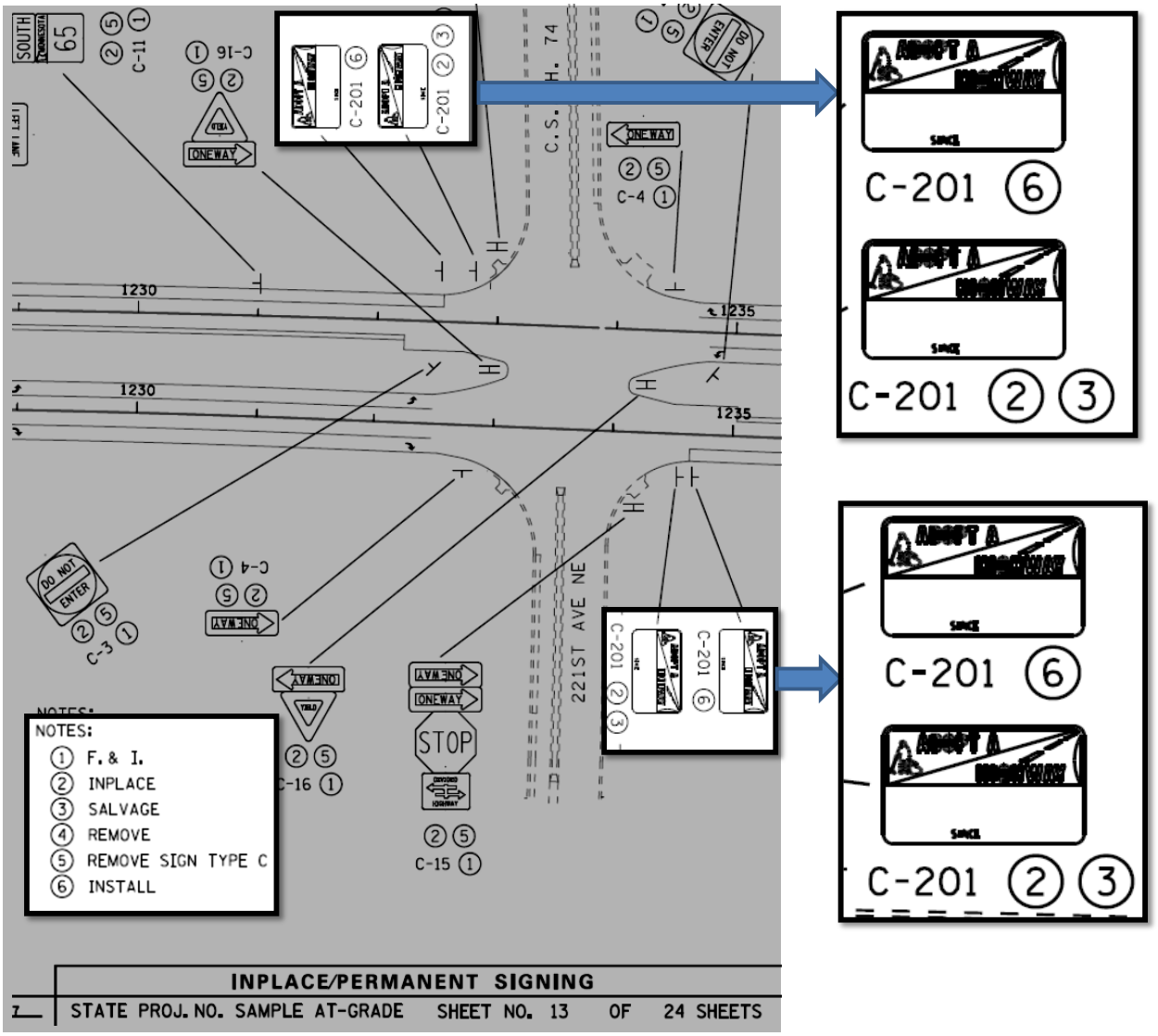
SIGN NO	QTY	POSTS NO & TYPE	POSTS KNEE BRACES QTY	POSTS LENGTH FEET	MTG HT (1) FEET	PANEL SIZE INCH	PANEL AREA SQ FT	PANEL TOTAL AREA SQ FT	CODE NO	PANEL LEGEND	
C-1	4	2-U	1	19	7	54 x 18	6.75	27.00	R6-1L	ONE WAY LEFT	(2) (3)
						54 x 18	6.75	27.00	R6-1R	ONE WAY RIGHT	(2)
						36 x 36	9.00	36.00	R1-1	STOP	(2)
						30 x 24	5.00	20.00	R6-3A	DIVIDED HIGHWAY	(2)
C-2	4	2-U	1	17	7	54 x 18	6.75	27.00	R6-1L	ONE WAY LEFT	(2)
						36 x 36 x 36	3.90	15.60	R1-2	YIELD	(2)
C-3	7	2-U	1	16	7	36 x 36	9.00	63.00	R5-1	DO NOT ENTER	
C-4	6	2-U		14	7	54 x 18	6.75	40.50	R6-1L	ONE WAY LEFT	
C-5	9	2-U	1	15	7	30 x 30	6.25	56.25	R3-7R	RIGHT LANE MUST TURN RIGHT	
C-6	8	2-U	1	15	7	30 x 30	6.25	50.00	R3-7L	LEFT LANE MUST TURN LEFT	



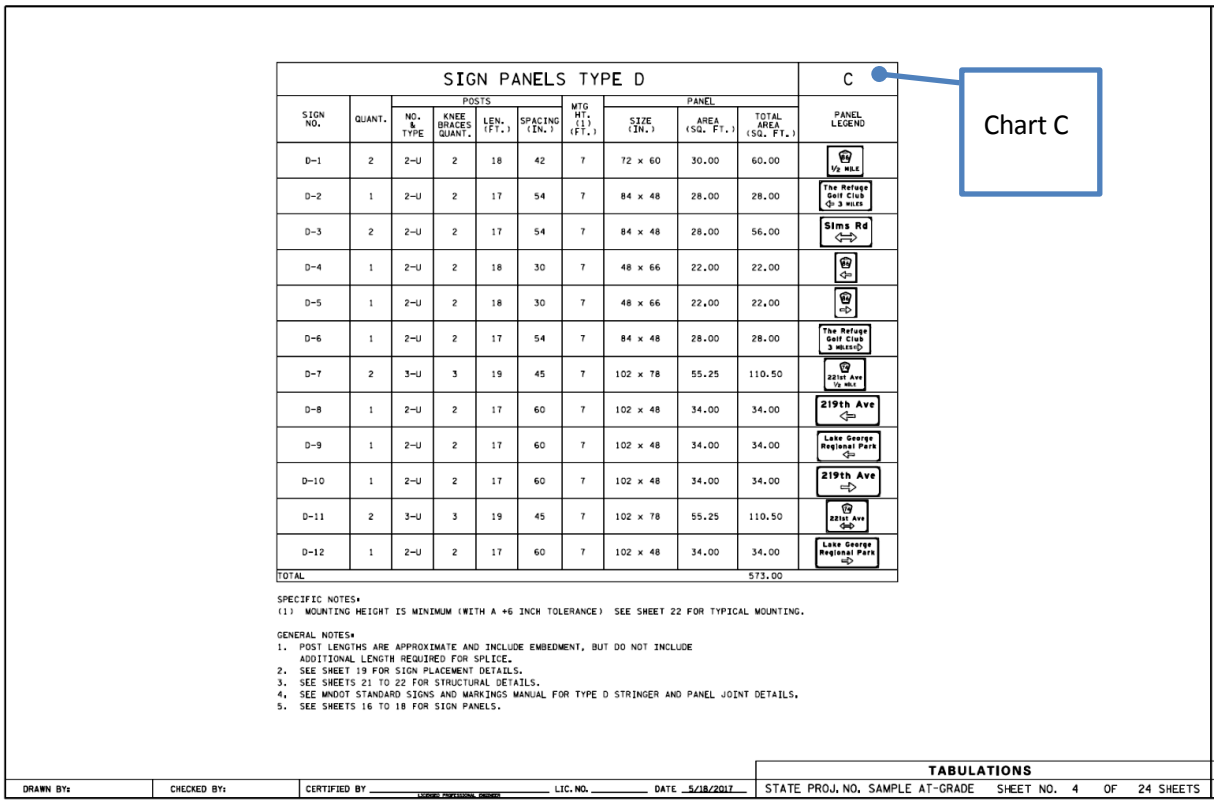
In the above image, the sign C-1 is highlighted on the Sign Panels Type C summary table. Also shown is an example of the Sign No. C-1 on sheet 8 of 25 of the sample plan set. Notice that this sign (C-1) is a cluster of 4 different signs (R6-1(L), R6-1(R), R1-1, R6-3a).

The image below shows a sample of sign C-201 on Chart B as laid out on Sheet 13 of the sample plan layout sheets.

SALVAGE & INSTALL SIGN TYPE C							B
SIGN NO	QTY	POSTS			MTG HT (1)	PANEL	
		NO & TYPE	KNEE BRACES	LENGTH		SIZE	PANEL LEGEND
	EACH		QTY	FEET	FEET	INCH	
C-201	2	2-U	1	16	7	60 x 36	ADOPT A HIGHWAY
TOTAL	2						



6.5.2 Chart C Sign Data Sheet



SIGN PANELS TYPE D — C

SIGN NO.	QUANT.	POSTS: NO. & TYPE	POSTS: KNEE BRACES QUANT.	POSTS: LEN. (FT.)	POSTS: SPACING (IN.)	MTG. HT. (1) (FT.)	PANEL: SIZE (IN.)	PANEL: AREA (SQ. FT.)	PANEL: TOTAL AREA (SQ. FT.)	PANEL LEGEND
D-1	2	2-U	2	18	42	7	72 x 60	30.00	60.00	½ MILE
D-2	1	2-U	2	17	54	7	84 x 48	28.00	28.00	The Refuge Golf Club ⇦ 3 MILES
D-3	2	2-U	2	17	54	7	84 x 48	28.00	56.00	Sims Rd ⇦⇨
D-4	1	2-U	2	18	30	7	48 x 66	22.00	22.00	⇦
D-5	1	2-U	2	18	30	7	48 x 66	22.00	22.00	⇨
D-6	1	2-U	2	17	54	7	84 x 48	28.00	28.00	The Refuge Golf Club 3 MILES⇨
D-7	2	3-U	3	19	45	7	102 x 78	55.25	110.50	221st Ave ½ MILE
D-8	1	2-U	2	17	60	7	102 x 48	34.00	34.00	219th Ave ⇦
D-9	1	2-U	2	17	60	7	102 x 48	34.00	34.00	Lake George Regional Park ⇦
D-10	1	2-U	2	17	60	7	102 x 48	34.00	34.00	219th Ave ⇨
D-11	2	3-U	3	19	45	7	102 x 78	55.25	110.50	221st Ave ⇦⇨
D-12	1	2-U	2	17	60	7	102 x 48	34.00	34.00	Lake George Regional Park ⇨
TOTAL									573.00	

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET 22 FOR TYPICAL MOUNTING.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEET 19 FOR SIGN PLACEMENT DETAILS.
3. SEE SHEETS 21 TO 22 FOR STRUCTURAL DETAILS.
4. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR TYPE D STRINGER AND PANEL JOINT DETAILS.
5. SEE SHEETS 16 TO 18 FOR SIGN PANELS.

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017 | TABULATIONS | STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 4 OF 24 SHEETS

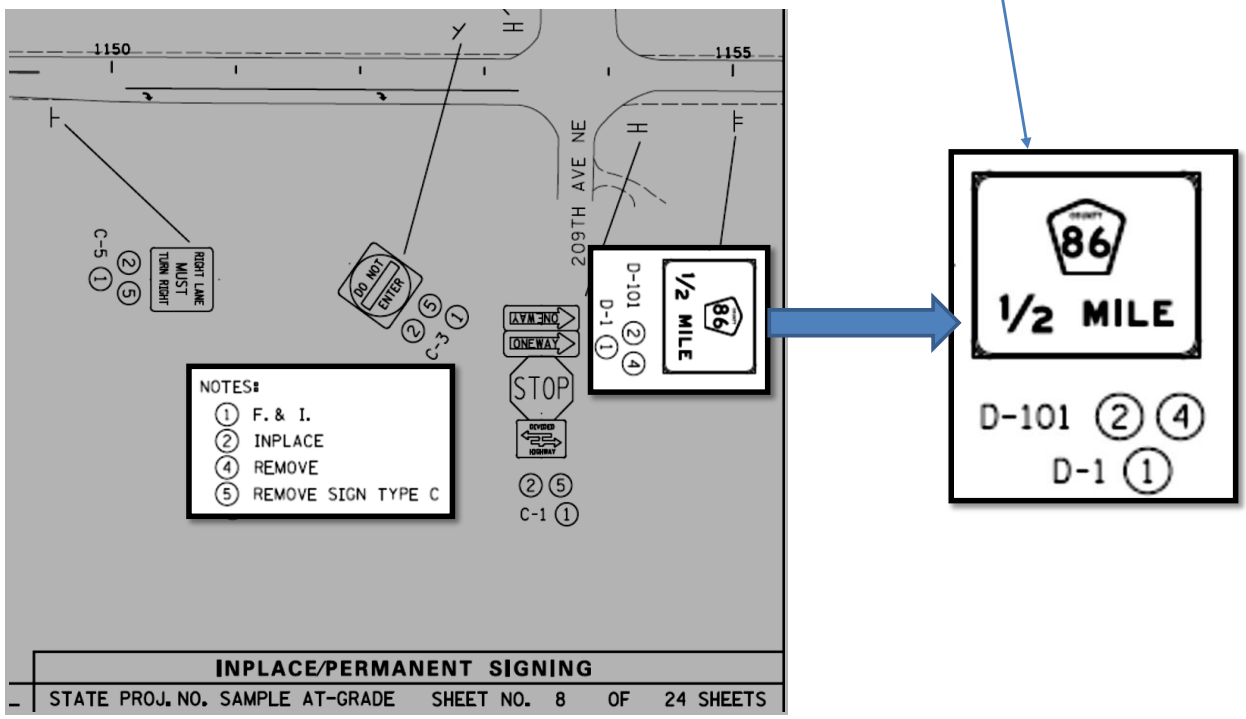
Chart C

Chart C is for Sign Panels Type D. The columns in the chart include:

- ✓ SIGN NO. is the number of the sign
- ✓ QUANTITY is the total number of signs found in the plan set.
- ✓ POSTS: NO. & TYPE is the number of posts and type
  - TEM Chart 6.2
- ✓ POSTS: KNEE BRACES QUANT. Is the quantity of knee braces used
  - TEM Chart 6.2
- ✓ POSTS: LEN. (FT.) is the length of the post
  - See Chapter **Exhibit 2-12** for post length determination
- ✓ POSTS: SPACING (IN.) is the spacing between the sign posts
- ✓ MTG. HT. is the mounting height of the sign. This is the minimum mounting height.
- ✓ 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 signs for the plan set
- ✓ PANEL LEGEND is the legend text found on the sign

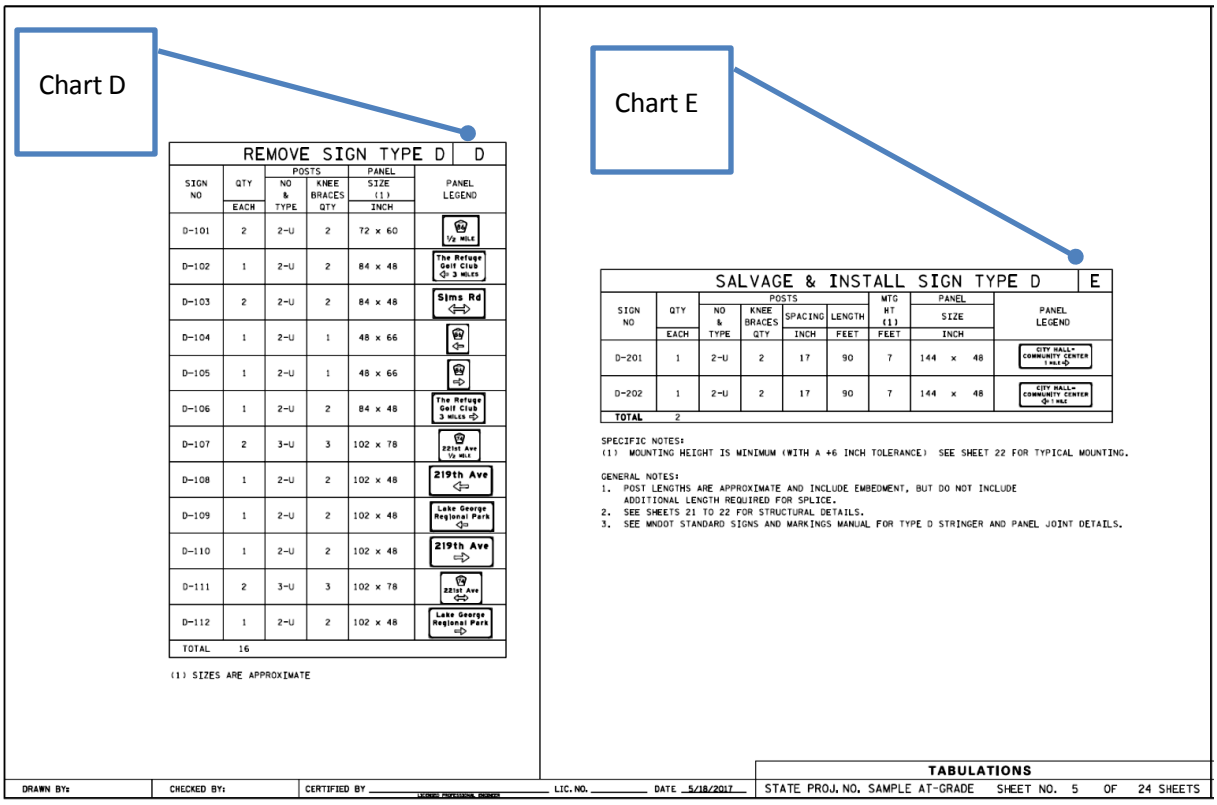
The image below shows a sample of sign D-1 on Chart C as laid out on Sheet 8 of the sample plan layout sheets.

SIGN PANELS TYPE D										C
SIGN NO.	QUANT.	POSTS				MTG HT. (1) (FT.)	PANEL			PANEL LEGEND
		NO. & TYPE	KNEE BRACES QUANT.	LEN. (FT.)	SPACING (IN.)		SIZE (IN.)	AREA (SQ. FT.)	TOTAL AREA (SQ. FT.)	
D-1	2	2-U	2	18	42	7	72 x 60	30.00	60.00	86 ½ MILE
D-2	1	2-U	2	17	54	7	84 x 48	28.00	28.00	The Refuge Golf Club ⇦ 3 MILES
D-3	2	2-U	2	17	54	7	84 x 48	28.00	56.00	Sims Rd ⇔
D-4	1	2-U	2	18	30	7	48 x 66	22.00	22.00	86 ⇦



Sign panels are laid out with the SignCAD® software.

6.5.3 Chart D and E Sign Data Sheet



REMOVE SIGN TYPE D | D

SIGN NO	QTY	POSTS NO & TYPE	POSTS KNEE BRACES QTY	PANEL SIZE (1) INCH	PANEL LEGEND
	EACH				
D-101	2	2-U	2	72 x 60	½ MILE
D-102	1	2-U	2	84 x 48	The Refuge Golf Club 3 MILES
D-103	2	2-U	2	84 x 48	Sims Rd
D-104	1	2-U	1	48 x 66	
D-105	1	2-U	1	48 x 66	
D-106	1	2-U	2	84 x 48	The Refuge Golf Club 3 MILES
D-107	2	3-U	3	102 x 78	221st Ave ½ MILE
D-108	1	2-U	2	102 x 48	219th Ave
D-109	1	2-U	2	102 x 48	Lake George Regional Park
D-110	1	2-U	2	102 x 48	219th Ave
D-111	2	3-U	3	102 x 78	221st Ave
D-112	1	2-U	2	102 x 48	Lake George Regional Park
TOTAL	16				

(1) SIZES ARE APPROXIMATE

SALVAGE & INSTALL SIGN TYPE D | E

SIGN NO	QTY	POSTS NO & TYPE	POSTS KNEE BRACES QTY	POSTS SPACING INCH	POSTS LENGTH FEET	MTG HT (1) FEET	PANEL SIZE INCH	PANEL LEGEND
	EACH							
D-201	1	2-U	2	17	90	7	144 x 48	CITY HALL→ COMMUNITY CENTER 1 MILE
D-202	1	2-U	2	17	90	7	144 x 48	CITY HALL← COMMUNITY CENTER 1 MILE
TOTAL	2							

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET 22 FOR TYPICAL MOUNTING.

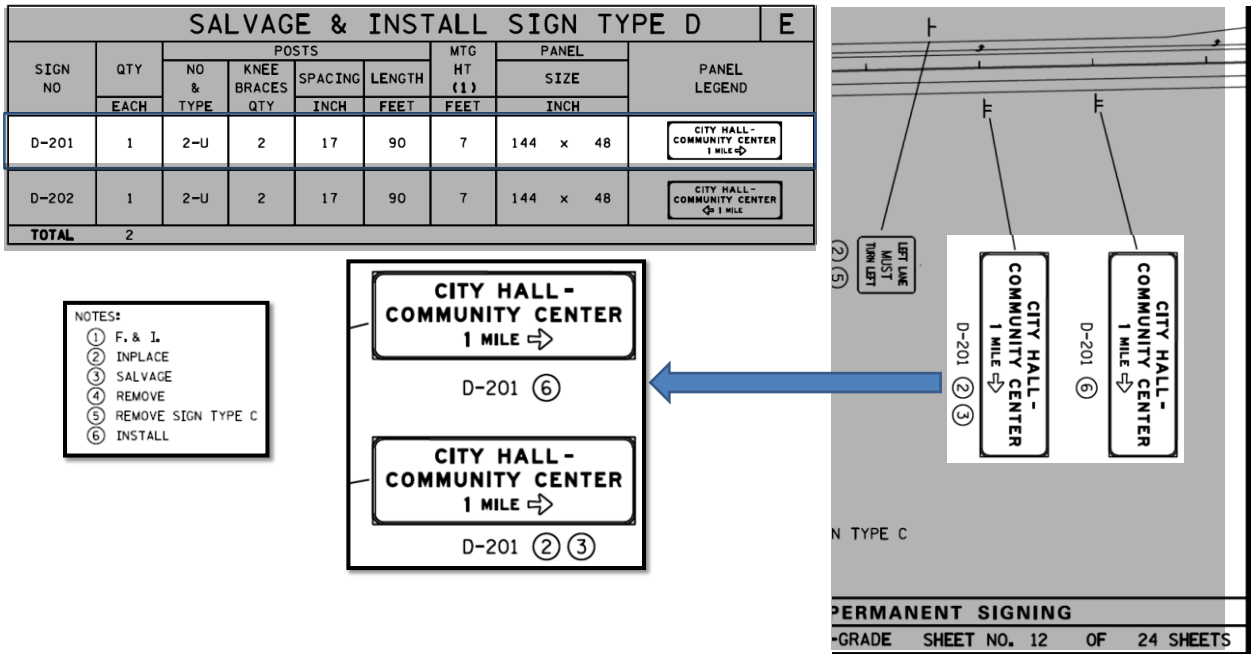
GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEETS 21 TO 22 FOR STRUCTURAL DETAILS.
3. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR TYPE D STRINGER AND PANEL JOINT DETAILS.

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER | LIC. NO. _____ | DATE 5/18/2017 | TABULATIONS | STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 5 OF 24 SHEETS

Chart D is for type D signs to be removed. Chart E is for type D signs to be salvaged and installed. The columns in the charts include:

- ✓ SIGN NO. is the number of the sign .
- ✓ QUANTITY is the total number of signs found in the plan set.
- ✓ POSTS: NO. & TYPE is the number of posts and type
  - TEM Chart 6.2
- ✓ POSTS: KNEE BRACES QUANT. Is the quantity of knee braces used
  - TEM Chart 6.2
- ✓ POSTS: LEN. (FT.) is the length of the post
- ✓ POSTS: SPACING (IN.) is the spacing between the sign posts
- ✓ MTG. HT. is the mounting height of the sign. This is the minimum mounting height.
- ✓ PANEL: SIZE (IN.) is the sign of the panel in length and height
- ✓ PANEL LEGEND is the legend text found on the sign

The image below shows a sample of sign D-101 on Chart D as laid out on Sheet 8 of the sample plan layout sheets.



SALVAGE & INSTALL SIGN TYPE D — E

SIGN NO	QTY EACH	POSTS NO & TYPE	POSTS KNEE BRACES QTY	POSTS SPACING INCH	POSTS LENGTH FEET	MTG HT (1) FEET	PANEL SIZE INCH	PANEL LEGEND
D-201	1	2-U	2	17	90	7	144 x 48	CITY HALL - COMMUNITY CENTER 1 MILE
D-202	1	2-U	2	17	90	7	144 x 48	CITY HALL - COMMUNITY CENTER 1 MILE
TOTAL	2							

NOTES:
1. F. & I.
2. INPLACE
3. SALVAGE
4. REMOVE
5. REMOVE SIGN TYPE C
6. INSTALL

CITY HALL - COMMUNITY CENTER 1 MILE
D-201 (6)

CITY HALL - COMMUNITY CENTER 1 MILE
D-201 (2) (3)

(2) (5) LEFT LANE MUST TURN LEFT

CITY HALL - COMMUNITY CENTER 1 MILE D-201 (2) (3)

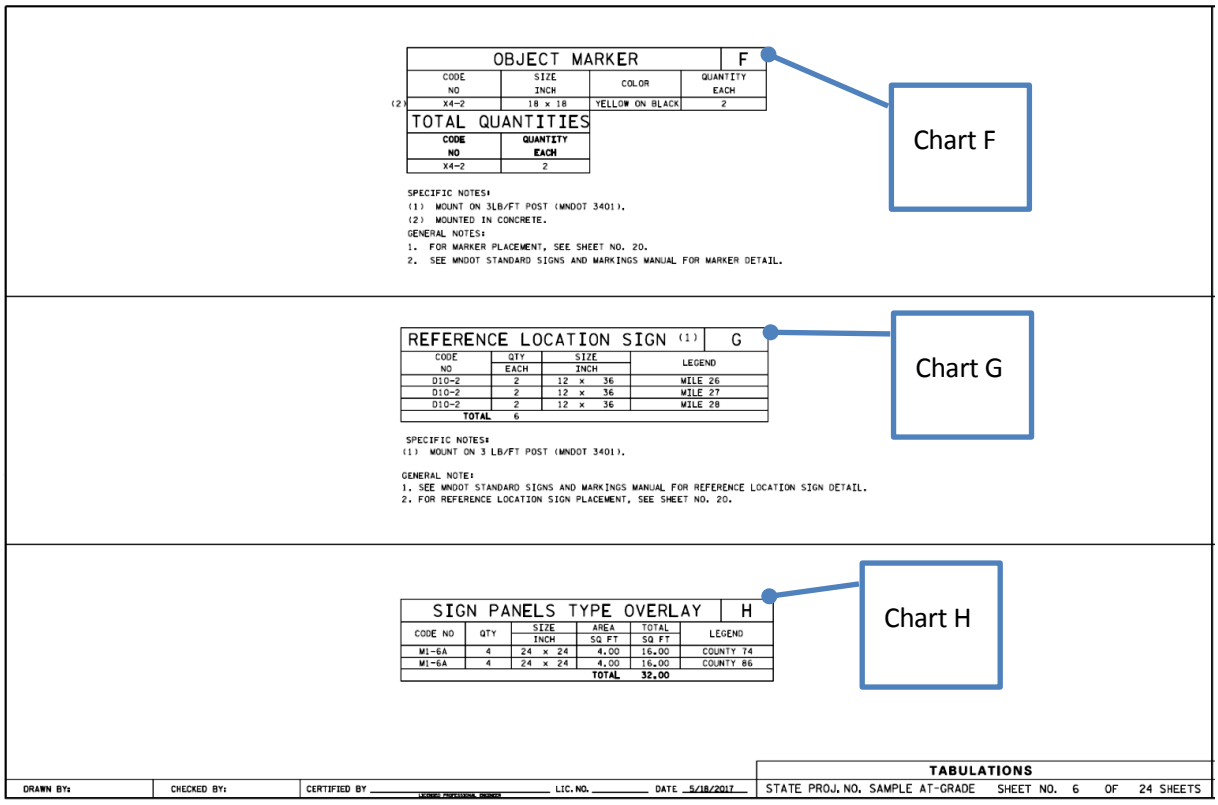
CITY HALL - COMMUNITY CENTER 1 MILE D-201 (6)

N TYPE C

PERMANENT SIGNING
-GRADE SHEET NO. 12 OF 24 SHEETS

The below image shows a sample of sign D-201 on Chart E as laid out on Sheet 12 of the sample plan layout sheets.

6.5.4 Chart F, G and H Sign Data Sheet



OBJECT MARKER — F

CODE NO	SIZE INCH	COLOR	QUANTITY EACH
X4-2	18 x 18	YELLOW ON BLACK	2

(2)

TOTAL QUANTITIES

CODE NO	QUANTITY EACH
X4-2	2

SPECIFIC NOTES:
(1) MOUNT ON 3LB/FT POST (MNDOT 3401).
(2) MOUNTED IN CONCRETE.
GENERAL NOTES:
1. FOR MARKER PLACEMENT, SEE SHEET NO. 20.
2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR MARKER DETAIL.

Chart F

REFERENCE LOCATION SIGN (1) — G

CODE NO	QTY EACH	SIZE INCH	LEGEND
D10-2	2	12 x 36	MILE 26
D10-2	2	12 x 36	MILE 27
D10-2	2	12 x 36	MILE 28
TOTAL	6		

SPECIFIC NOTES:
(1) MOUNT ON 3 LB/FT POST (MNDOT 3401).

GENERAL NOTE:
1. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR REFERENCE LOCATION SIGN DETAIL.
2. FOR REFERENCE LOCATION SIGN PLACEMENT, SEE SHEET NO. 20.

Chart G

SIGN PANELS TYPE OVERLAY — H

CODE NO	QTY	SIZE INCH	AREA SQ FT	TOTAL SQ FT	LEGEND
M1-6A	4	24 x 24	4.00	16.00	COUNTY 74
M1-6A	4	24 x 24	4.00	16.00	COUNTY 86
			TOTAL	32.00	

Chart H

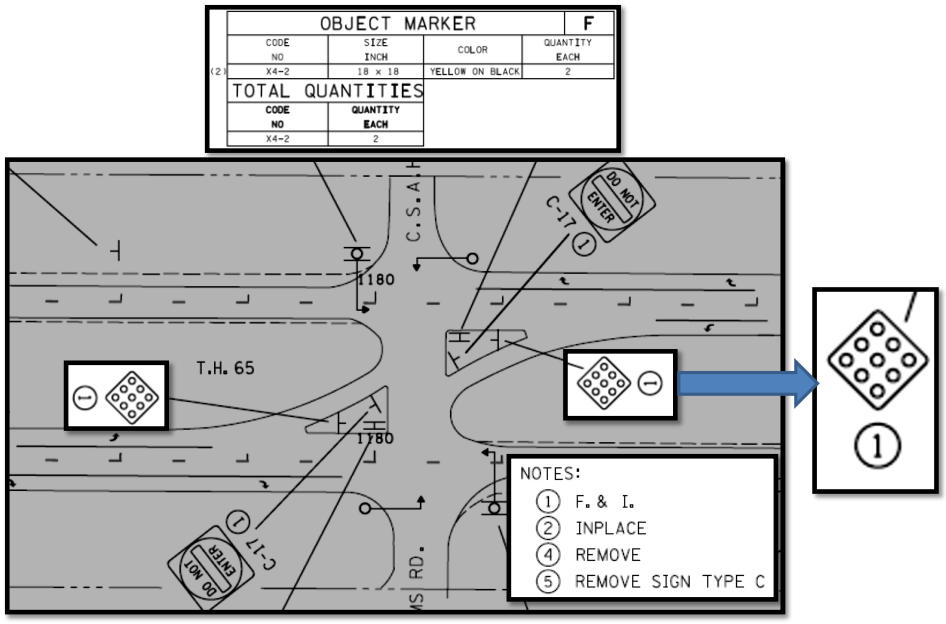
TABULATIONS

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017 | STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 6 OF 24 SHEETS

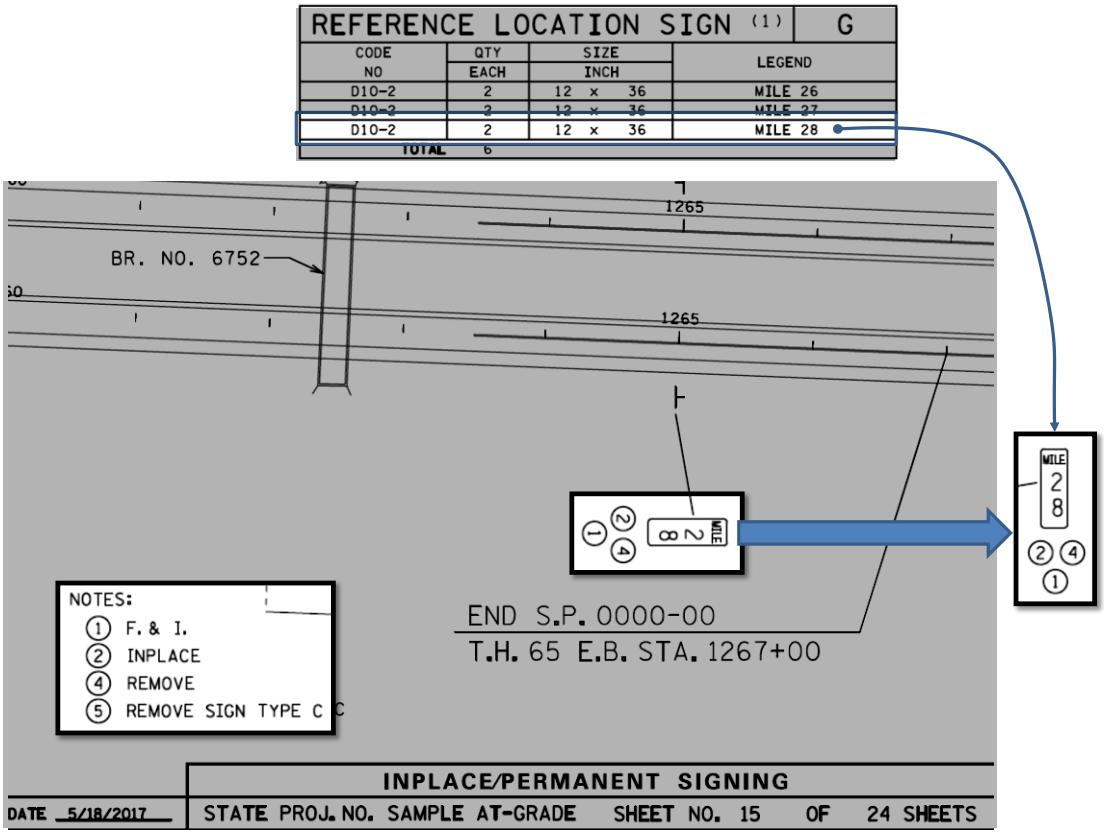
Chart F is for markers, hart G is for Reference Location Signs and Chart H is for Sign Panel Overlays. The columns in the charts include:

- ✓ CODE NO. is the number of the sign
- ✓ QTY is the total quantity on the plan set.
- ✓ SIZE (IN.) is the sign of the panel in length and height (excludes Chart F)
- ✓ AREA (SQ. FT.) is the area of the sign
- ✓ TOTAL (SQ. FT.) is the total area of the signs for the plan set
- ✓ LEGEND is the legend text found on the sign (excludes Chart F)

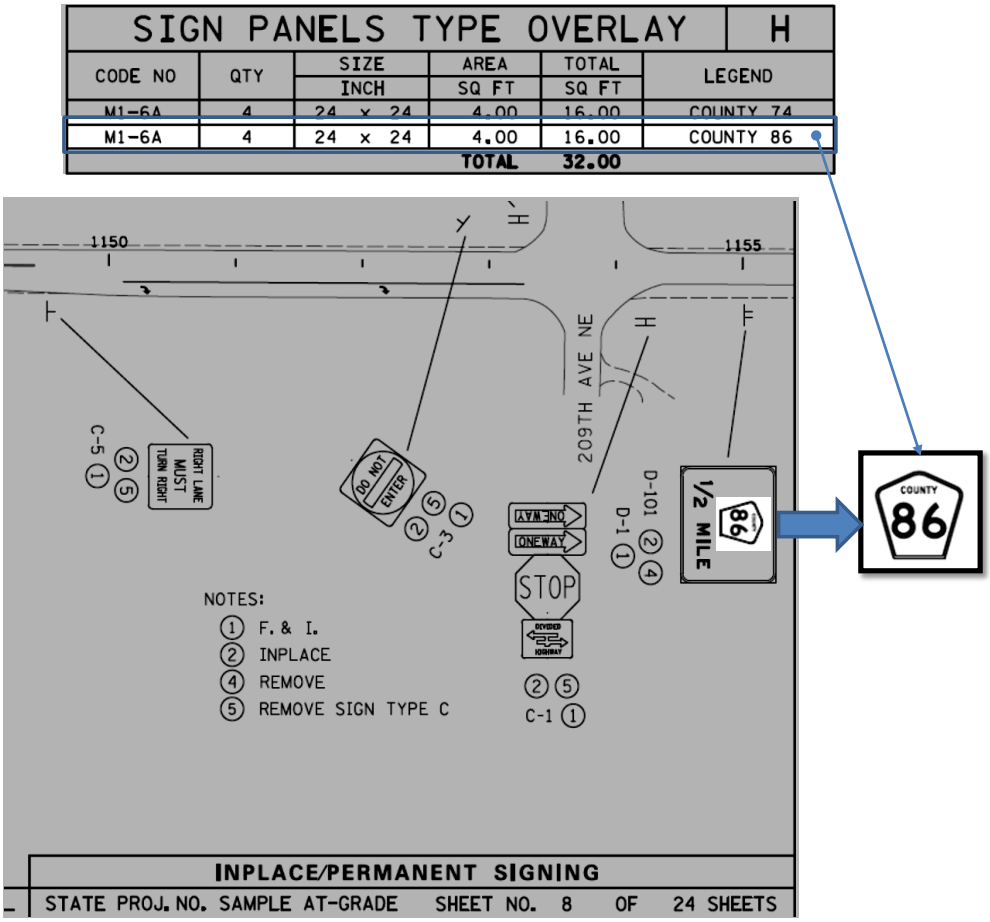
The below image shows a sample of the markers on Chart F as laid out on Sheet 10 of the sample plan layout sheets.



The below image shows a sample of the reference post marker on Chart G as laid out on Sheet 15 of the sample plan layout sheets.



The image below shows a sample of the sign panel overlay "COUNTY 86" on Chart H as laid out on Sheet 8 of the sample plan layout sheets.

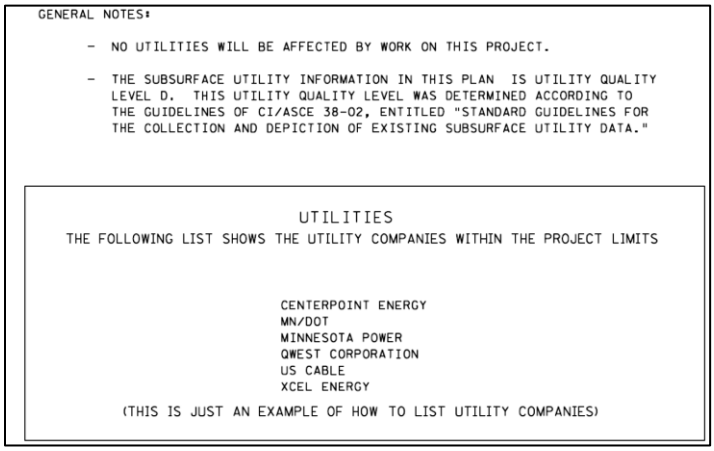


SIGN PANELS TYPE OVERLAY — H

CODE NO	QTY	SIZE INCH	AREA SQ FT	TOTAL SQ FT	LEGEND
M1-6A	4	24 x 24	4.00	16.00	COUNTY 74
M1-6A	4	24 x 24	4.00	16.00	COUNTY 86
			TOTAL	32.00	

6.6 Public Utilities Sheet

See the sample plans, sheet 7 for the full size utilities. This is only an example sheet. Follow the Utility Manual processes.



GENERAL NOTES:

- NO UTILITIES WILL BE AFFECTED BY WORK ON THIS PROJECT.
- THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."

UTILITIES

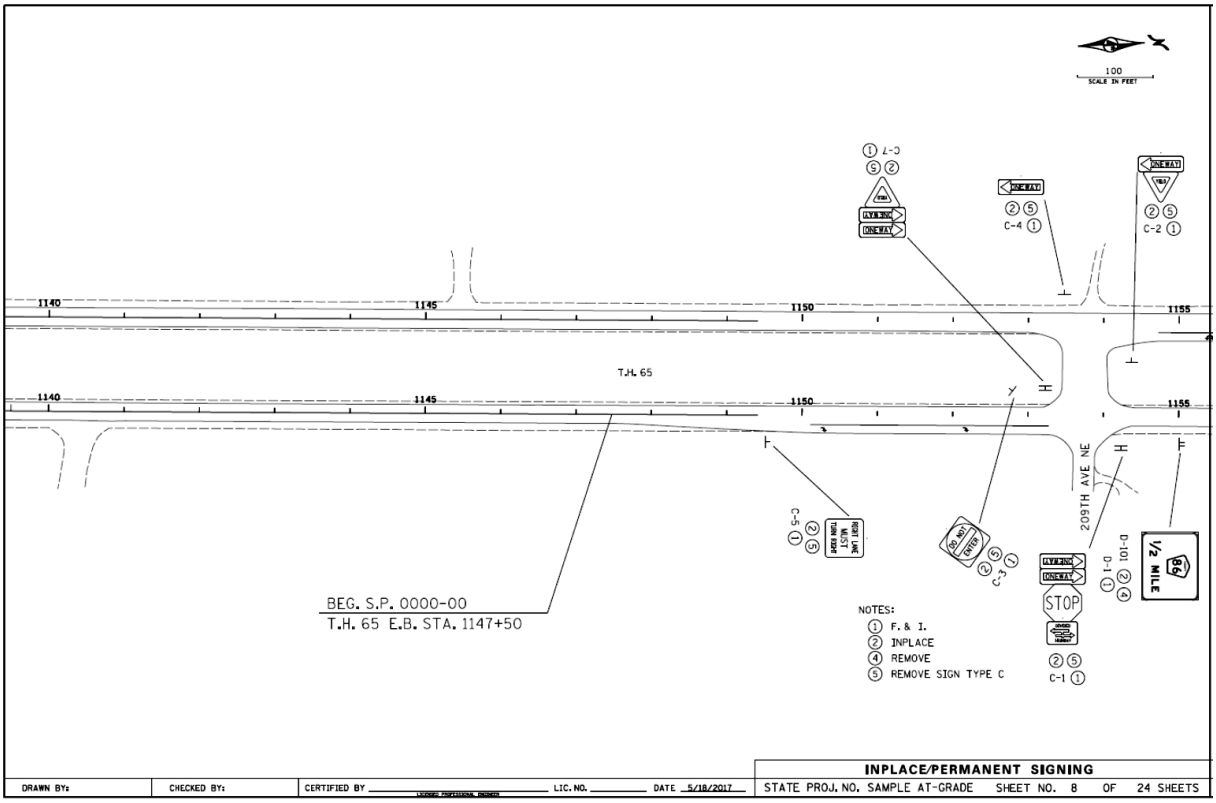
THE FOLLOWING LIST SHOWS THE UTILITY COMPANIES WITHIN THE PROJECT LIMITS

CENTERPOINT ENERGY
MN/DOT
MINNESOTA POWER
QWEST CORPORATION
US CABLE
XCEL ENERGY

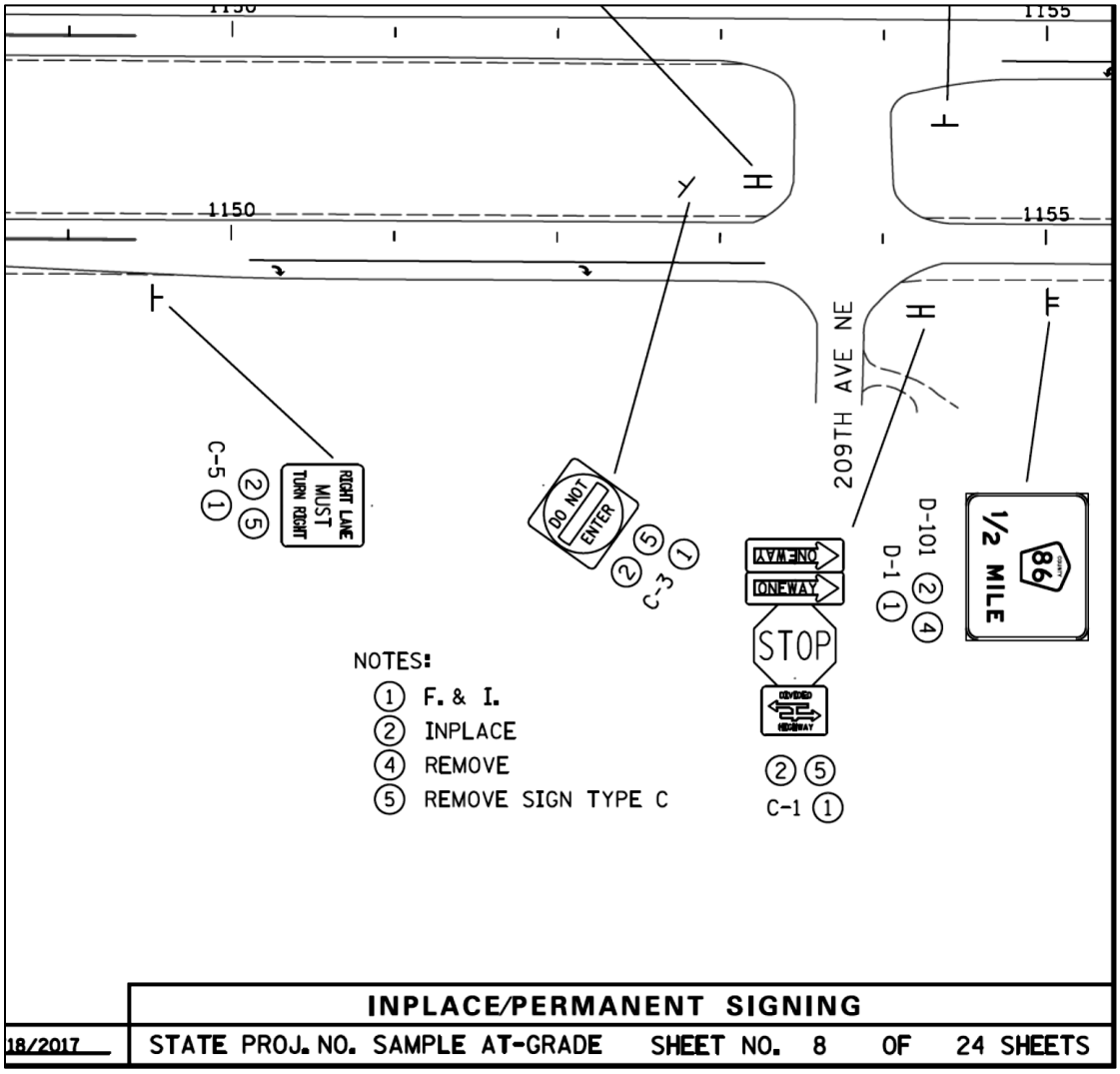
(THIS IS JUST AN EXAMPLE OF HOW TO LIST UTILITY COMPANIES)

6.7 Roadway 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. Below is sheet 8. The sample plan includes 8 roadway layout sheets (sheet 8 to 15).



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 image above and below, 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:

NOTES:
1. F. & I.
2. INPLACE
3. SALVAGE
4. REMOVE
5. REMOVE SIGN TYPE C
6. INSTALL
7. F. & I. SIGN PANEL OVERLAY(S)

F. & I. = Furnish and Install

INPLACE = Signs to keep inplace

SALVAGE = Signs that should be salvaged

REMOVE = Signs that should be removed

INSTALL = Signs that should be installed

See the handout with the sample plan for a complete list of the roadway notes that are used on a plan set.

6.8 Clear Zone Requirements

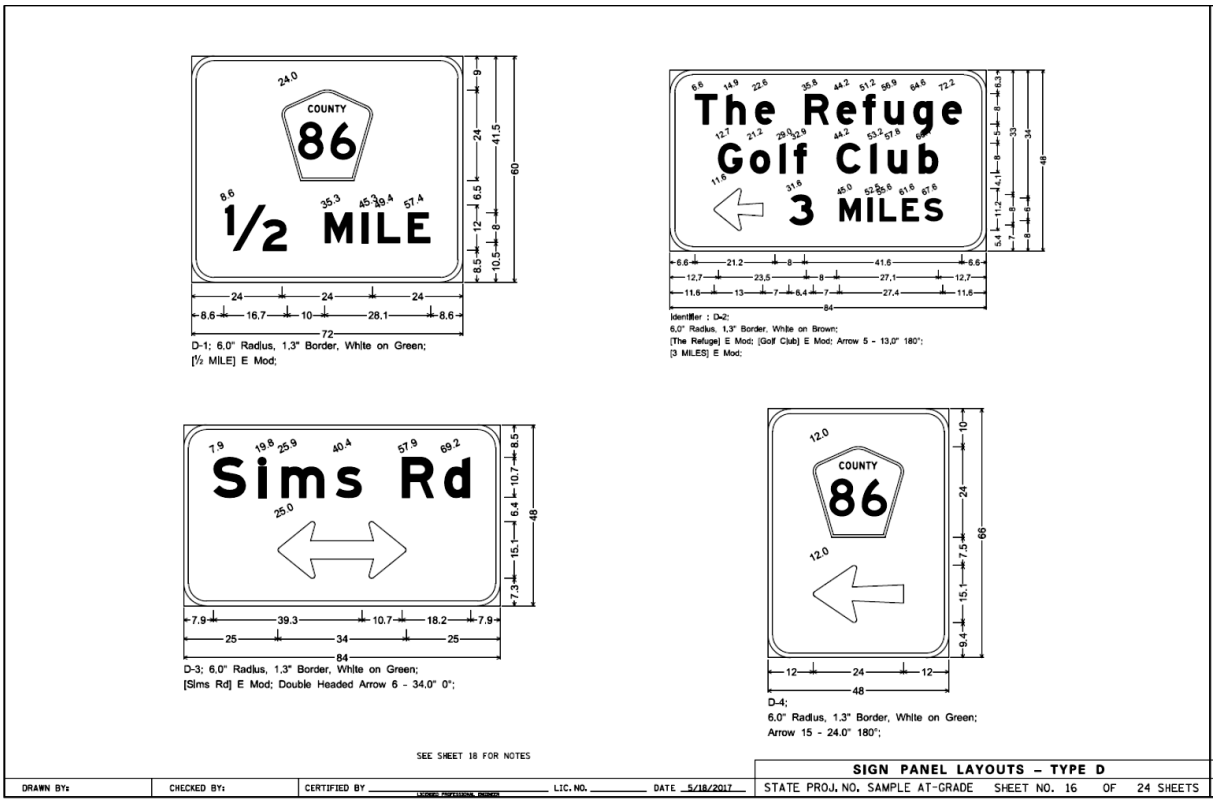
Clear Zones (from the Road Design Manual)

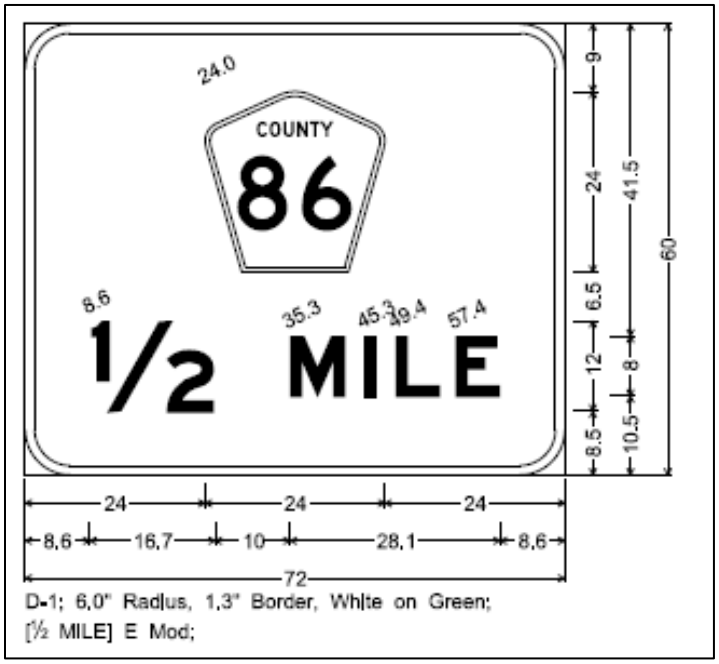
The roadside clear zone is the distance from the edge of the travel lane which should be free of any non-traversable hazard such as steep slopes or fixed objects. The clear zone distances are targeted towards allowing approximately 80 to 85 percent of all run-off-the-road vehicles to recover or come 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.

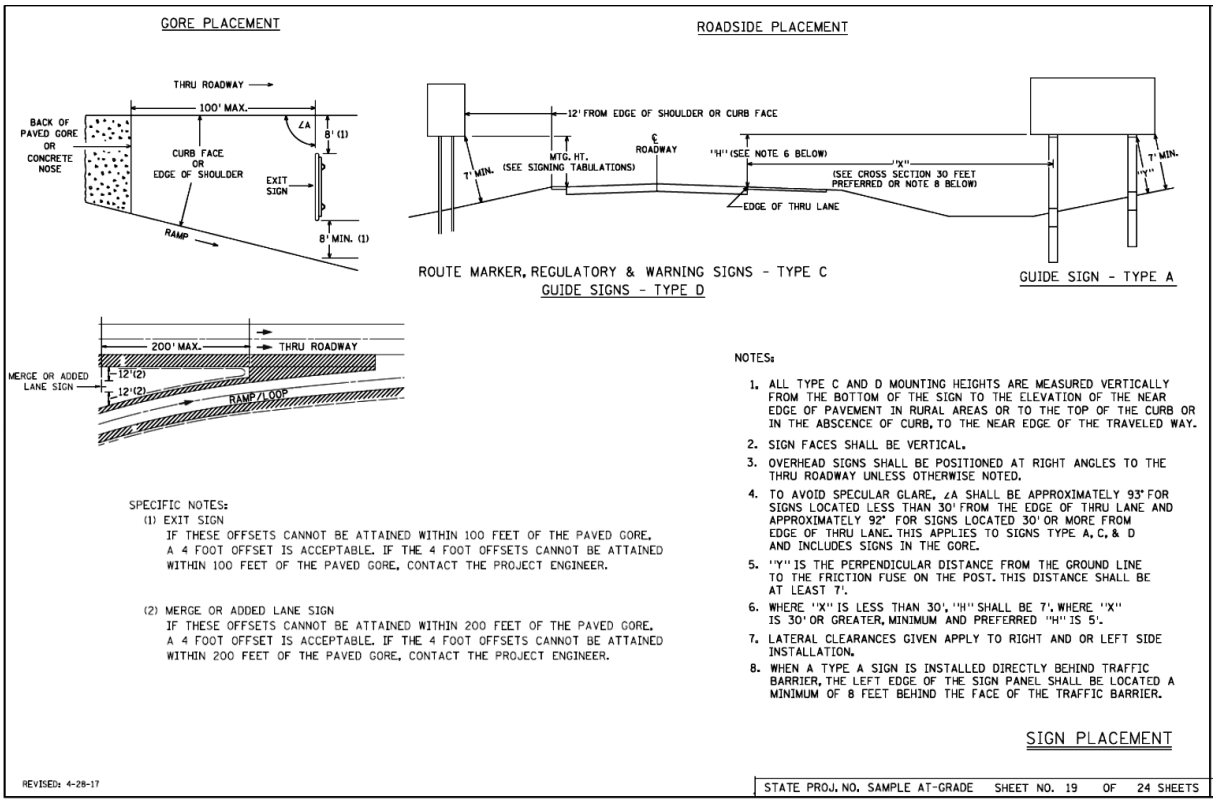
6.9 Sign Panel Layout Sheet



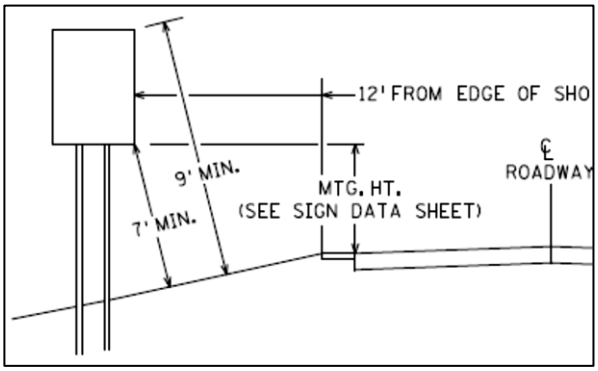


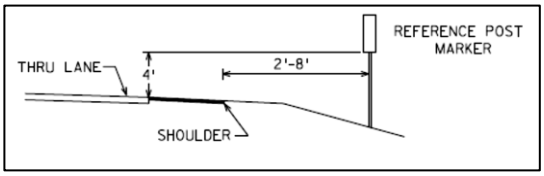
When sign panels exist, the layout details will be shown on these sheets. MnDOT uses the software SignCAD® to layout guide signs.

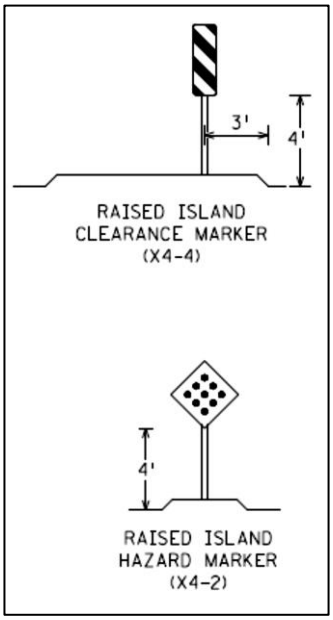
6.10 Placement Details



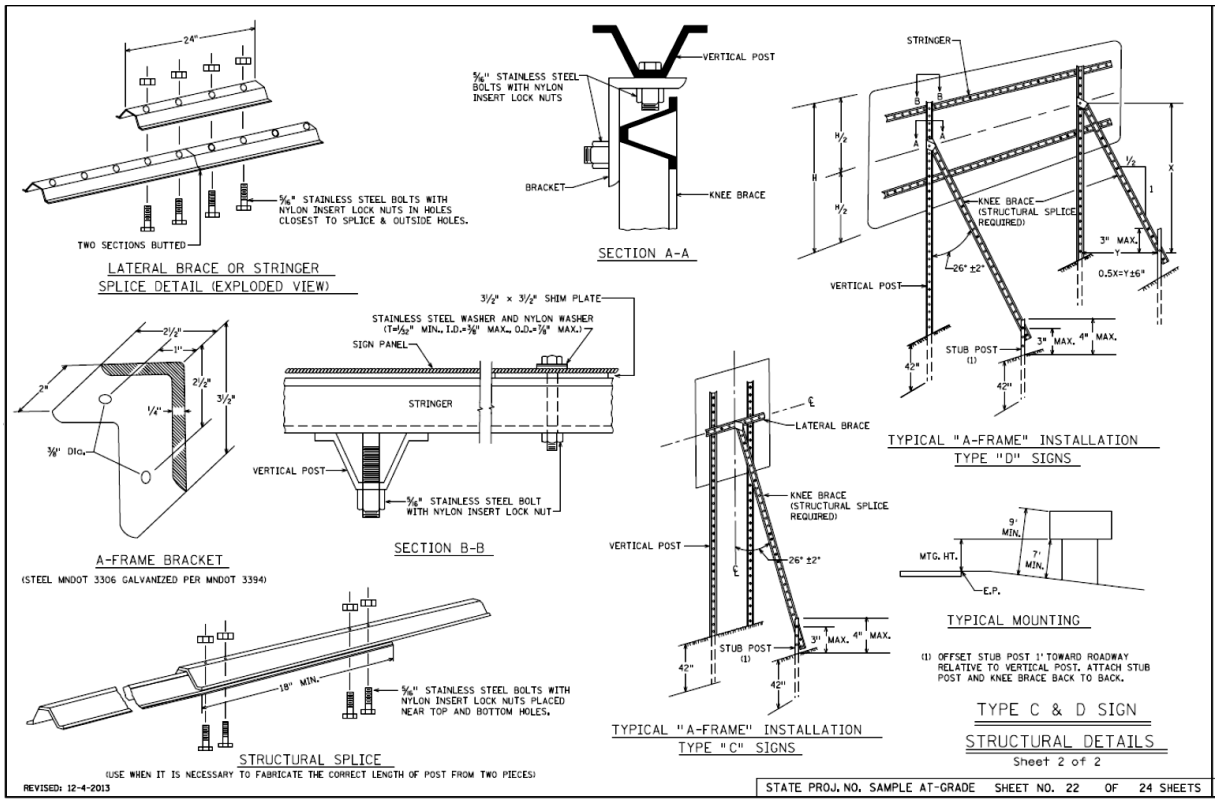
See the plan set for the placement detail sheets. The sample plan includes 2 sample sheets (sheet 19 and 20). Below are a few close-up views of the sign placement details.



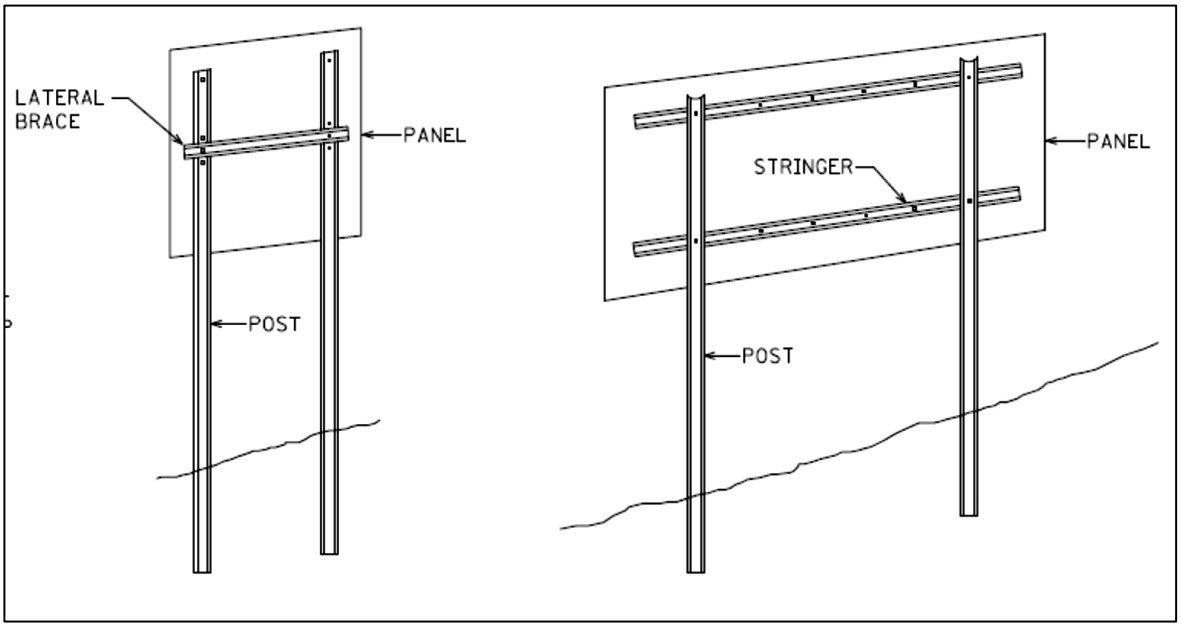


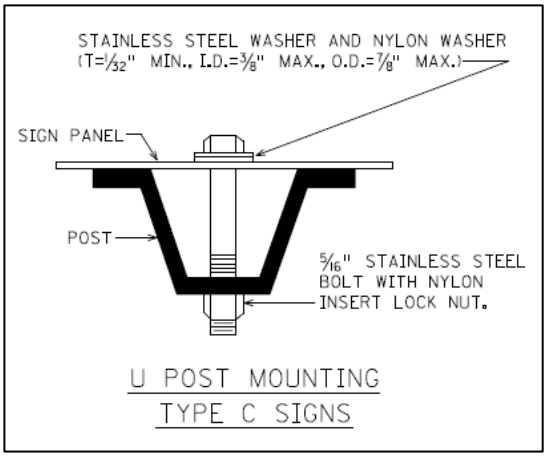


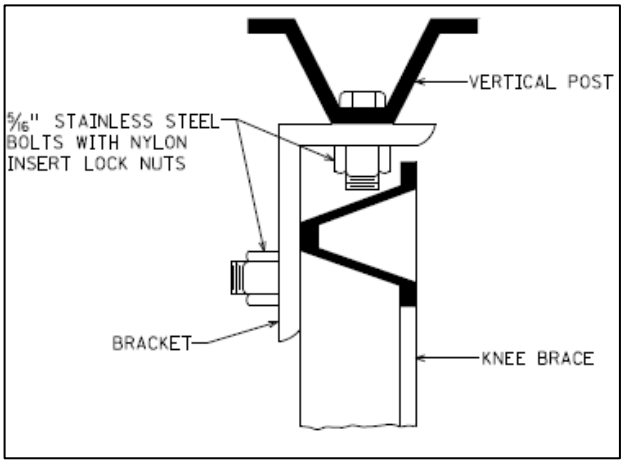
6.11 Structural Details

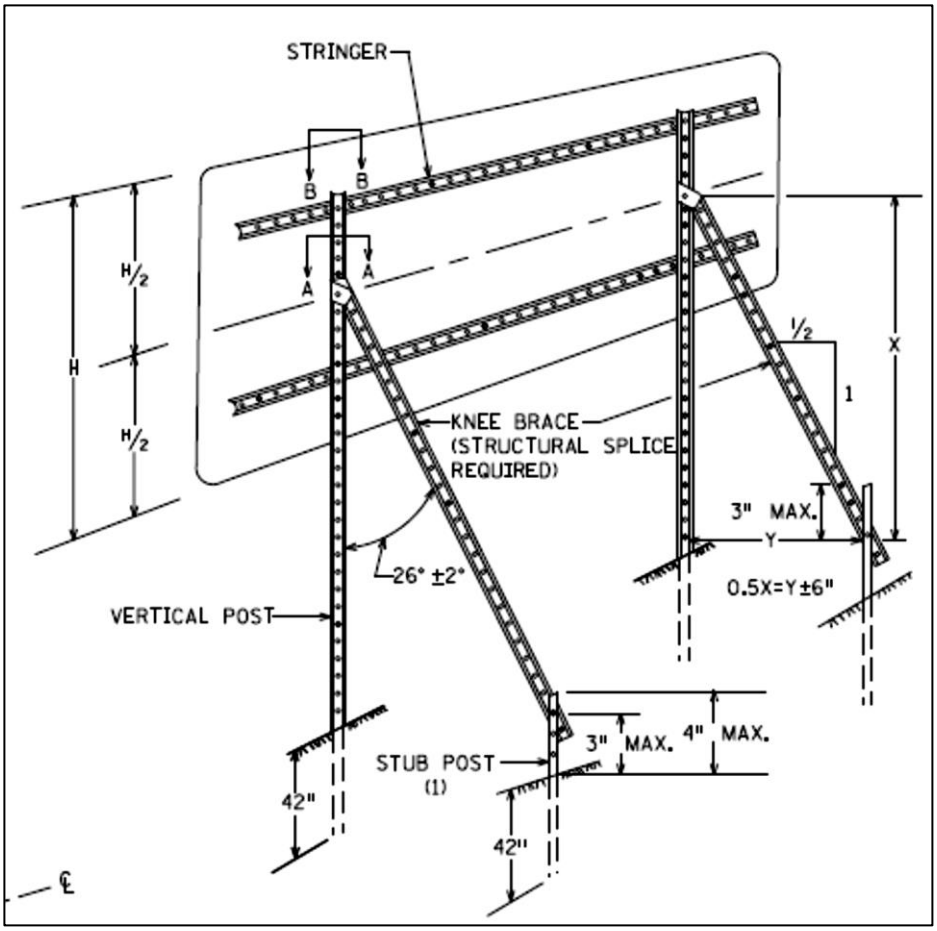


See the plan set for the structural detail sheets. The sample plan includes 5 sample sheets (sheet 21 through 24). Below are a few close-up views of the sign structural details.




STAINLESS STEEL WASHER AND NYLON WASHER
(T=1/32" MIN., I.D.=3/8" MAX., O.D.=7/8" MAX.)
SIGN PANEL
POST
5/16" STAINLESS STEEL
BOLT WITH NYLON
INSERT LOCK NUT.
U POST MOUNTING
TYPE C SIGNS


VERTICAL POST
5/16" STAINLESS STEEL
BOLTS WITH NYLON
INSERT LOCK NUTS
BRACKET
KNEE BRACE


STRINGER
B
B
A
A
H/2
H
H/2
KNEE BRACE
(STRUCTURAL SPLICE
REQUIRED)
1/2
1
X
3" MAX.
Y
0.5X=Y±6"
26° ±2°
VERTICAL POST
STUB POST
(1)
3" MAX.
4" MAX.
42"
42"
℄

6.12 Common Plan Set Issues

The following is a list of some of the common issues with plan sets from MnDOT reviewers. These are not in any order of importance.

- ✓ The designer uses PLACE instead of INSTALL. Whenever INSTALL is used by itself it implies that the material is either salvaged or supplied. It is preferred to use PLACE, FURNISH AND INSTALL (F & I), or CONSTRUCT.
    - INSTALL by itself implies that material is either salvaged or supplied. If this IS the case, it is OK to leave it (usually, this is not the case). When it is not INSTALL, and as previously noted, use PLACE, F & I, or CONSTRUCT.
- ✓ When using reference points, they need to be written in the standard format of XXX+XX.XXX.
- ✓ Ensure to label the mainline and cross streets as well as bridges and what the bridges cross over/under.
    - For Bridge labeling, use the Bridge Number as shown in the rest of the plan. Also label what it is over/under such as roadway, railroad, river name, etc.
- ✓ Check that the labelling at the bottom of the sheet matches the rest of the plan (e.g. SP XXXX-XX (TH XX)).
- ✓ Make sure the legend matches what is shown in the plan.
- ✓ Check that the sheet numbers in the signature block are correct and that they include their printed name.
- ✓ Ensure that pay items agree with what's shown on the plan and that all items are accounted for.
- ✓ Make sure all signs are accounted for in the tab/summary, especially the special signs.
- ✓ Manual details are not necessary in the plan as they are in the manuals. If they are, make sure the notes and references all make sense.

6.12.1 Design Scene

Design Scene is a guidance document for designers, technicians and engineers to help improve the quality and reduce cost and time of plan preparation. The Design Scene website is,

http://www.dot.state.mn.us/pre-letting/scene/.


DESIGN SCENE

OFFICE OF PROJECT MANAGEMENT & TECHNICAL SUPPORT — PROJECT DESIGN SERVICES UNIT

June 2014 - Page 7

Chapter 14 – Impact Attenuators
By: Y. Crocker with assistance from Kevin Farraher

In order to avoid external conflicts and maintain consistency within MnDOT, we will be changing how we call out temporary and permanent impact attenuators on our traffic control plans.

We will be specifying whether they are TL3's or TL2's (test level's) instead of posted speed limits.

All Temporary Impact Attenuators that are to be placed on roads with the speeds of 50 mph or greater will now be TL3 and those that are 45 mph or less shall be TL2.
These will be noted on our Pay Item Tabulation sheets like we have been doing. If the project requires both TL3 and TL2 attenuation, then they should be labeled on the plan sheets for clarification.

Examples: Same test level for all…

PAY ITEM TABULATION

PAY ITEM	UNIT	TOTAL
PORTABLE PRECAST CONCRETE BARRIER SECTION, 810"	CN FT	240
PORTABLE PRECAST CONCRETE BARRIER SECTION, 810", ANCHORED	CN FT	240
IMPACT ATTENUATOR	ASSEMBLY	4
TEMPORARY IMPACT ATTENUATOR	ASSEMBLY	4
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
PERMANENT PAVEMENT MARKING TAPE	CN FT	5750
PERMANENT PREFORMED PLASTIC BLOCK (BLACK)	CN FT	3450

No need to label attenuators

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7. AT-GRADE SAMPLE PLAN

The following is a handout of an at-grade sample plan. This sample plan can be downloaded from the OTST Signing website, http://www.dot.state.mn.us/trafficeng/signing/plans.html.

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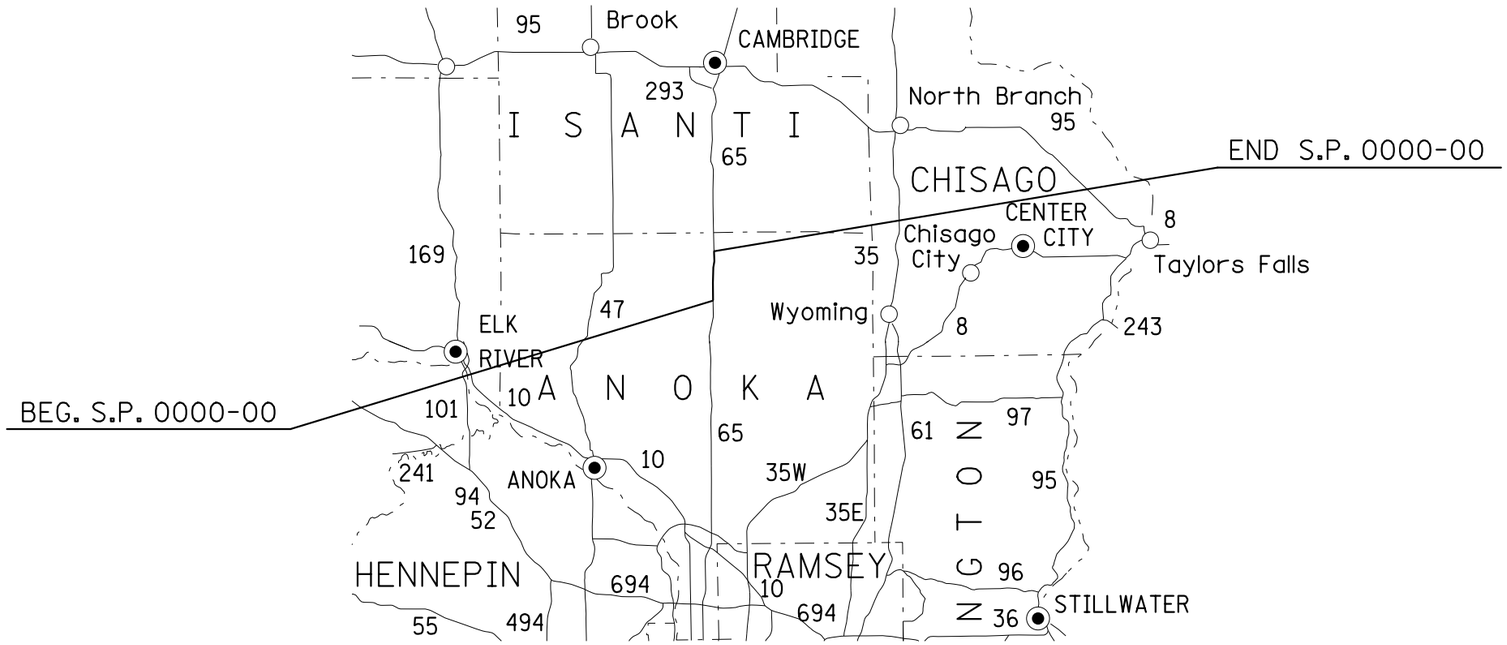
MINNESOTA DEPARTMENT OF TRANSPORTATION

CONSTRUCTION PLAN FOR SIGN REPLACEMENT

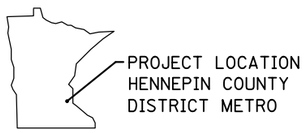
LOCATED ON T.H. 65 600' SO. OF 209TH AVE. N.E. TO 3/4 MILE NORTH OF 221ST AVE. N.E.



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.	CHARGE IDENTIFIER
0000-00	

FED. PROJ. NO. 0000-00

GOVERNING SPECIFICATIONS

THE 2016 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

INDEX

THIS PLAN CONTAINS 24 SHEETS

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: B. GOLDBERG LICENSE # 1984

DATE: SIGNATURE:

DESIGN SQUAD G. SCHWARTZ, R. SMITH, A. COGAN

RECOMMENDED FOR APPROVAL 20
DISTRICT TRANSPORTATION ENGINEER

RECOMMENDED FOR APPROVAL 20
DISTRICT TRAFFIC ENGINEER

RECOMMENDED FOR APPROVAL 20
STATE PRE-LETTING ENGINEER

OFFICE OF LAND MANAGEMENT APPROVAL 20
DIRECTOR, LAND MANAGEMENT

APPROVED 20
STATE DESIGN ENGINEER

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. SAMPLE AT-GRADE SHEET NO. 1 OF 24 SHEETS

PLOTTED/REVISED: 5/18/2017

DISTRICT *: METRO
IPLOT NAME: SAMPLE CO_SIGNING TYPICALS
PATH & FILENAME: IP_PWPdi874706\SAMPLE CO_SIGNING TYPICALS.dgn

STATEMENT OF ESTIMATED QUANTITIES

TAB	SHEET NO	ITEM NO	ITEM	UNIT	TOTAL SIGNING QUANTITIES
		2011.601	AS BUILT	LUMP SUM	1
		2021.501	MOBILIZATION	LUMP SUM	1
		2104.509	REMOVE MARKER	EACH	6
		2104.509	REMOVE SIGN TYPE C	EACH	59
D	5	2104.509	REMOVE SIGN TYPE D	EACH	16
B	3	2104.523	SALVAGE SIGN TYPE C	EACH	2
E	5	2104.523	SALVAGE SIGN TYPE D	EACH	2
		2563.601	TRAFFIC CONTROL	LUMP SUM	1
A	3	2564.531	SIGN PANELS TYPE C	SQ FT	791
C	4	2564.531	SIGN PANELS TYPE D	SQ FT	573
H	6	2564.531	SIGN PANELS TYPE OVERLAY	SQ FT	32
B	3	2564.537	INSTALL SIGN TYPE C	EACH	2
E	5	2564.537	INSTALL SIGN TYPE D	EACH	2
G	6	2564.551	REFERENCE LOCATION SIGN	EACH	6
F	6	2564.552	OBJECT MARKER TYPE X4-2	EACH	2

SIGN PANELS TYPE C — A

SIGN NO	QTY	POSTS NO & TYPE	POSTS KNEE BRACES QTY	POSTS LENGTH FEET	MTG HT (1) FEET	PANEL SIZE INCH	PANEL AREA SQ FT	PANEL TOTAL AREA SQ FT	CODE NO	PANEL LEGEND	
C-1	4	2-U	1	19	7	54 x 18	6.75	27.00	R6-1L	ONE WAY LEFT	(2) (3)
						54 x 18	6.75	27.00	R6-1R	ONE WAY RIGHT	(2)
						36 x 36	9.00	36.00	R1-1	STOP	(2)
						30 x 24	5.00	20.00	R6-3A	DIVIDED HIGHWAY	(2)
C-2	4	2-U	1	17	7	54 x 18	6.75	27.00	R6-1L	ONE WAY LEFT	(2)
						36 x 36 x 36	3.90	15.60	R1-2	YIELD	(2)
C-3	7	2-U	1	16	7	36 x 36	9.00	63.00	R5-1	DO NOT ENTER	
C-4	6	2-U		14	7	54 x 18	6.75	40.50	R6-1L	ONE WAY LEFT	
C-5	9	2-U	1	15	7	30 x 30	6.25	56.25	R3-7R	RIGHT LANE MUST TURN RIGHT	
C-6	8	2-U	1	15	7	30 x 30	6.25	50.00	R3-7L	LEFT LANE MUST TURN LEFT	
C-7	4	2-U	1	16	7	54 x 18	6.75	27.00	R6-1L	ONE WAY LEFT	(2) (3)
						54 x 18	6.75	27.00	R6-1R	ONE WAY RIGHT	(2)
						36 x 36 x 36	3.90	15.60	R1-2	YIELD	(2)
C-8	3	2-U		14	7	54 x 18	6.75	20.25	R6-1R	ONE WAY RIGHT	(2)
C-9	2	2-U	1	17	7	48 x 48	16.00	32.00	W3-3	SIGNAL AHEAD	
C-10	4	2-U	1	18	7	48 x 60	20.00	80.00	R2-1	SPEED LIMIT 65	
C-11	2	2-U	1	17	7	30 x 15	3.13	6.25	M3-3ma	SOUTH	(2)
						36 x 36	9.00	18.00	W13-1P	MINNESOTA 65	(2)
(6) C-12	2				7	54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	(3)
						54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	
C-13	2	2-U	1	17	7	30 x 15	3.13	6.25	M3-1ma	NORTH	(2)
						36 x 36	9.00	18.00	W13-1P	MINNESOTA 65	(2)
C-14	2	2-U	1	17	7	54 x 18	6.75	13.50	R6-1R	ONE WAY RIGHT	
						36 x 36	9.00	18.00	R1-1	STOP	
C-15	2	2-U	1	19	7	54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	(2) (3)
						54 x 18	6.75	13.50	R6-1R	ONE WAY RIGHT	(2)
						36 x 36	9.00	18.00	R1-1	STOP	(2)
						30 x 24	5.00	10.00	R6-3	DIVIDED HIGHWAY	(2)
C-16	2	2-U	1	17	7	48 x 18	6.00	12.00	R6-1R	ONE WAY RIGHT	(4)
						36 x 36 x 36	3.90	7.80	R1-2	YIELD	
(5) C-17	2	1-ST		16	7	36 x 36	9.00	18.00	R5-1	DO NOT ENTER	
(5) C-18	2	1-ST		10	7	54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	(3)
						54 x 18	6.75	13.50	R6-1L	ONE WAY LEFT	
							TOTAL	791.00			

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET NO. 22 FOR TYPICAL MOUNTING.
(2) FOR PUNCHING AND MOUNTING DETAILS SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL, PAGE 110.
(3) MOUNT BACK TO BACK.
(4) MOUNT BACK TO BACK WITH ONEWAY ABOVE YIELD.
(5) MOUNT IN CONCRETE, SEE SHEET 23
(6) MOUNT ON SIGNAL POLE, SEE SHEET 24.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEET 19 FOR SIGN PLACEMENT DETAILS.
3. SEE SHEETS 21 TO 22 FOR STRUCTURAL DETAILS.
4. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS OF TYPE C SIGN PANELS.

SALVAGE & INSTALL SIGN TYPE C — B

SIGN NO	QTY	POSTS NO & TYPE	POSTS KNEE BRACES QTY	POSTS LENGTH	MTG HT (1)	PANEL SIZE	PANEL LEGEND
	EACH			FEET	FEET	INCH	
C-201	2	2-U	1	16	7	60 x 36	ADOPT A HIGHWAY
TOTAL	2						

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE)
SEE SHEET 22 FOR TYPICAL MOUNTING.
GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEET 19 FOR SIGN PLACEMENT DETAILS.
3. SEE SHEETS 21 TO 22 FOR STRUCTURAL DETAILS.
4. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS OF TYPE C SIGN PANELS.

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017

STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 3 OF 24 SHEETS

SIGN PANELS TYPE D

C

SIGN NO.	QUANT.	POSTS				MTG HT. (1) (FT.)	PANEL			PANEL LEGEND
		NO. & TYPE	KNEE BRACES QUANT.	LEN. (FT.)	SPACING (IN.)		SIZE (IN.)	AREA (SQ. FT.)	TOTAL AREA (SQ. FT.)	
D-1	2	2-U	2	18	42	7	72 x 60	30.00	60.00	86 ½ MILE
D-2	1	2-U	2	17	54	7	84 x 48	28.00	28.00	The Refuge Golf Club ⇦ 3 MILES
D-3	2	2-U	2	17	54	7	84 x 48	28.00	56.00	Sims Rd ⇦⇨
D-4	1	2-U	2	18	30	7	48 x 66	22.00	22.00	86 ⇦
D-5	1	2-U	2	18	30	7	48 x 66	22.00	22.00	86 ⇨
D-6	1	2-U	2	17	54	7	84 x 48	28.00	28.00	The Refuge Golf Club 3 MILES ⇨
D-7	2	3-U	3	19	45	7	102 x 78	55.25	110.50	74 221st Ave ½ MILE
D-8	1	2-U	2	17	60	7	102 x 48	34.00	34.00	219th Ave ⇦
D-9	1	2-U	2	17	60	7	102 x 48	34.00	34.00	Lake George Regional Park ⇦
D-10	1	2-U	2	17	60	7	102 x 48	34.00	34.00	219th Ave ⇨
D-11	2	3-U	3	19	45	7	102 x 78	55.25	110.50	74 221st Ave ⇦⇨
D-12	1	2-U	2	17	60	7	102 x 48	34.00	34.00	Lake George Regional Park ⇨
TOTAL									573.00	

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET 22 FOR TYPICAL MOUNTING.

GENERAL NOTES:
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEET 19 FOR SIGN PLACEMENT DETAILS.
3. SEE SHEETS 21 TO 22 FOR STRUCTURAL DETAILS.
4. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR TYPE D STRINGER AND PANEL JOINT DETAILS.
5. SEE SHEETS 16 TO 18 FOR SIGN PANELS.

REMOVE SIGN TYPE D — D

SIGN NO	QTY	POSTS		PANEL	PANEL LEGEND
		NO & TYPE	KNEE BRACES QTY	SIZE (1)	
	EACH			INCH	
D-101	2	2-U	2	72 x 60	86 ½ MILE
D-102	1	2-U	2	84 x 48	The Refuge Golf Club ⇦ 3 MILES
D-103	2	2-U	2	84 x 48	Sims Rd ⇦⇨
D-104	1	2-U	1	48 x 66	86 ⇦
D-105	1	2-U	1	48 x 66	86 ⇨
D-106	1	2-U	2	84 x 48	The Refuge Golf Club 3 MILES ⇨
D-107	2	3-U	3	102 x 78	74 221st Ave ½ MILE
D-108	1	2-U	2	102 x 48	219th Ave ⇦
D-109	1	2-U	2	102 x 48	Lake George Regional Park ⇦
D-110	1	2-U	2	102 x 48	219th Ave ⇨
D-111	2	3-U	3	102 x 78	74 221st Ave ⇦⇨
D-112	1	2-U	2	102 x 48	Lake George Regional Park ⇨
TOTAL	16				

(1) SIZES ARE APPROXIMATE

SALVAGE & INSTALL SIGN TYPE D — E

SIGN NO	QTY	POSTS				MTG HT (1)	PANEL	PANEL LEGEND
		NO & TYPE	KNEE BRACES QTY	SPACING	LENGTH		SIZE	
	EACH			INCH	FEET	FEET	INCH	
D-201	1	2-U	2	17	90	7	144 x 48	CITY HALL - COMMUNITY CENTER 1 MILE ⇨
D-202	1	2-U	2	17	90	7	144 x 48	CITY HALL - COMMUNITY CENTER ⇦ 1 MILE
TOTAL	2							

SPECIFIC NOTES:
(1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET 22 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 21 TO 22 FOR STRUCTURAL DETAILS.
3. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR TYPE D STRINGER AND PANEL JOINT DETAILS.

PLOTTED/REVISED: 5/18/2017
DISTRICT *: METRO
PLOT NAME: SAMPLE CHARTS4
PATH & FILENAME: IP_PWP:d187406\SAMPLE CHARTS.dgn

OBJECT MARKER — F

	CODE NO	SIZE INCH	COLOR	QUANTITY EACH
(2)	X4-2	18 x 18	YELLOW ON BLACK	2

TOTAL QUANTITIES

CODE NO	QUANTITY EACH
X4-2	2

SPECIFIC NOTES:
(1) MOUNT ON 3LB/FT POST (MNDOT 3401).
(2) MOUNTED IN CONCRETE.
GENERAL NOTES:
1. FOR MARKER PLACEMENT, SEE SHEET NO. 20.
2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR MARKER DETAIL.

REFERENCE LOCATION SIGN (1) — G

CODE NO	QTY EACH	SIZE INCH	LEGEND
D10-2	2	12 x 36	MILE 26
D10-2	2	12 x 36	MILE 27
D10-2	2	12 x 36	MILE 28
TOTAL	6		

SPECIFIC NOTES:
(1) MOUNT ON 3 LB/FT POST (MNDOT 3401).

GENERAL NOTE:
1. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR REFERENCE LOCATION SIGN DETAIL.
2. FOR REFERENCE LOCATION SIGN PLACEMENT, SEE SHEET NO. 20.

SIGN PANELS TYPE OVERLAY — H

CODE NO	QTY	SIZE INCH	AREA SQ FT	TOTAL SQ FT	LEGEND
M1-6A	4	24 x 24	4.00	16.00	COUNTY 74
M1-6A	4	24 x 24	4.00	16.00	COUNTY 86
			TOTAL	**32.00**	

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017

STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 6 OF 24 SHEETS

PLOTTED/REVISED: 5/18/2017

GENERAL NOTES:

- NO UTILITIES WILL BE AFFECTED BY WORK ON THIS PROJECT.

- THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."

UTILITIES

THE FOLLOWING LIST SHOWS THE UTILITY COMPANIES WITHIN THE PROJECT LIMITS

CENTERPOINT ENERGY
MN/DOT
MINNESOTA POWER
QWEST CORPORATION
US CABLE
XCEL ENERGY

(THIS IS JUST AN EXAMPLE OF HOW TO LIST UTILITY COMPANIES)

DISTRICT #: METRO
IPLOT NAME: UTILITIES
PATH & FILENAME: IP_PWP:d1874706\SAMPLE_UTILITIES.dgn

100
SCALE IN FEET

1140 1145 1150 1155

T.H. 65

C-7 (1) (2) (5)
YIELD
ONE WAY
ONE WAY

ONE WAY
(2) (5)
C-4 (1)

ONE WAY
YIELD
(2) (5)
C-2 (1)

209TH AVE NE

C-5 (1) (2) (5)
RIGHT LANE MUST TURN RIGHT

DO NOT ENTER
(2) (5) (1)
C-3

ONE WAY
ONE WAY
STOP
DIVIDED HIGHWAY
(2) (5)
C-1 (1)

D-101 (2) (4)
D-1 (1)

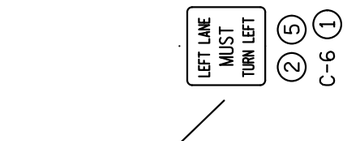
1/2 MILE
86

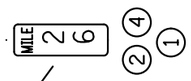
BEG. S.P. 0000-00
T.H. 65 E.B. STA. 1147+50

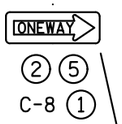
NOTES:
(1) F. & I.
(2) INPLACE
(4) REMOVE
(5) REMOVE SIGN TYPE C

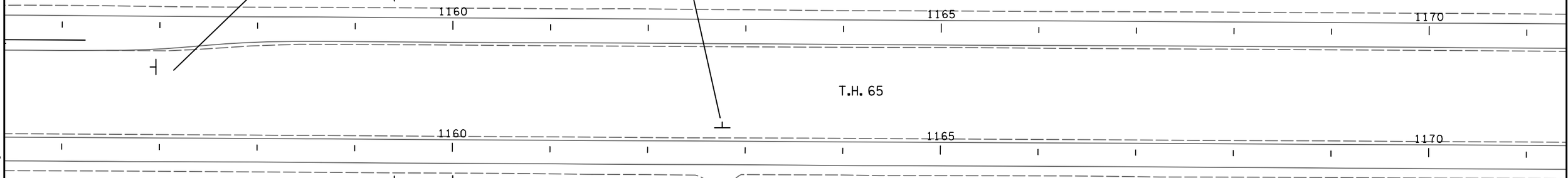
INPLACE/PERMANENT SIGNING

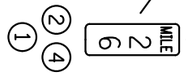
DRAWN BY:	CHECKED BY:	CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017	STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 8 OF 24 SHEETS

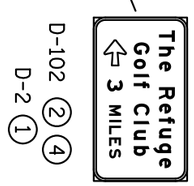


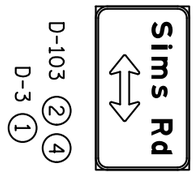


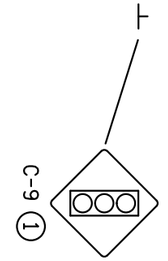












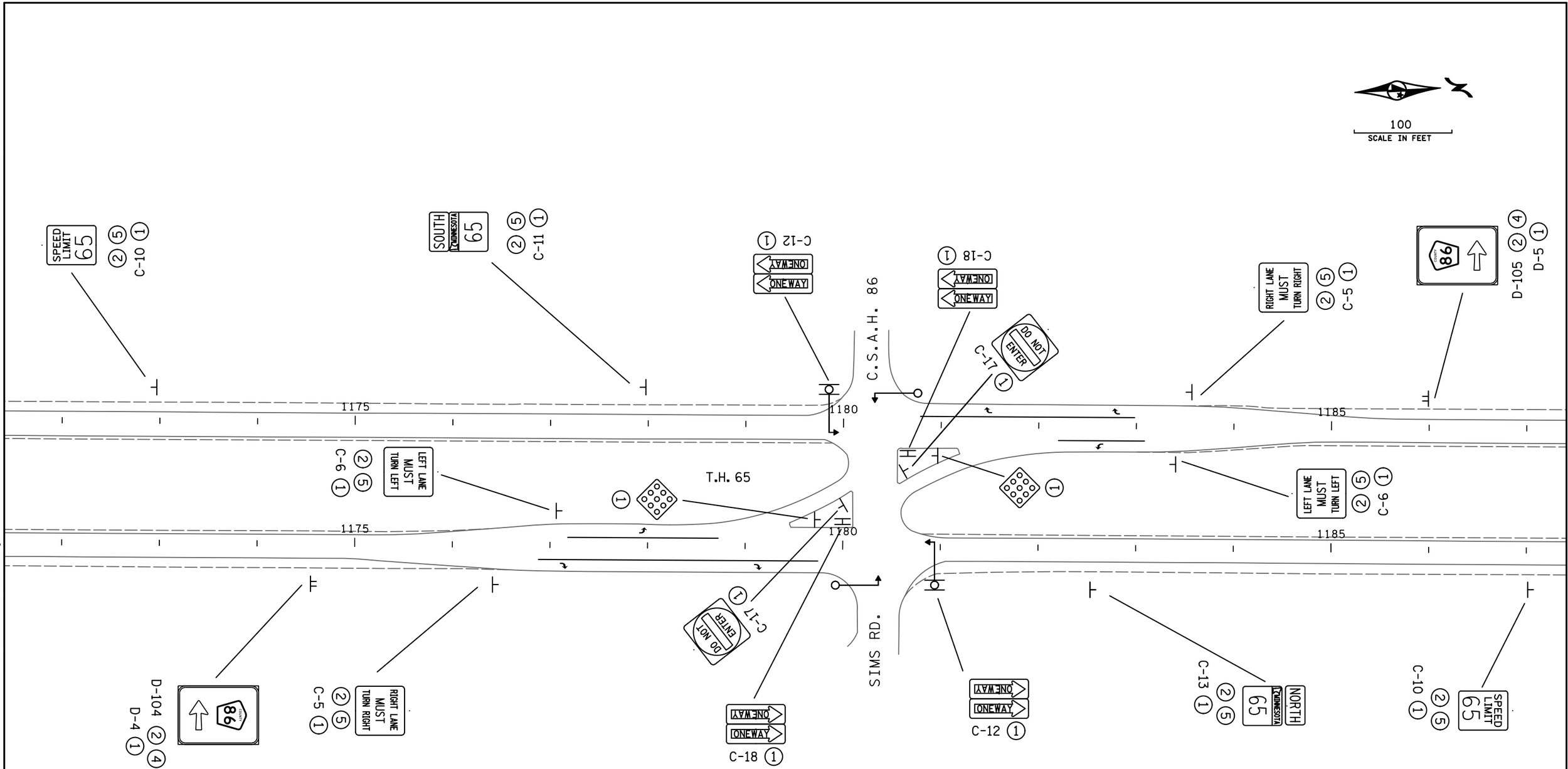
NOTES:

① F. & I.
② INPLACE
④ REMOVE
⑤ REMOVE SIGN TYPE C

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LIC. NO. _____ DATE 5/18/2017
LICENSED PROFESSIONAL ENGINEER

STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 9 OF 24 SHEETS

PLOTTED/REVISED: 5/18/2017



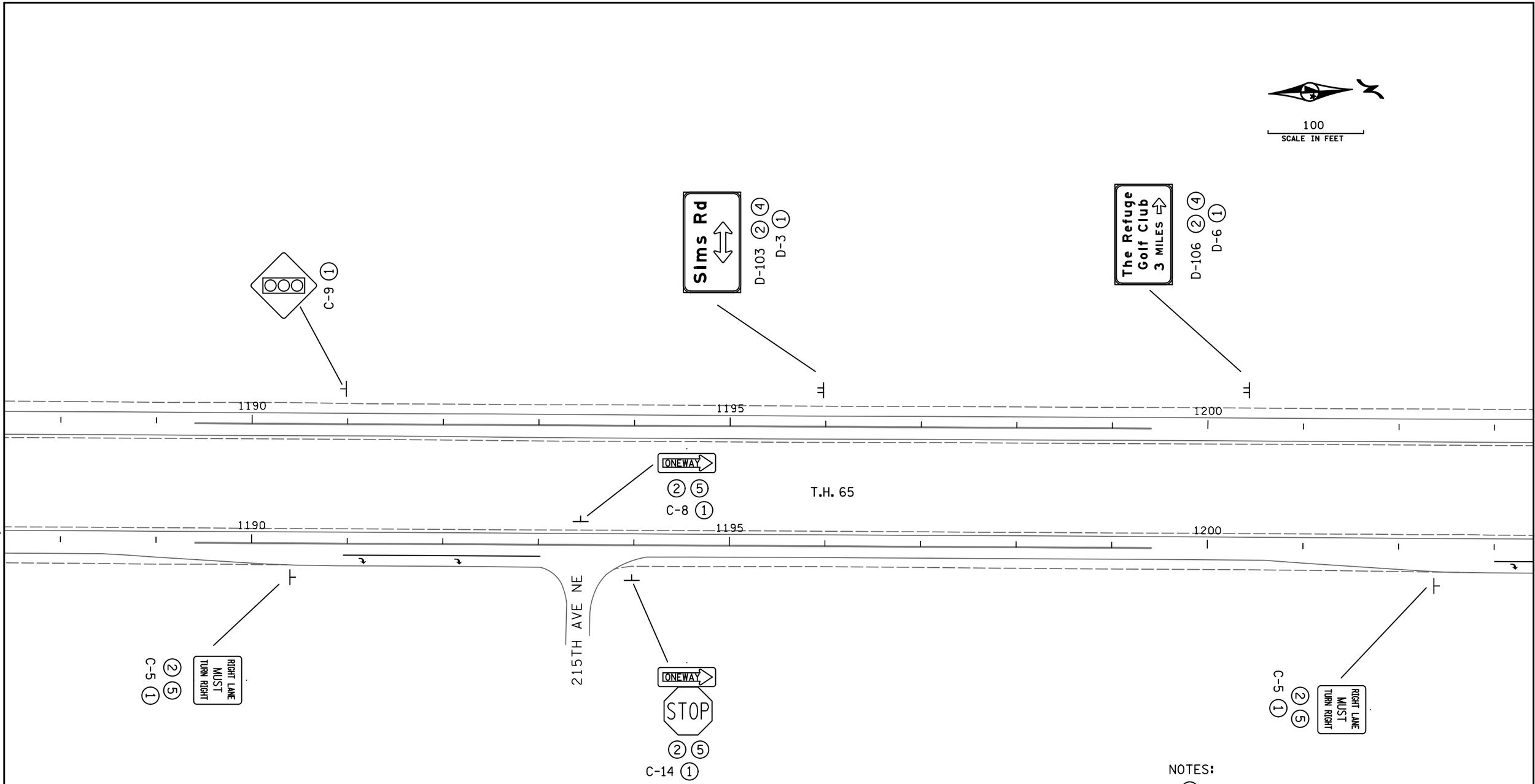
NOTES:

1. F. & I.
2. INPLACE
4. REMOVE
5. REMOVE SIGN TYPE C

DISTRICT *: METRO
IPLOT NAME: 2017 at GradeSAMPLE_PS.IDGN3
PATH & FILENAME: IP_PWP:d187406\SAMPLE 2017 at Grade_PS.IDGN.dgn

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LIC. NO. _____ DATE 5/18/2017
LICENSED PROFESSIONAL ENGINEER

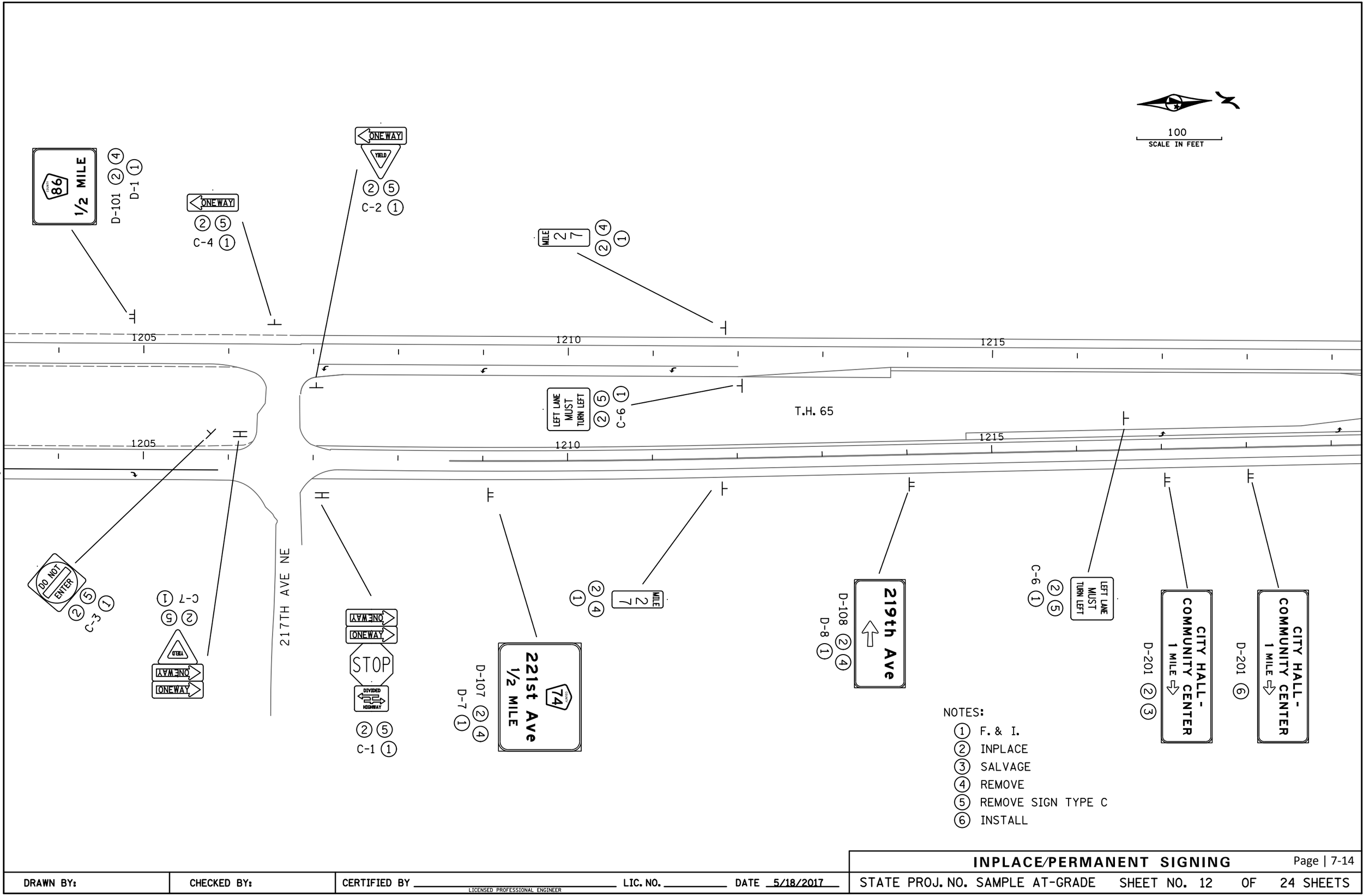
STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 10 OF 24 SHEETS



NOTES:

① F. & I.
② INPLACE
④ REMOVE
⑤ REMOVE SIGN TYPE C

DRAWN BY:	CHECKED BY:	CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017	STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 11 OF 24 SHEETS



NOTES:

1. F. & I.
2. INPLACE
3. SALVAGE
4. REMOVE
5. REMOVE SIGN TYPE C
6. INSTALL

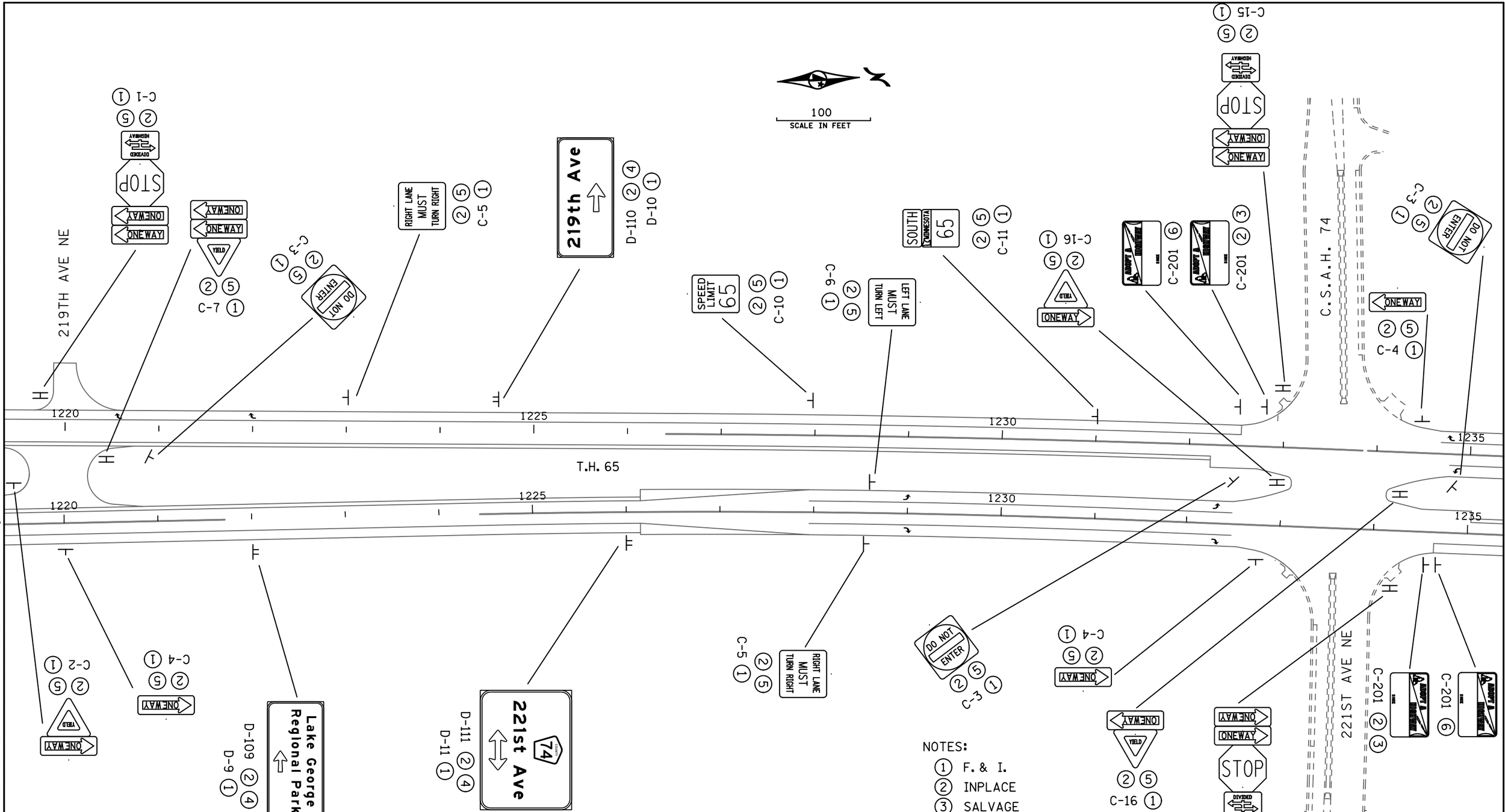
DISTRICT *: METRO
IPLOT NAME: 2017 at GradeSAMPLE_PS1.DGN5
PATH & FILENAME: IP_PWP:d1874706\SAMPLE 2017 at Grade_PS1.DGN.dgn

PLOTTED/REVISED: 5/18/2017

DRAWN BY:	CHECKED BY:	CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017

INPLACE/PERMANENT SIGNING

STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 12 OF 24 SHEETS



NOTES:

1. F. & I.
2. INPLACE
3. SALVAGE
4. REMOVE
5. REMOVE SIGN TYPE C
6. INSTALL

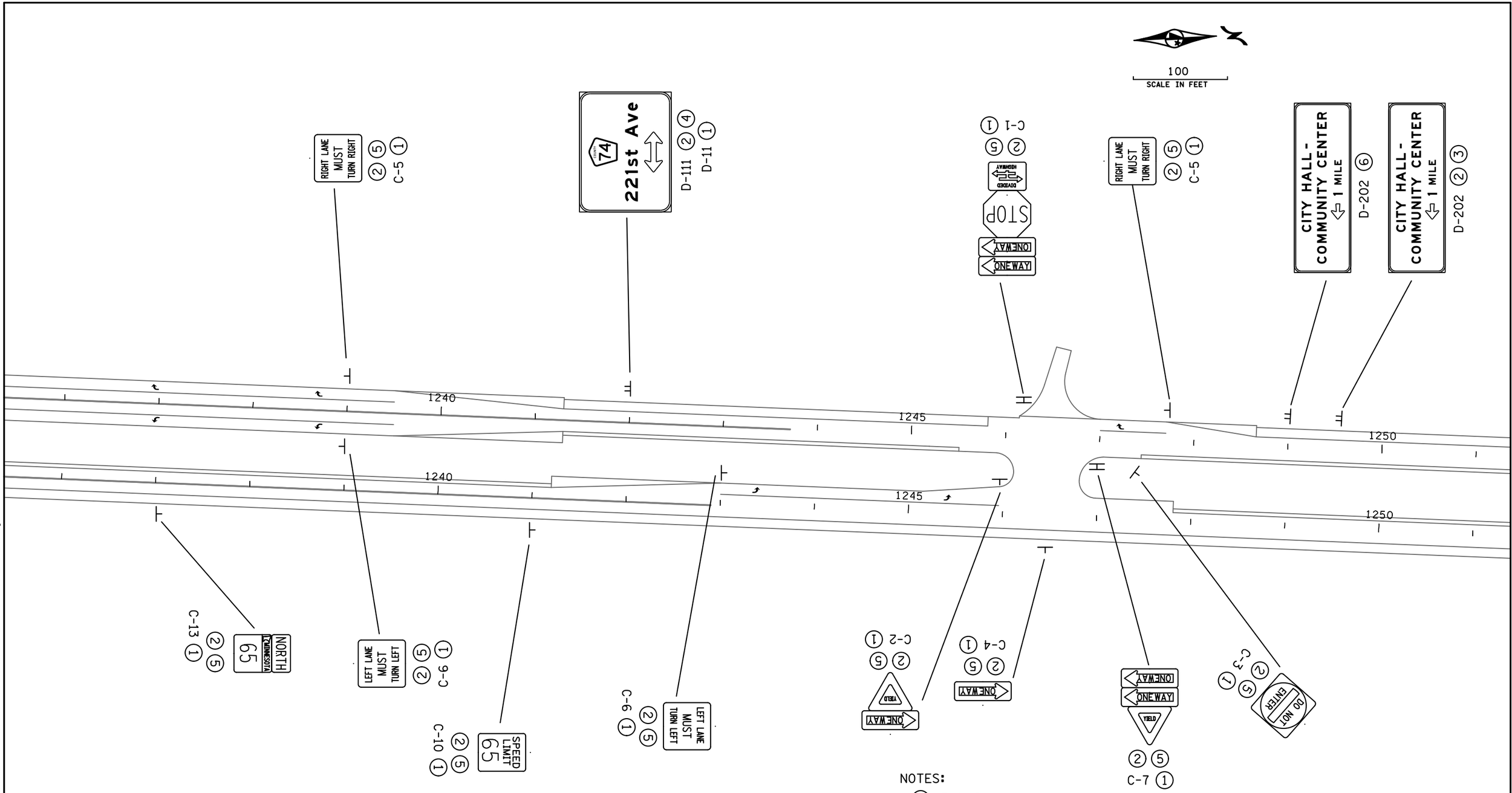
PLOTTED/REVISED: 5/18/2017

DISTRICT *: METRO
IPLOT NAME: 2017 dt GradeSAMPLE_PSI.DGN6
PATH & FILENAME: IP_PWP\dl8747O6\SAMPLE 2017 dt Grade_PSI.DGN.dgn

DRAWN BY:	CHECKED BY:	CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017	INPLACE/PERMANENT SIGNING

STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 13 OF 24 SHEETS

PLOTTED/REVISED: 5/18/2017



NOTES:

① F. & I.
② INPLACE
③ SALVAGE
④ REMOVE
⑤ REMOVE SIGN TYPE C
⑥ INSTALL

DISTRICT *: METRO
IPLOT NAME: 2017 at GradeSAMPLE_PSI.DGNT
PATH & FILENAME: IP_PWP:d187406\SAMPLE 2017 at Grade_PSI.DGN.dgn

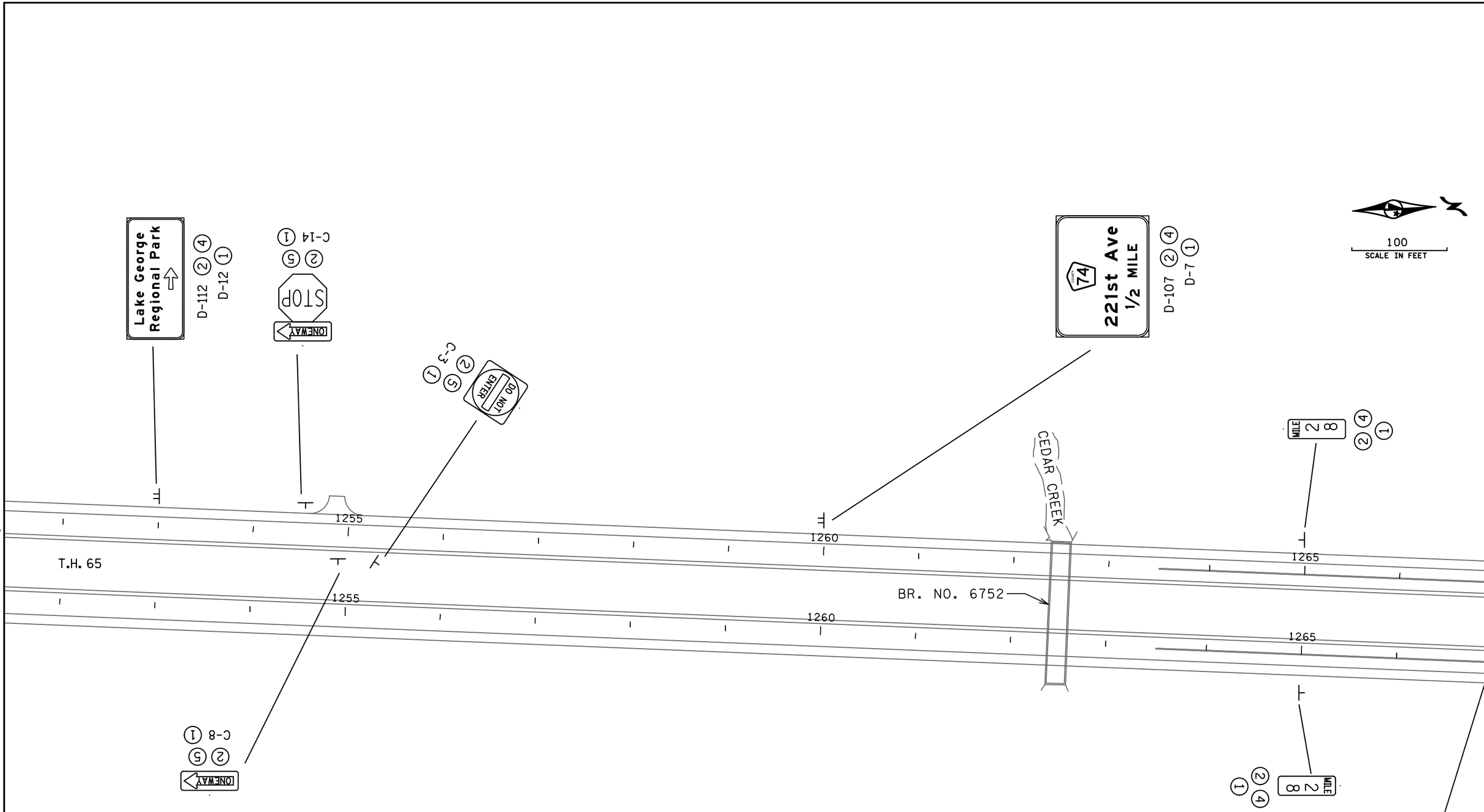
DRAWN BY:	CHECKED BY:	CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER	LIC. NO. _____	DATE 5/18/2017

INPLACE/PERMANENT SIGNING

STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 14 OF 24 SHEETS

PLOTTED/REVISED: 5/18/2017

DISTRICT *: METRO
IPLOT NAME: 2017 at GradeSAMPLE_PSILDGN8
PATH & FILENAME: IP_PWP:d187470G\SAMPLE 2017 at Grade_PSILDGN.dgn

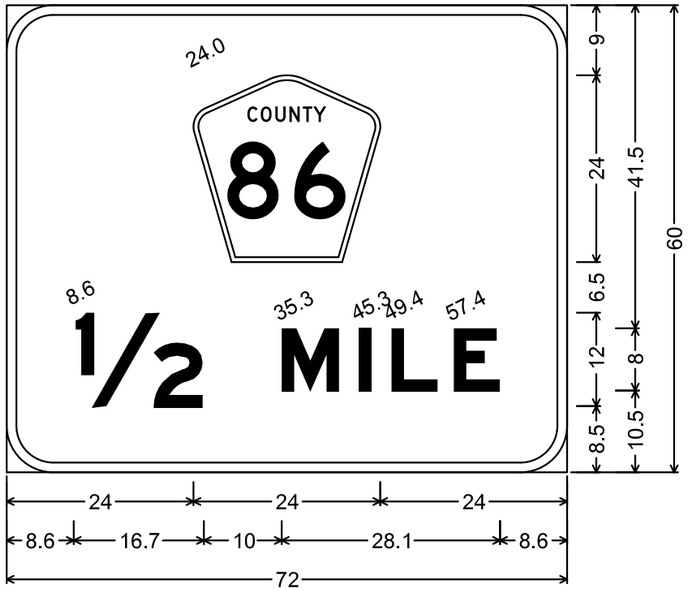


NOTES:

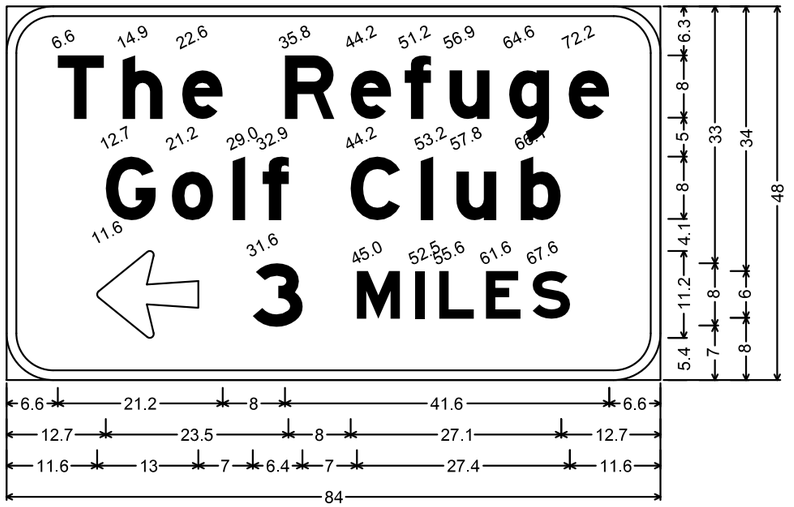
(1) F. & I.
(2) INPLACE
(4) REMOVE
(5) REMOVE SIGN TYPE C

END S.P. 0000-00
T.H. 65 E.B. STA. 1267+00

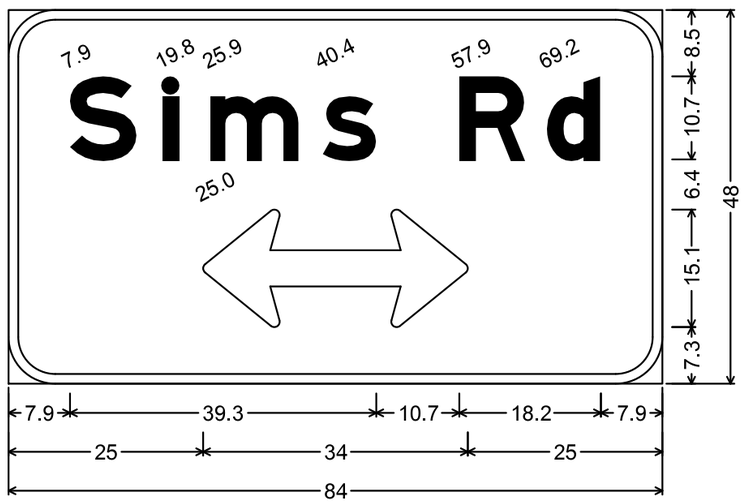
DRAWN BY:	CHECKED BY:	CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017	INPLACE/PERMANENT SIGNING	Page | 7-17
			STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 15 OF 24 SHEETS	



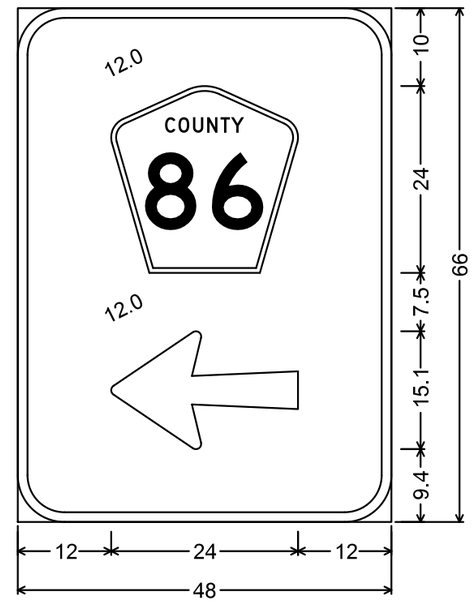
D-1; 6.0" Radius, 1.3" Border, White on Green;
[½ MILE] E Mod;



Identifier : D-2;
6.0" Radius, 1.3" Border, White on Brown;
[The Refuge] E Mod; [Golf Club] E Mod; Arrow 5 - 13.0" 180°;
[3 MILES] E Mod;



D-3; 6.0" Radius, 1.3" Border, White on Green;
[Sims Rd] E Mod; Double Headed Arrow 6 - 34.0" 0°;



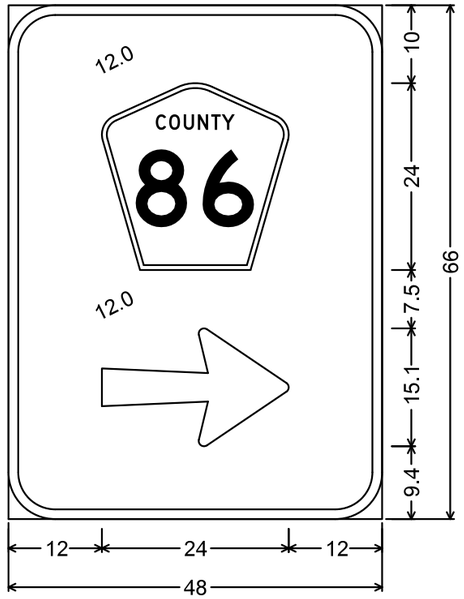
D-4;
6.0" Radius, 1.3" Border, White on Green;
Arrow 15 - 24.0" 180°;

SEE SHEET 18 FOR NOTES

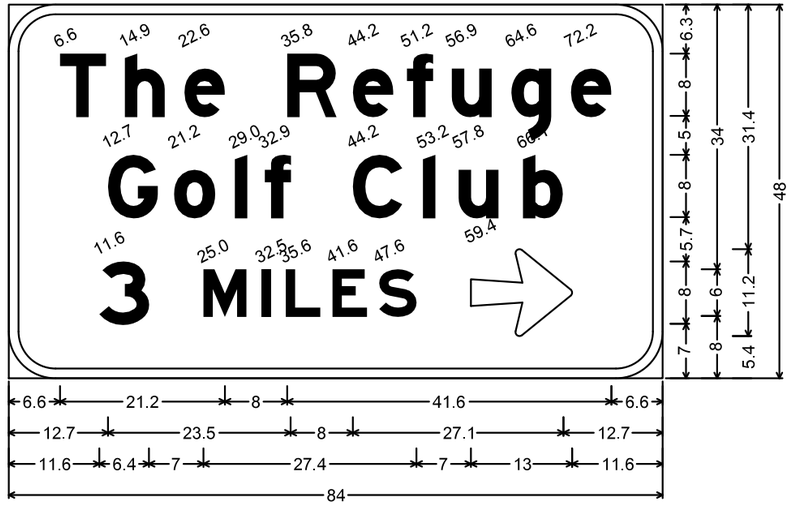
SIGN PANEL LAYOUTS – TYPE D

DRAWN BY: | CHECKED BY: | CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LIC. NO. _____ DATE 5/18/2017

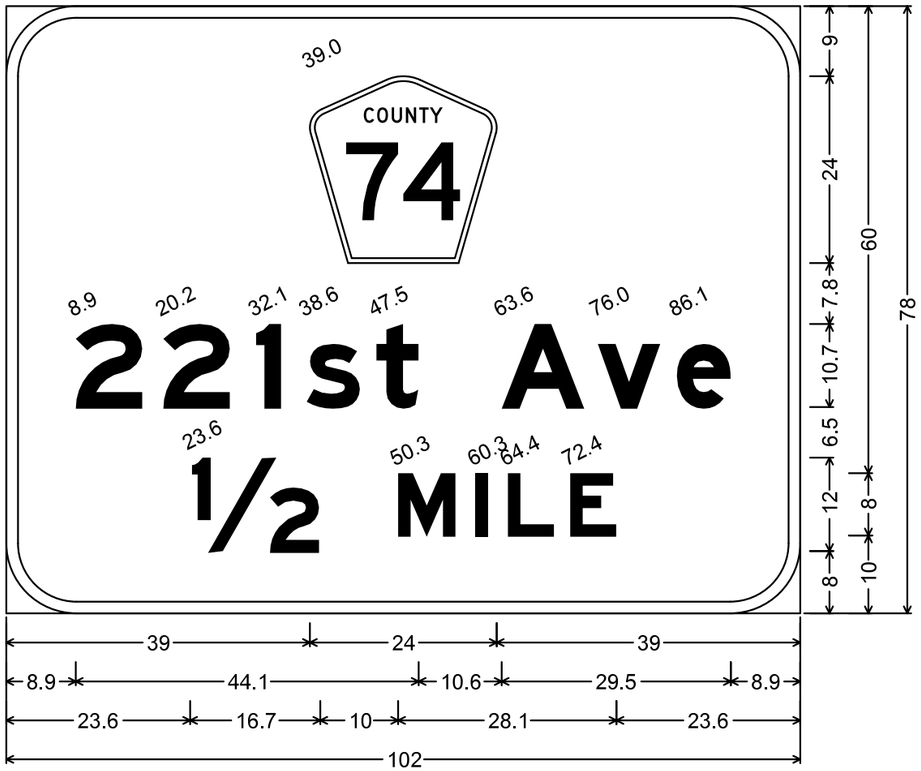
STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 16 OF 24 SHEETS



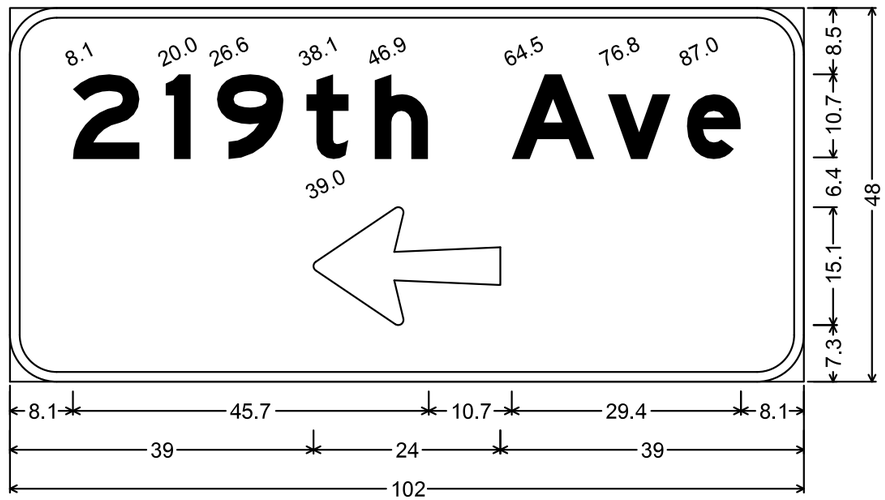
D-5;
6.0" Radius, 1.3" Border, White on Green;
Arrow 15 - 24.0" 0°;



D-6;
6.0" Radius, 1.3" Border, White on Brown;
[The Refuge] E Mod; [Golf Club] E Mod; [3 MILES] E Mod;
Arrow 5 - 13.0" 0°;



D-7; 9.0" Radius, 1.5" Border, White on Green;
[221st Ave] E Mod; [½ MILE] E Mod;



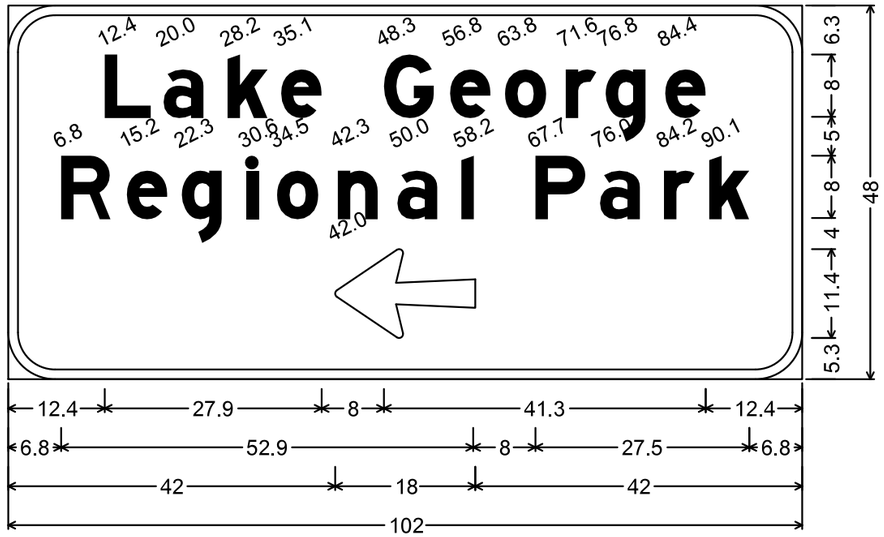
D-8; 6.0" Radius, 1.3" Border, White on Green;
[219th Ave] E Mod; Arrow 15 - 24.0" 180°;

SEE SHEET 18 FOR NOTES

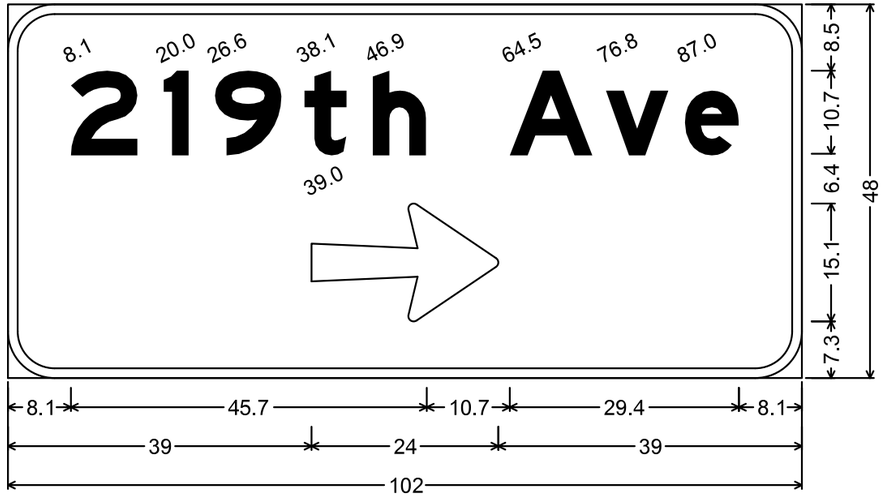
DRAWN BY:	CHECKED BY:	CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER	LIC. NO. _____	DATE 5/18/2017

SIGN PANEL LAYOUTS – TYPE D

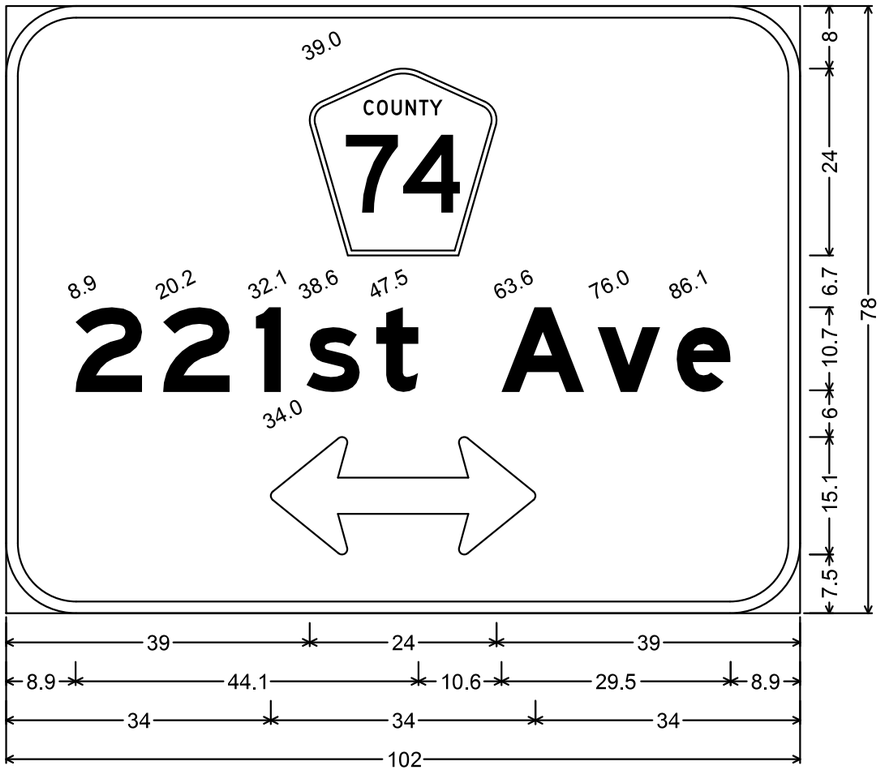
STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 17 OF 24 SHEETS



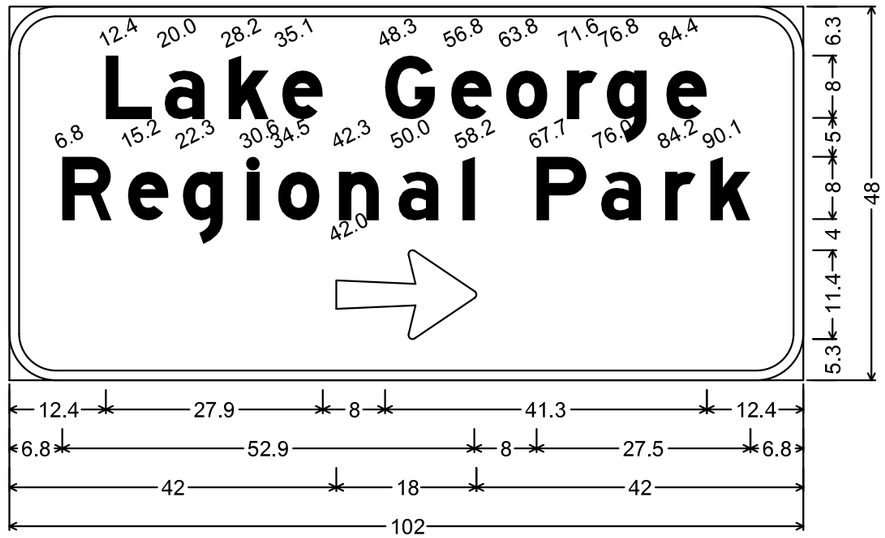
D-9; 6.0" Radius, 1.3" Border, White on Brown;
[Lake George] E Mod; [Regional Park] E Mod; Arrow 14 - 18.0" 180°;



D-10; 6.0" Radius, 1.3" Border, White on Green;
[219th Ave] E Mod; Arrow 15 - 24.0" 0°;



D-11; 9.0" Radius, 1.5" Border, White on Green;
[221st Ave] E Mod; Double Headed Arrow 6 - 34.0" 0°;



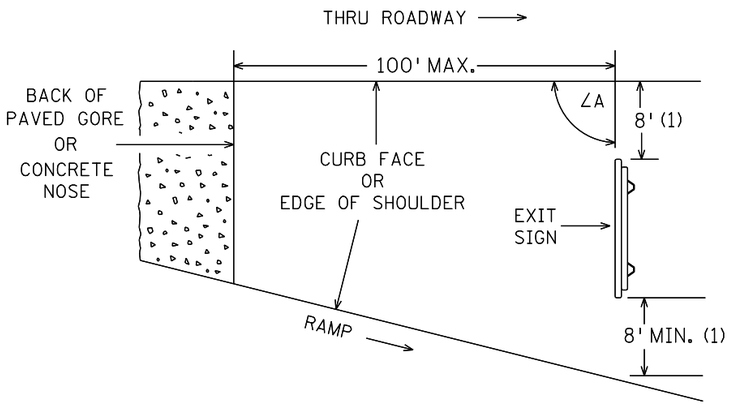
D-12; 6.0" Radius, 1.3" Border, White on Brown;
[Lake George] E Mod; [Regional Park] E Mod; Arrow 14 - 18.0" 0°;

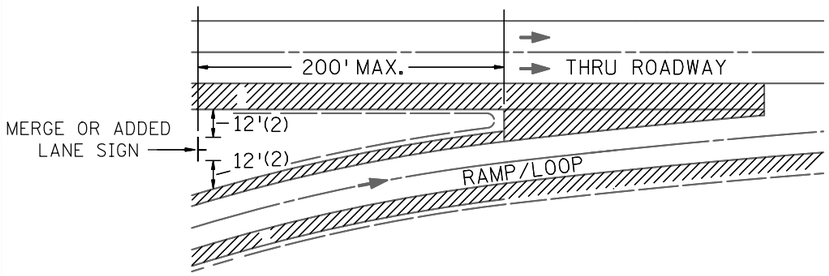
NOTES:
1. CORNERS OF SIGN PANELS EXTENDING BEYOND THE BORDER MAY BE TRIMMED.
2. SEE MNDOT STANDARDS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAILS.
3. ALL DIMENSIONS ARE IN INCHES.

PLOTTED/REVISED: 5/18/2017

DISTRICT *: METRO
IPLOT NAME: SAMPLE PLAN PANELS.DGN3
PATH & FILENAME: I:\P_PWPdi874706\SAMPLE PLAN PANELS.DGN.dgn

GORE PLACEMENT



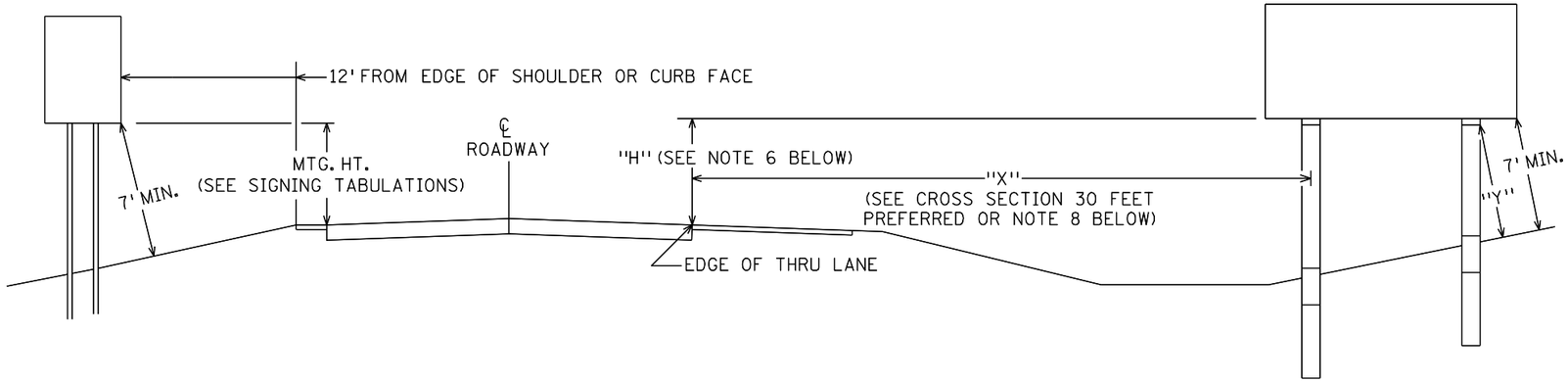


SPECIFIC NOTES:

(1) EXIT SIGN
IF THESE OFFSETS CANNOT BE ATTAINED WITHIN 100 FEET OF THE PAVED GORE, A 4 FOOT OFFSET IS ACCEPTABLE. IF THE 4 FOOT OFFSETS CANNOT BE ATTAINED WITHIN 100 FEET OF THE PAVED GORE, CONTACT THE PROJECT ENGINEER.

(2) MERGE OR ADDED LANE SIGN
IF THESE OFFSETS CANNOT BE ATTAINED WITHIN 200 FEET OF THE PAVED GORE, A 4 FOOT OFFSET IS ACCEPTABLE. IF THE 4 FOOT OFFSETS CANNOT BE ATTAINED WITHIN 200 FEET OF THE PAVED GORE, CONTACT THE PROJECT ENGINEER.

ROADSIDE PLACEMENT



ROUTE MARKER, REGULATORY & WARNING SIGNS - TYPE C
GUIDE SIGNS - TYPE D

GUIDE SIGN - TYPE A

NOTES:

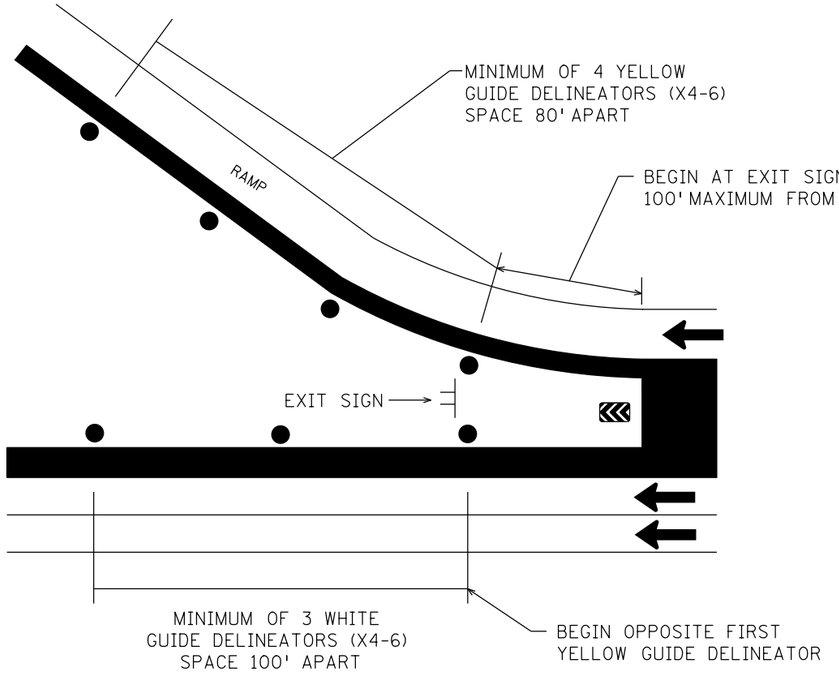
1. ALL TYPE C AND D MOUNTING HEIGHTS ARE MEASURED VERTICALLY FROM THE BOTTOM OF THE SIGN TO THE ELEVATION OF THE NEAR EDGE OF PAVEMENT IN RURAL AREAS OR TO THE TOP OF THE CURB OR IN THE ABSCENCE OF CURB, TO THE NEAR EDGE OF THE TRAVELED WAY.
2. SIGN FACES SHALL BE VERTICAL.
3. OVERHEAD SIGNS SHALL BE POSITIONED AT RIGHT ANGLES TO THE THRU ROADWAY UNLESS OTHERWISE NOTED.
4. TO AVOID SPECULAR GLARE, ∠A SHALL BE APPROXIMATELY 93° FOR SIGNS LOCATED LESS THAN 30' FROM THE EDGE OF THRU LANE AND APPROXIMATELY 92° FOR SIGNS LOCATED 30' OR MORE FROM EDGE OF THRU LANE. THIS APPLIES TO SIGNS TYPE A, C, & D AND INCLUDES SIGNS IN THE GORE.
5. "Y" IS THE PERPENDICULAR DISTANCE FROM THE GROUND LINE TO THE FRICTION FUSE ON THE POST. THIS DISTANCE SHALL BE AT LEAST 7'.
6. WHERE "X" IS LESS THAN 30', "H" SHALL BE 7'. WHERE "X" IS 30' OR GREATER, MINIMUM AND PREFERRED "H" IS 5'.
7. LATERAL CLEARANCES GIVEN APPLY TO RIGHT AND OR LEFT SIDE INSTALLATION.
8. WHEN A TYPE A SIGN IS INSTALLED DIRECTLY BEHIND TRAFFIC BARRIER, THE LEFT EDGE OF THE SIGN PANEL SHALL BE LOCATED A MINIMUM OF 8 FEET BEHIND THE FACE OF THE TRAFFIC BARRIER.

SIGN PLACEMENT

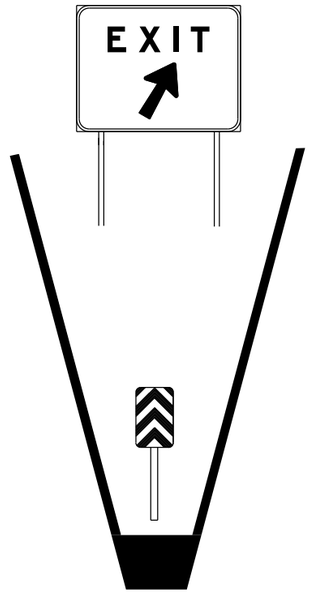
REVISED: 4-28-17

STATE PROJ. NO. SAMPLE AT-GRADE	SHEET NO. 19	OF	24 SHEETS

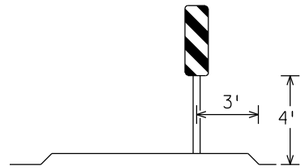
PLOTTED/REVISED: 5/18/2017



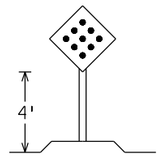
PLAN A
RAMP DELINEATION



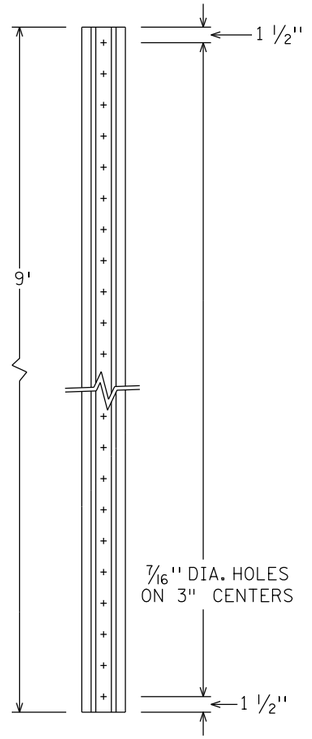
TYPE 3 OBJECT MARKER
12" X 24" (X4-4C)



RAISED ISLAND
TYPE 3 OBJECT MARKER
(X4-4)

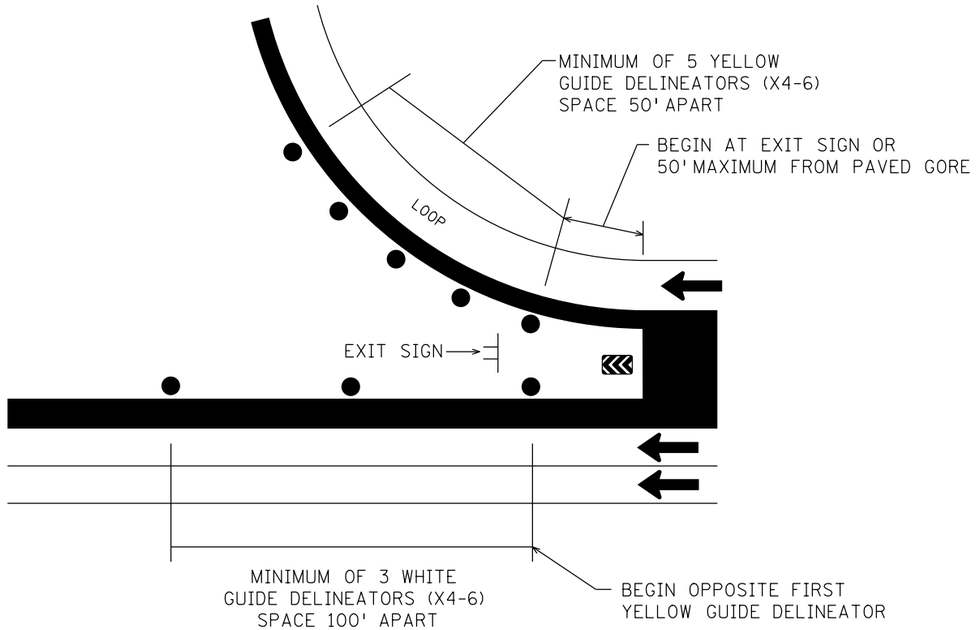


RAISED ISLAND
TYPE 2 OBJECT MARKER
(X4-2)

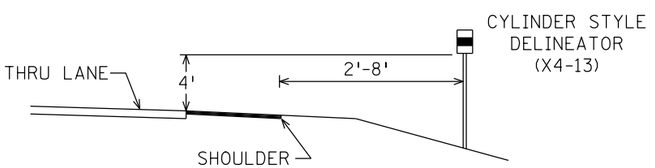


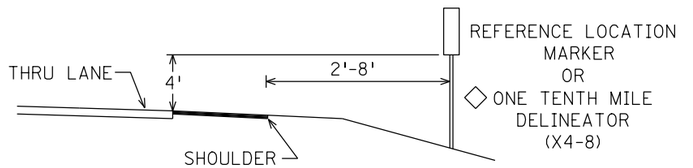
MNDOT 3401
NORMAL WEIGHT= 3 LB./FT.

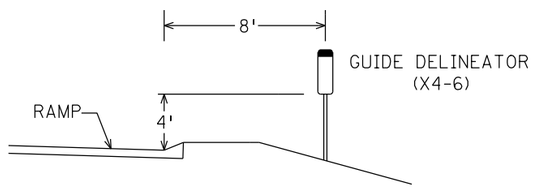
DELINEATOR POST



PLAN B
LOOP DELINEATION







TYPICAL PLACEMENT

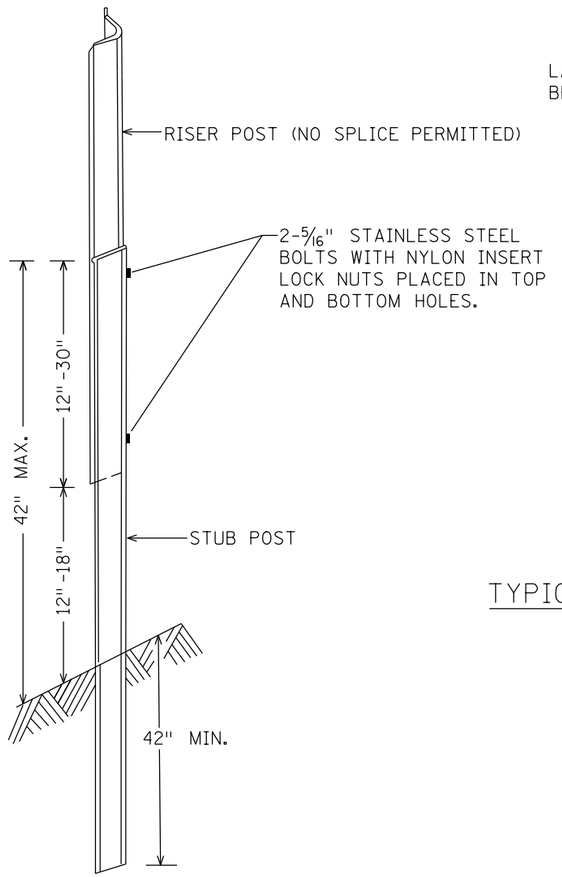
DELINEATORS AND MARKERS

DISTRICT *: METRO
IPLOT NAME: SAMPLE CO_SIGNING TYPICALS5
PATH & FILENAME: IP_PWPdl874706\SAMPLE CO_SIGNING TYPICALS.dgn

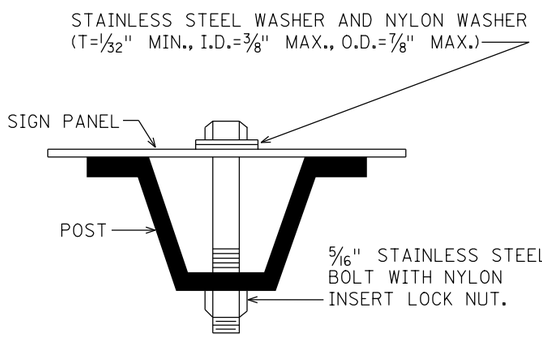
REVISED: 10-2-2013

PLOTTED/REVISED: 5/18/2017

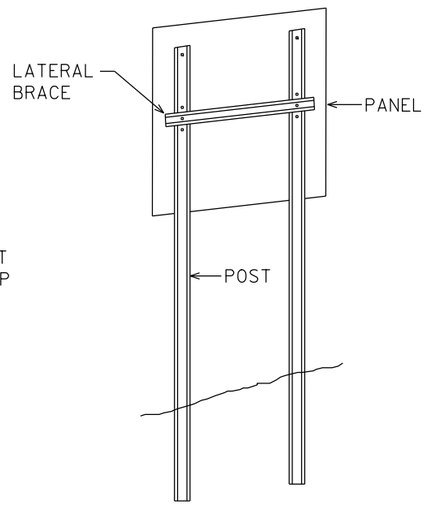
TYPE C & D POST



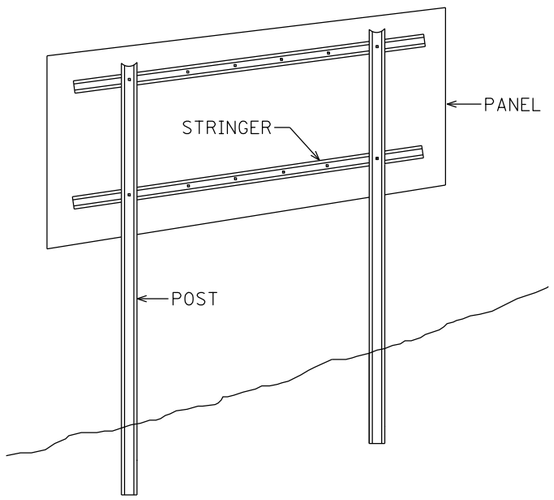
U POST BREAKAWAY SPLICE



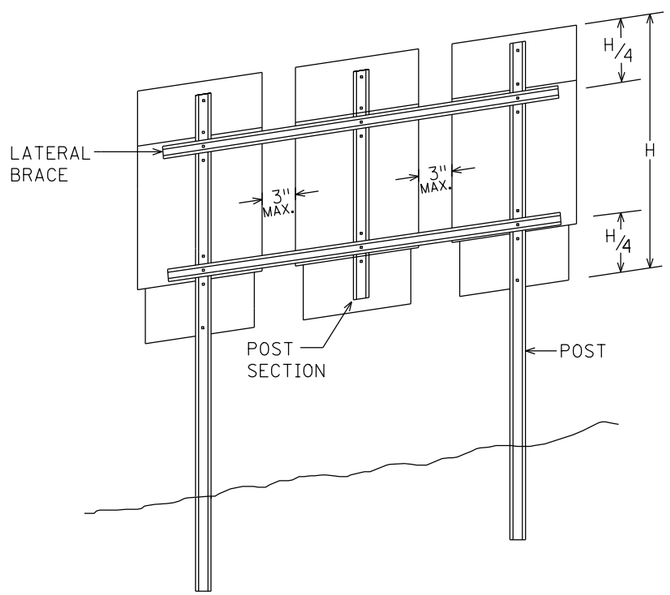
U POST MOUNTING
TYPE C SIGNS



TYPICAL TYPE C INSTALLATION



TYPICAL TYPE D INSTALLATION



MODIFIED TYPE C INSTALLATION

NOTES:

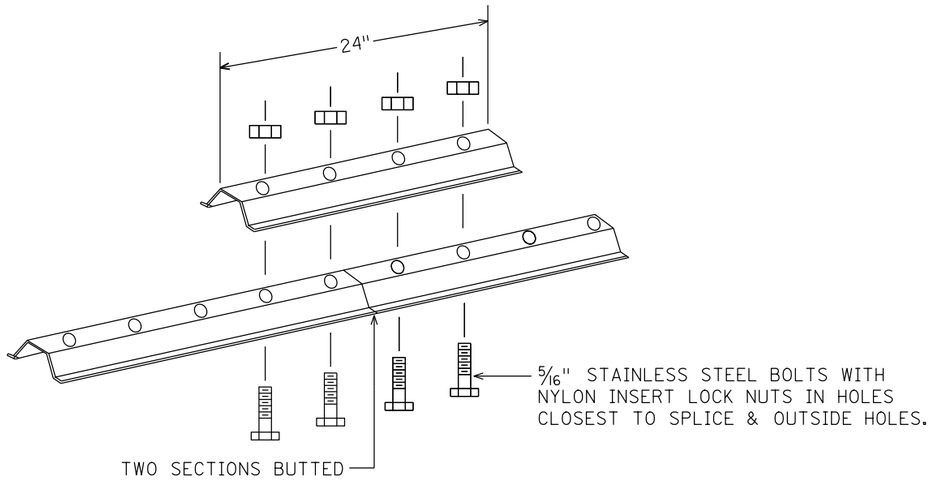
1. USE 3 LB/FT STUB POSTS. SHALL CONFORM TO MNDOT 3401.
2. USE 2.5 LB/FT RISER POSTS, STRINGERS, KNEE BRACES AND LATERAL BRACES. ALL SHALL CONFORM TO MNDOT 3401.
3. SEE SIGN DATA SHEETS FOR NUMBER OF POSTS, KNEE BRACES, POST LENGTHS AND SPACINGS, AS DETERMINED FROM TEM CHARTS 6.3 AND 6.4.
4. IF MORE THAN TWO POSTS ARE NEEDED, THE MINIMUM SPACING SHALL BE 45" BETWEEN POSTS.
5. TYPE D SIGN PANELS SHALL BE BOLTED TO STRINGERS AT 24" MAXIMUM INTERVALS IN ACCORDANCE WITH THE TYPE D STRINGER AND PANEL-JOINT DETAIL (SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL).
6. MOUNTING (PUNCH CODE) FOR TYPE C SIGN PANELS SHALL BE AS INDICATED IN THE MNDOT STANDARD SIGNS AND MARKINGS MANUAL UNLESS OTHERWISE SPECIFIED.
7. ALL RISER (VERTICAL) U POSTS SHALL BE SPLICED. DRIVEN STUB POSTS SHALL BE AT LEAST 7' LONG.
8. USE STAINLESS STEEL 5/16" BOLTS, WASHERS AND NYLON INSERT LOCK NUTS AS SHOWN FOR ALL GROUND MOUNTED AND OVERHEAD MOUNTED SIGNS.
9. STAINLESS STEEL WASHER WITH SAME DIMENSIONS SHALL BE PROVIDED BETWEEN ALL NYLON WASHERS AND BOLT HEADS.
10. BRACING STUBS SHALL BE NO MORE THAN 4" ABOVE GROUND AND EMBEDDED AT LEAST 42".
11. A-FRAME BRACKET SHALL BE STEEL CONFORMING TO MNDOT 3306 AND GALVANIZED IN ACCORDANCE WITH MNDOT 3394.
12. COLLARS SHALL BE USED TO SHIM OVERLAYS AND LEGEND COMPONENTS AWAY FROM PANEL WHERE INTERFERENCE WITH BOLT HEADS IS ENCOUNTERED. MNDOT 3352.2A6.
13. 2 POST TYPE C SIGNS SHALL BE REINFORCED WITH AT LEAST ONE LATERAL BRACE. INSTALLATIONS WHERE THE TOTAL PANEL HEIGHT IS 60" OR MORE SHALL HAVE TWO LATERAL BRACES LOCATED APPROXIMATELY AT THE QUARTER POINTS.
14. WHERE 2 SINGLE POST TYPE C SIGNS ARE INSTALLED SIDE BY SIDE, THEY SHALL BE REINFORCED LATERALLY BY AT LEAST 2 BRACES, BOLTED AT EACH POST AND LOCATED APPROXIMATELY AT THE QUARTER POINTS.
15. WHERE 3 OR MORE TYPE C SIGNS ARE INSTALLED SIDE BY SIDE, THEY SHALL BE REINFORCED LATERALLY BY AT LEAST 2 BRACES, BOLTED AT EACH POST AND POST SECTION AND LOCATED APPROXIMATELY AT THE QUARTER POINTS AS SHOWN IN MODIFIED TYPE C INSTALLATION.

TYPE C & D SIGN
STRUCTURAL DETAILS

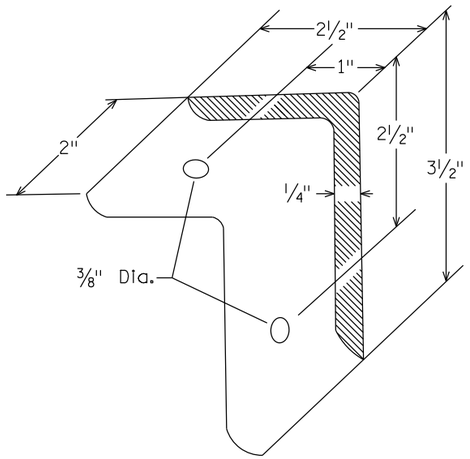
DISTRICT *: METRO
IPLOT NAME: SAMPLE CO_SIGNING TYPICALS2
PATH & FILENAME: IP_PWP:dl87406\SAMPLE CO_SIGNING TYPICALS.dgn

REVISED: 5-5-2017

PLOTTED/REVISED: 5/18/2017

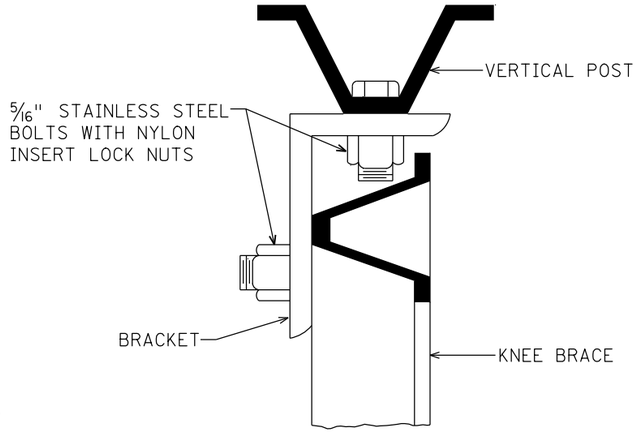


LATERAL BRACE OR STRINGER SPLICE DETAIL (EXPLODED VIEW)

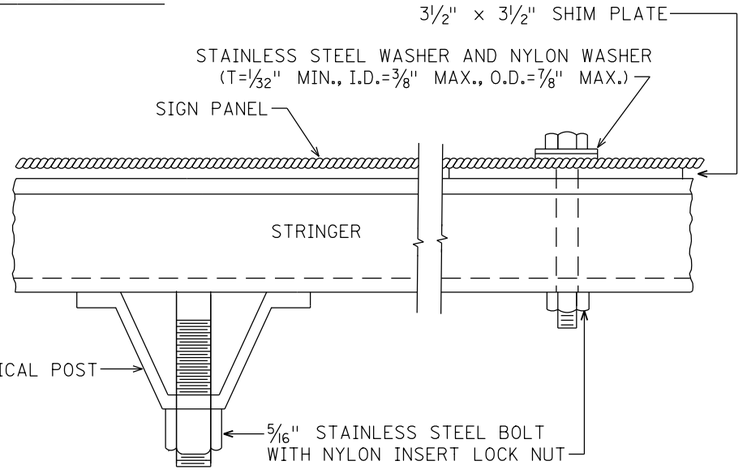


A-FRAME BRACKET

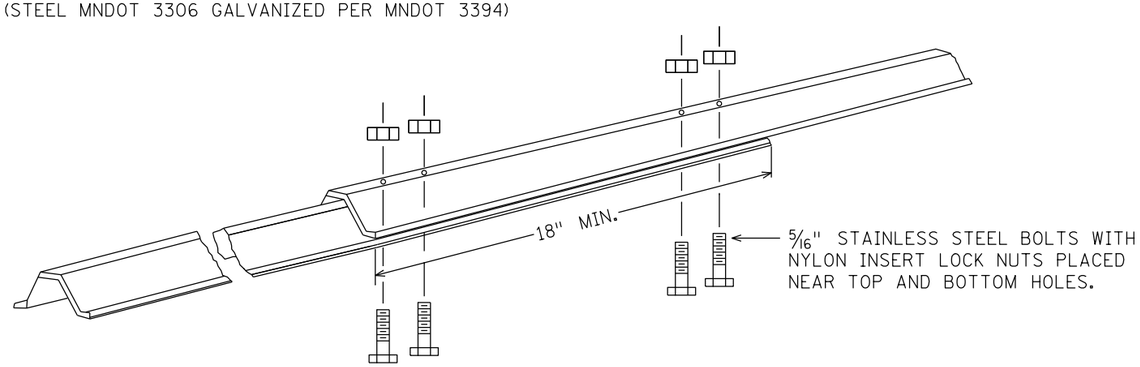
(STEEL MNDOT 3306 GALVANIZED PER MNDOT 3394)



SECTION A-A

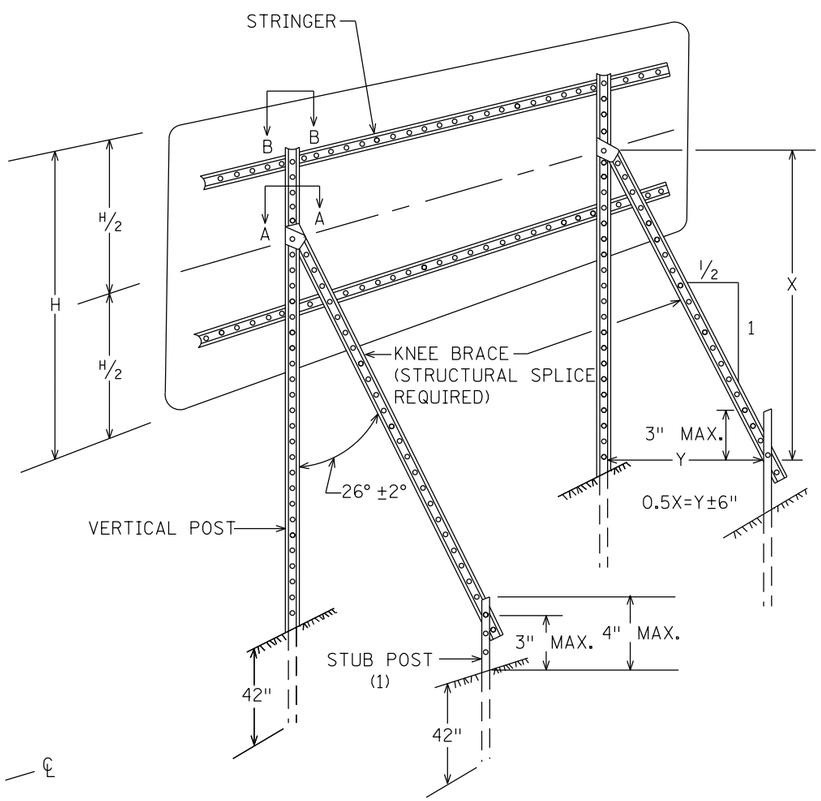


SECTION B-B

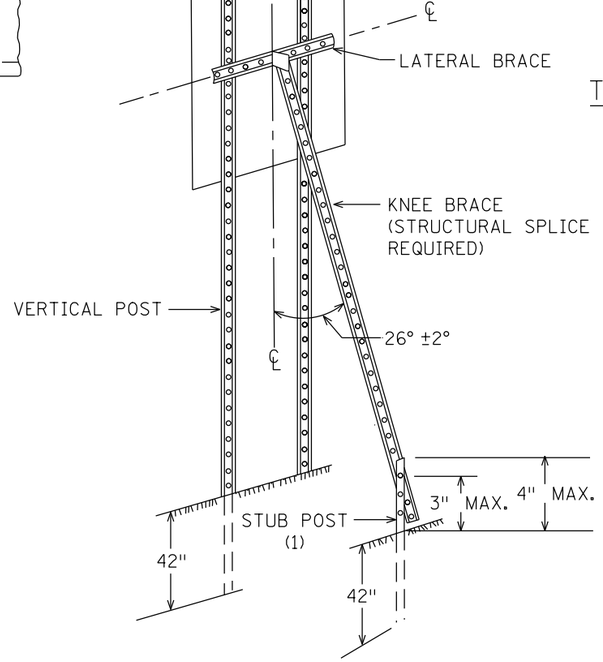


STRUCTURAL SPLICE

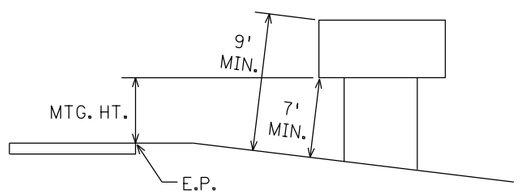
(USE WHEN IT IS NECESSARY TO FABRICATE THE CORRECT LENGTH OF POST FROM TWO PIECES)



TYPICAL "A-FRAME" INSTALLATION TYPE "D" SIGNS



TYPICAL "A-FRAME" INSTALLATION TYPE "C" SIGNS



TYPICAL MOUNTING

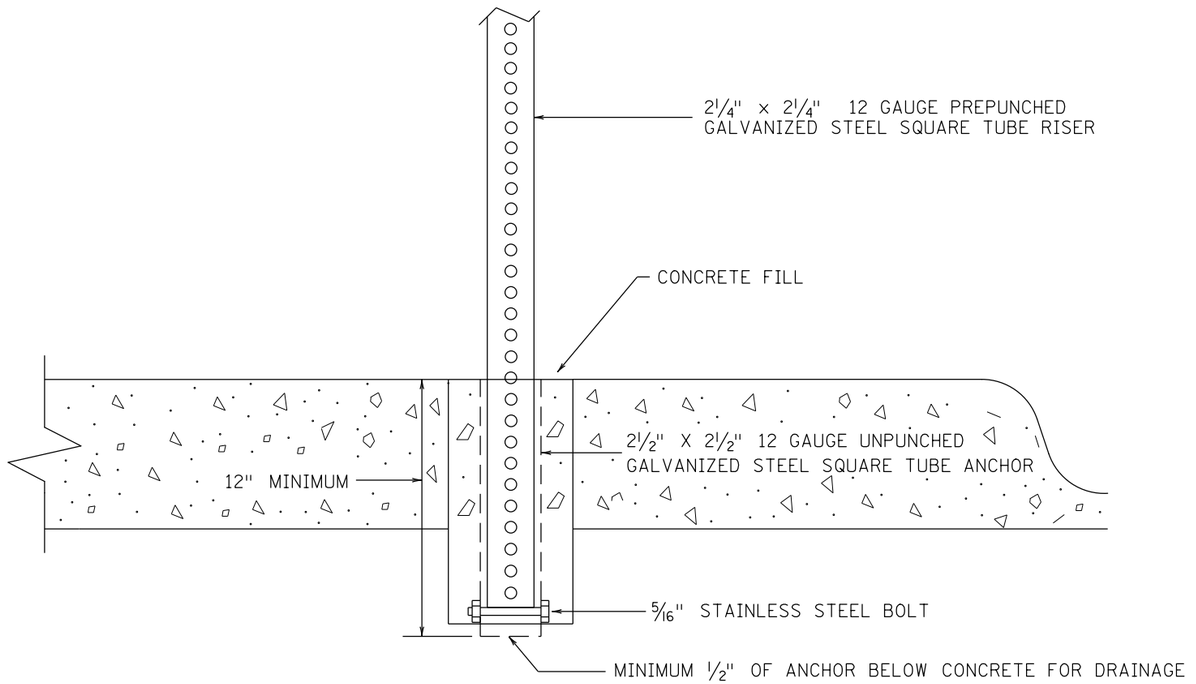
(1) OFFSET STUB POST 1' TOWARD ROADWAY RELATIVE TO VERTICAL POST. ATTACH STUB POST AND KNEE BRACE BACK TO BACK.

TYPE C & D SIGN STRUCTURAL DETAILS

Sheet 2 of 2

DISTRICT #: METRO
IPLOT NAME: SAMPLE CO_SIGNING TYPICALS3
PATH & FILENAME: IP_PWP:dl8744706\SAMPLE CO_SIGNING TYPICALS.dgn

REVISED: 12-4-2013



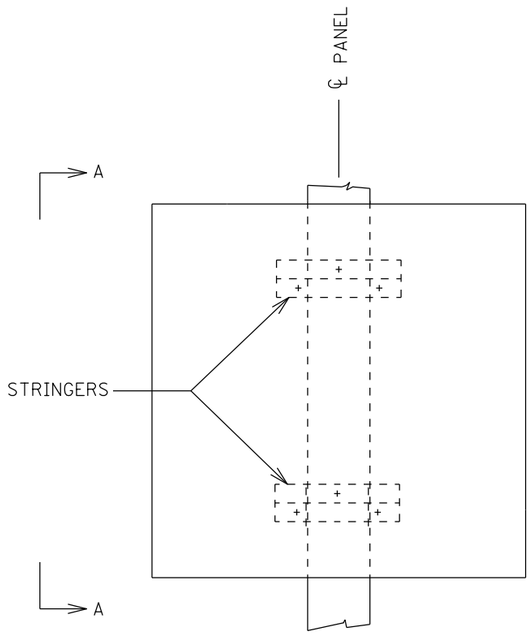
NOTES;

1. DRILL AN 8" DIAMETER HOLE THE FULL DEPTH OF THE ANCHOR.
2. DRILL ⅜" HOLES ON OPPOSITE SIDES OF THE UNPUNCHED GALVANIZED STEEL SQUARE TUBE ANCHOR APPROX. 1" FROM THE BOTTOM OF THE ANCHOR. INSERT A 5/16" STAINLESS STEEL BOLT THROUGH THE HOLES AND SECURE WITH A STAINLESS STEEL LOCK NUT WITH NYLON INSERT. THE PREPUNCHED GALVANIZED STEEL SQUARE TUBE RISER (TO BE INSERTED INSIDE THE UNPUNCHED GALVANIZED SQUARE TUBE ANCHOR) WILL REST ON BOLT.
3. INSERT THE ANCHOR IN THE HOLE.
4. AFTER INSTALLATION OF THE UNPUNCHED GALVANIZED STEEL SQUARE TUBE ANCHOR, FILL THE HOLE WITH A CONCRETE MIX APPROVED BY THE ENGINEER AND LEVEL OFF THE TOP OF CONCRETE.
5. MAXIMUM SIGN PANEL SIZE IS 42" WIDE X 48" HIGH.
6. SIGN PANEL TO BE MOUNTED 7 FT ABOVE THE GROUND.

TYPE C SIGNS, DELINEATORS & MARKERS IN CONCRETE

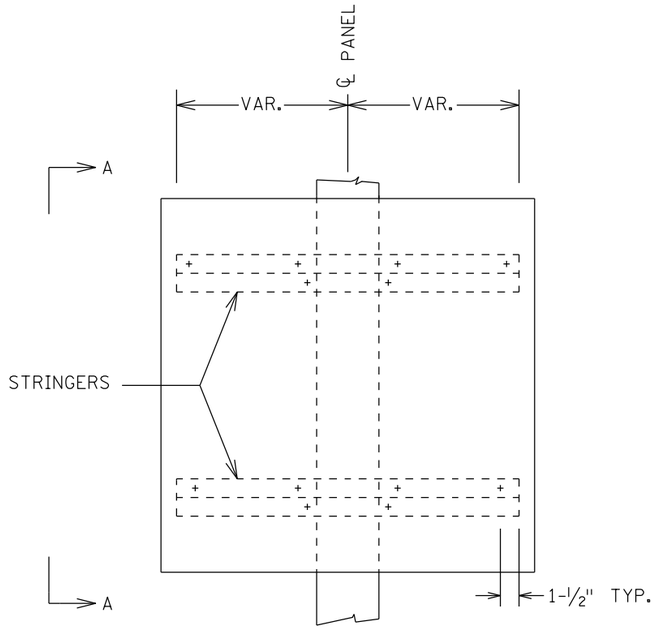
REVISED: 5-28-2015

STATE PROJ. NO. SAMPLE AT-GRADE SHEET NO. 23 OF 24 SHEETS



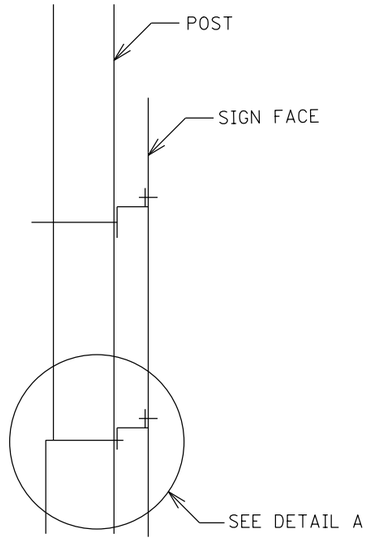
SINGLE POST PUNCHING

ELEVATION

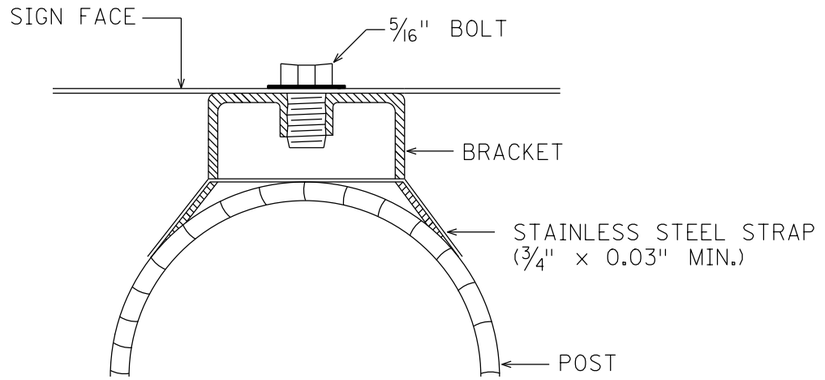


2-POST PUNCHING

ELEVATION

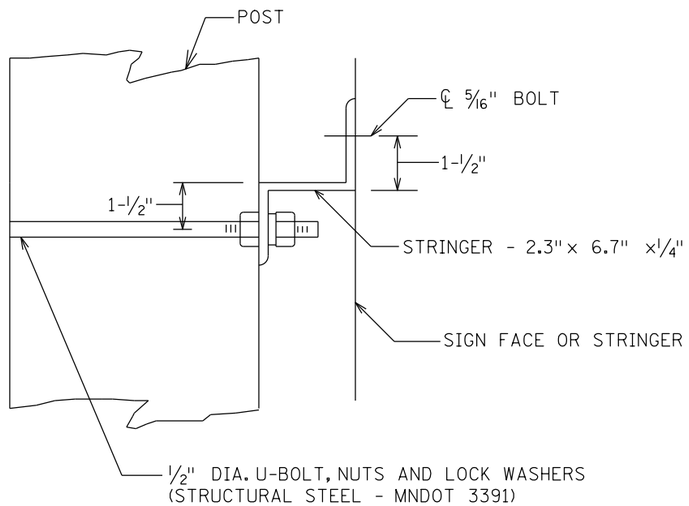


VIEW A-A

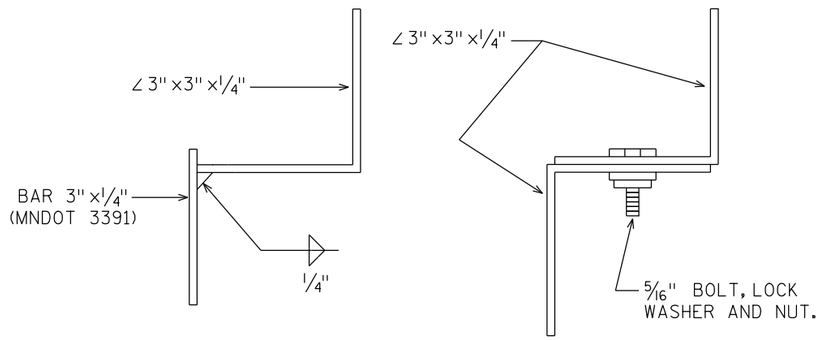


GALVANIZED OR STAINLESS STEEL BRACKET, BOLT AND WASHER.

STRAP MOUNTING DETAIL FOR OVERHEAD IDENTIFICATION AND LIGHTING SYSTEM IDENTIFICATION PLATES



DETAIL A



DETAIL A STRINGER ALTERNATES

NOTES:
1. FOR DETAILS AND NOTES NOT SHOWN SEE "C" & "D" SIGN DETAILS.
2. FOR BACK TO BACK MOUNTINGS, ROTATE STRINGERS FOR ONE PANEL 180° FROM WHAT IS SHOWN SUCH THAT PANELS CAN BE MOUNTED AT SAME ELEVATION.
3. DETAIL A STRINGER MAY BE ONE OF THE THREE DESIGNS DETAILED OR AN APPROVED EQUAL. STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH MNDOT 3306 AND GALVANIZED IN ACCORDANCE WITH MNDOT 3394. FASTENERS SHALL BE IN ACCORDANCE WITH MNDOT 3391.2B AND SHALL BE GALVANIZED EITHER BY THE HOT-DIP PROCESS IN ACCORDANCE WITH ASTM A153, OR BY THE MECHANICAL PROCESS IN ACCORDANCE WITH ASTM B695, CLASS 50 OR GREATER.

SIGN TYPE C AND D STRUCTURAL STEEL MOUNTING SYSTEM FOR ROUND SUPPORTS

8. SPECIFICATIONS AND SPECIAL PROVISIONS

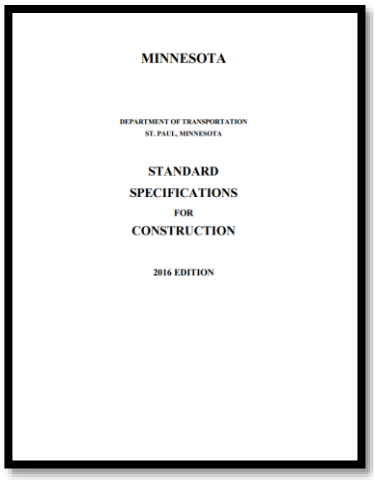
8.1 MnDOT Standard Specification for Construction Book (Spec Book)

The "Spec Book" (**Exhibit 8-1**) contains standard specifications to be used and referred to in the design of plans and in the preparing of Special Provisions. Plan designers need to be aware of the specifications contained in the Spec Book that may apply to their individual project.

The Spec Book includes both metric and non-metric units of measure conversions. The Spec book includes modifications to the prior Spec Book.

Note: The Spec Book is being updated with a 2018 version and is scheduled to be published by the end of June 2017. **The effective date for the 2018 Spec Book is the November 17, 2017 letting.**

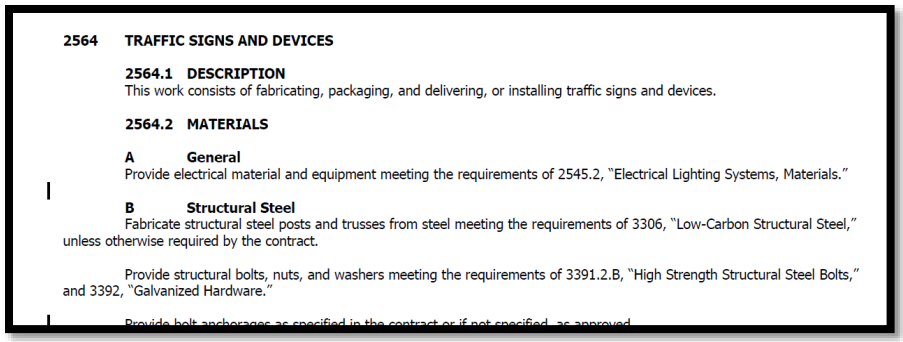
Exhibit 8-1 Standard Specifications for Construction Book (Spec Book)


MINNESOTA

DEPARTMENT OF TRANSPORTATION
ST. PAUL, MINNESOTA

STANDARD
SPECIFICATIONS
FOR
CONSTRUCTION

2016 EDITION


2564 TRAFFIC SIGNS AND DEVICES

2564.1 DESCRIPTION
This work consists of fabricating, packaging, and delivering, or installing traffic signs and devices.

2564.2 MATERIALS

A General
Provide electrical material and equipment meeting the requirements of 2545.2, "Electrical Lighting Systems, Materials."

B Structural Steel
Fabricate structural steel posts and trusses from steel meeting the requirements of 3306, "Low-Carbon Structural Steel," unless otherwise required by the contract.

Provide structural bolts, nuts, and washers meeting the requirements of 3391.2.B, "High Strength Structural Steel Bolts," and 3392, "Galvanized Hardware."

Provide bolt anchorages as specified in the contract or if not specified, as approved

8.1.1 Format of the "Spec Book"

The Spec Book is made of three divisions:

- ✓ Division I - General Requirements and Covenants
- ✓ Division II - Construction Details
- ✓ Division III - Materials

DIVISION I — General Requirements and Covenants

Each Division I Specification number begins with "1" (1101 - 1911). There are 9 sections within Division I. Each section of Division I is given a numeric series. For example, Scope of Work is the 1400 series (1401 - 1408).

A section of Division I that all designers need to be particularly aware of is shown in **Exhibit 8-2**.

Exhibit 8-2 Spec Book 1504, Coordination of Contract Documents

1504 COORDINATION OF CONTRACT DOCUMENTS

A requirement appearing in one of the Contract documents is as binding as though the requirement appears in all. If discrepancies exist between the Contract documents, the following order of precedence applies:

(1) Addenda,
(2) Special Provisions,
(3) Project-Specific Plan Sheets,
(4) Supplemental Specifications,
(5) Standard Plan Sheets and Standard Plates,
(6) Standard Specifications.

If discrepancies exist between dimensions in the Contract documents, the following order of precedence applies:

(1) Plan dimensions,
(2) Calculated dimensions,
(3) Scaled dimensions.

The Department and Contractor shall inform each other as to any discrepancy or defect they discover. Neither the Contractor nor the Engineer shall take advantage of any discrepancy or defect. The Engineer will review the alleged discrepancy or defect to determine if a contract revision is necessary in accordance with 1402, "Contract Revisions." The Engineer will decide all issues concerning a discrepancy or defect.

DIVISION II — Construction Details

Each Division II Specification number begins with "2" (2021 - 2582) and as in Division I, each section is given a numeric series. This Division is divided into six sections:

1. General (2021 - 2051)
2. Grading (2101 - 2131)
3. Pavement Marking Removal (2102)
4. Base Construction (2211- 2232)
5. Pavement Construction (2301 - 2399)
6. Bridges and Structures (2401 - 2481)
7. Miscellaneous (2501 - 2582)

Each section is generally divided into the following sections:

1. Description
2. Materials
3. Construction Requirements
4. Method of Measurement
5. Basis of Payment

8.1.2 DIVISION III — Materials

Each Division III Specification number begins with "3" (3101 - 3973) and as in Divisions I and II, each section is given a numeric series. This Division is divided into eighteen sections. Division II cross references various sections of this Division.

Note: The pay items in the updated 2018 Spec Book are being updated. Information on the coming changes are included in the handout in the Appendix (see page **9-33**.

8.2 MnDOT Contract Proposal

8.2.1 Contents

Each MnDOT project has a proposal. The proposal contains items such as:

- ✓ Addendums
- ✓ Notices to Bidders
- ✓ Appendices
- ✓ Special Provisions (by division, for example: Division A, Divisions S, Division SS, Division SL, Division ST, etc.)
- ✓ Attachments
- ✓ Contract Schedule (Bid Prices)

8.3 Special Provisions

Special Provisions are defined as:

> "Additions and revisions to the Standard and Supplemental Specifications covering conditions peculiar to an individual project."

Special Provisions are just that: **"SPECIAL"** provisions. If an item(s) is adequately addressed or specified in the Spec Book, Standard Plates, Plan, or other Contract documents, then that item(s) should not be duplicated within the Special Provisions.

Topics that are always covered by Special Provisions include:

- ✓ Construction Start Dates
- ✓ Completion Dates
- ✓ Traffic Control
- ✓ Special Pay Items (those where the digit after the period is a '6')

The Special Provisions need to cover every special pay item from the Plan. A special pay item is any item whose fifth digit is a '6' (this is the digit after the period). If the Spec. Book adequately described the work to be done, and what is included in the item, then all that is needed is how the item is to be measured and paid for.

Division ST is for signing projects. Special Provisions may be formatted into more than one ST section. For example:

Division ST

- ✓ ST-1 (2104) Removing Miscellaneous Structures
- ✓ ST-2 (2564) Traffic Signs and Devices
- ✓ ST-3 (3352) Signs, Delineators and Markers

A typical set of Special Provisions are formatted similar to the Spec Book; however, the actual format of the Special Provisions may vary somewhat when compared to the Spec Book format. The following sections can be found in the Special Provisions:

- ✓ **Description** – An overview of the division.
- ✓ **Materials** – This section will cover any material items that are not covered in other Contract documents, or language in other documents that needs to be modified for this specific project.
- ✓ **Construction Requirements** - This section contains language dealing with the actual construction for the project. Like the materials section, it will include language that modifies items in the Spec Book, Plan, or other Contract documents.
- ✓ **Measurement and Payment** - This section will specify exactly how the traffic control signal system will be measured and paid for. The pay item(s) in this section need to match the pay item(s) listed on the estimated quantity sheet in the Plan.

Special Provisions may also include detail drawings that are pertinent to the specific project.

8.3.1 Special Provision Boilerplates

Standard special provisions have been developed for use on MnDOT signing projects. These can be obtained from the OTST Signing webpage, www.dot.state.mn.us/trafficeng/signing/plans.html.

The following is a handout of the boilerplate from the website, current at the time of print.

Note: Always obtain the latest version of the sample Special Provisions. Modify the sample (boilerplate) by removing the items that are not needed.

HANDOUT

DIVISION ST

DELETE WHEN DONE: To Update Table of Contents Right Click on the index above and choose Update Field. If given a choice choose "Update Entire Table".

DELETE WHEN DONE: Statements highlighted in yellow are guidelines or instructional in nature. Remove these notes before completing the spec. When appearing at the top left of a provision, it pertains to the paragraph immediately beneath the note, as well as any indented items following it.

DELETE WHEN DONE: Words highlighted in green are fields that may need to be modified or removed before completion of the spec, such as contact information, city names, sign numbers, or charts on the Plans.

For provisions containing the descriptor, "For Sign(s) [Type]-XX:", this descriptor should only be used when the provision applies to specific sign numbers among that type on the Plans. Insert as necessary. Leave out the descriptor if the provision applies to all signs of that type on the Plans.

I hereby certify that the Special Provisions for traffic sign construction (Division ST) contained in this proposal 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.

_____
Engineer Name

Lic. No. XXXXX Date MM/DD/YY

MM/DD/YY **DELETE: Updated 12/02/16** S.P. XXXX-XXX (T.H. XX)

DIVISION ST

ST-1 (2104) REMOVING MISCELLANEOUS STRUCTURES

ST-1.1 DESCRIPTION
The Contractor shall remove and salvage miscellaneous structures according to 2104, "Removing Pavement and Miscellaneous Structures" and these Special Provisions.

ST-1.2 MATERIALS
The Contractor shall use materials according to 2104, "Removing Miscellaneous Structures" and the 2104, "Removing Miscellaneous Structures: Construction Requirements" section of these Special Provisions.

ST-1.3 CONSTRUCTION REQUIREMENTS

A Remove By Others

Use for projects that include LOGO signs.
Give at least 14 calendar days advance notice to the General Manager of Minnesota Logos to arrange removal of Logo signs designated on the Plans as "REMOVE BY OTHERS".

Dave DeSutter
General Manager
Minnesota Logos
952-895-8079
ddesutter@interstatelogos.com

B Remove Sign Panel Type D
Remove the sign panel and mounting hardware.

Use when the bridge-mounted sign structure is to be reused
Leave the bridge mounted sign structure in place for the later installation of a new sign panel.

C Remove Sign Type C and Type D

Use for mast arm-mounted signs
For each mast arm mounted sign, remove the bracketing and hardware which attaches each sign panel to the traffic signal mast arm.

Use for light fixture-mounted signs
For each sign mounted on a light fixture, remove the bracketing and hardware which attaches each sign panel to the light fixture.

Use for bridge rail-mounted signs
For each bridge rail mounted sign, remove the bridge rail mounted sign structure and mounting hardware. Fill anchorage holes in concrete with epoxy grout.

Use for bridge-mounted signs
For each bridge mounted sign, remove the sign panel, mounting hardware, and bridge mounted sign structure.

After removal of the sign structure,

Fill anchorage holes in concrete with epoxy grout.

Plug holes in steel with galvanized high strength steel bolts, washers, and nuts.

Use for sign replacement projects.
Schedule the work so that replacement signs are installed on the same work day that the in-place signs are removed.

HANDOUT

HANDOUT

D Remove Sign Type Special
Remove the entire street name sign structure, including any concrete footings.

E Salvage Delineator and Marker
Inform the Engineer of any damaged in-place delineators or markers prior to salvaging.

Remove and dispose of the sign structure, nuts, bolts and washers.

If the Contractor damages a delineator or marker,

Dispose of the damaged delineator or marker.

Fabricate a new delineator or marker according to 2564.2F, "Traffic Signs and Devices: Signs and Markers," and these Special Provisions, at no cost to the Department or City of __, __ County.

Prevent damage to the aluminum sign panels and the sign sheeting materials at all times, including during storage.

Methods to prevent damage during storage include but are not limited to:

Store sign panels so that they are NOT lying on the ground.

Store sign panels so that reflective surfaces do NOT come in contact with dirt, water, or grass.

Store sign panels so that they are NOT covered with plastic or a tarp.

Salvaged delineators will be reinstalled under Item No. 2564.602 - Install Delineator.

Salvaged markers will be reinstalled under Item No. 2564.602 - Install Marker.

F Salvage Sign Panel Type C
Inform the Engineer of any damaged in-place Type C sign panels prior to salvaging.

Remove and dispose of the nuts, bolts and washers.

If the Contractor damages a sign panel,

Dispose of the damaged sign panel.

Fabricate a new sign panel according to 2564.2F, "Traffic Signs and Devices: Signs and Markers," and these Special Provisions, at no cost to the Department or City of __, __ County.

Prevent damage to the aluminum sign panels and the sign sheeting materials at all times, including during storage.

Methods to prevent damage during storage include but are not limited to:

Store sign panels so that they are NOT lying on the ground.

Store sign panels so that reflective surfaces do NOT come in contact with dirt, water, or grass.

Store sign panels so that they are NOT covered with plastic or a tarp.

Salvaged sign panels will be reinstalled under Item No. 2564.536 - Install Sign Panel Type C.

G Salvage Sign Panel Type Special
Use if mounting above Type C sign on U-channel post (not permitted in MetroDistrict)

HANDOUT

MM/DD/YY **DELETE: Updated 12/02/16** S.P. XXXX-XXX (T.H. XX)

Inform the Engineer of any damaged in-place sign panels prior to salvaging.

(note if there are two plates mounted back to back)

Salvage the street name plates and bracket assembly.

Leave the sign panels attached to the bracket assembly.

Leave the mounting hardware attached to the flanged channel sign post(s).

If the Contractor damages a bracket assembly or street name plates,

Dispose of the damaged bracket assembly or damaged street name plate.

Fabricate new bracket assembly or street name plate according to City of __, __County specifications, 2564.2F, "Traffic Signs and Devices: Signs and Markers;" and these Special Provisions, at no cost to the Department or City of __, __ County.

Prevent damage to the bracket assemblies, aluminum sign panels, and the sign sheeting materials at all times, including during storage.

Methods to prevent damage during storage include but are not limited to:

Store sign panels so that they are NOT lying on the ground.

Store sign panels so that reflective surfaces do NOT come in contact with dirt, water, or grass.

Store sign panels so that they are NOT covered with plastic or a tarp.

Salvaged sign panels, bracket assemblies, and mounting hardware will be reinstalled under Item No. 2564.536 - Install Sign Panel Type Special.

H Salvage Sign Type C and Type D
Inform the Engineer of any damaged in-place Type C or Type D sign panels prior to salvaging.

Remove and dispose of the sign structure, nuts, bolts and washers.

If the Contractor damages a sign panel,

Dispose of the damaged sign panel.

Fabricate a new sign panel according to 2564.2F, "Traffic Signs and Devices: Signs and Markers," and these Special Provisions, at no cost to the Department or City of __, __ County.

Prevent damage to the aluminum sign panels and the sign sheeting materials at all times, including during storage.

Methods to prevent damage during storage include but are not limited to:

Store sign panels so that they are NOT lying on the ground.

Store sign panels so that reflective surfaces do NOT come in contact with dirt, water, or grass.

Store sign panels so that they are NOT covered with plastic or a tarp.

Salvaged Type C sign panels will be reinstalled under Item No. 2564.537 - Install Sign Type C.

HANDOUT

HANDOUT

Salvaged Type D sign panels will be reinstalled under Item No. 2564.537 - Install Sign Type D.

I Salvage Sign Type Special
Inform the Engineer of any damaged in-place sign prior to salvaging.

Salvage the sign post with the bracket assembly and street name plates attached.

If the Contractor damages a sign post, bracket assembly, or street name plate,

Dispose of the damaged sign post, bracket assembly, or street name plate.

Fabricate a new sign post, bracket assembly, or street name plate according to City of __, __ County specifications, 2564.2F, "Traffic Signs and Devices: Signs and Markers;" and these Special Provisions, at no cost to the Department or City of __, __ County.

Prevent damage to the sign posts, bracket assemblies, aluminum sign panels, and the sign sheeting materials at all times, including during storage.

Methods to prevent damage during storage include but are not limited to:

Store sign panels so that they are NOT lying on the ground.

Store sign panels so that reflective surfaces do NOT come in contact with dirt, water, or grass.

Store sign panels so that they are NOT covered with plastic or a tarp.

Salvaged signs will be reinstalled under Item No. 2564.537 - Install Sign Type Special.

ST-1.4 METHOD OF MEASUREMENT & BASIS OF PAYMENT
The Engineer will measure each item according to the Contract and the 2104, "Removing Miscellaneous Structures: Construction Requirements" section of these Special Provisions.

The Department will include all work described in the Contract and the 2104, "Removing Miscellaneous Structures: Construction Requirements" section of these Special Provisions as part of the contract unit price per unit of measure.

The Department will pay for traffic signs and devices on the basis of the following schedule:
Include only pay items that contain work specified in the special provisions.

Item No.:	Item:	Unit:
2104.509	Remove Sign Panel Type _	Each
2104.509	Remove Sign Type _	Each
2104.523	Salvage Sign Panel Type _	Each
2104.523	Salvage Sign Type _	Each
2104.523	Salvage Delineator	Each
2104.523	Salvage Marker	Each

The Department's payment for each item shall be compensation in full for all work, material, and costs involved in performing the work specified on the Plans and these Special Provisions.

ST-2 (2564) TRAFFIC SIGNS AND DEVICES

ST-2.1 DESCRIPTION
The Contractor shall furnish and install traffic signs in accordance with 2564, "Traffic Signs and Devices," except as modified in these Special Provisions.

ST-2.2 MATERIALS

MM/DD/YY DELETE: Updated 12/02/16 S.P. XXXX-XXX (T.H. XX)

METRO DISTRICT ONLY
Fabricate all signs, markers, and delineators with material in accordance with 3352, "Signs, Delineators, and Markers" except as modified in these Special Provisions.

Fabricate all rigid permanent signs, markers, and delineators with materials from the *MnDOT Approved/Qualified Products List*.

Provide sign face material meeting the performance requirements of 3352.2.A.2.b, "Sign Sheeting Type IV" for rigid permanent signs, markers, and delineators described in Table 2564.2-ST1 and on the Plans:

Table 2564.2-ST1: MnDOT Metro District Sign Sheeting Type IV Requirements

Category	Item	Condition(s)
(1)	Sign Panels Type C	All Sign Panels Type C with the exception of: • R1-1 STOP, R1-2 YIELD, R1-3P ALL WAY, R5-1 DO NOT ENTER signs, • W-Series (warning) signs, • S-Series (school) signs, • Mast arm-mounted signs, and • Bridge-mounted signs. Provide sign face material meeting the requirements of 3352.2.A.2.f, "Sign Sheeting Type XI for the exceptions listed in Category (1).
(2)	Sign Panels Type D	Ground-mounted signs
(3)	Sign Panels Type Overlay	Type Overlays which are attached to signs described in Categories (1) and (2)
(4)	Delineator Type X3-1	All
(5)	Delineator Type X4-6	White background color
(6)	Delineator Type X4-8	All
(7)	Infiltration Area Marker X3-6a	All

Provide non-fluorescent reflective sheeting for the yellow background color portions for:
- Overhead-mounted Type D sign panels,
- Sign Panel Type Overlays attached to overhead-mounted Type C and Type D sign panels, and
- X3-6A Infiltration Area Markers.

ST-2.3 CONSTRUCTION REQUIREMENTS
The provisions of 2564.3, "Construction Requirements, General" are modified and supplemented as follows:

The following replaces the fourth paragraph of 2564.3A:
Sign locations and sign structure posts lengths indicated on the Plans are approximate. Locate and stake final sign and delineator locations and obtain approval of locations by the Engineer. Determine the final post lengths for Type C signs, Type D signs and delineators in accordance with offsets, mounting heights and clearances detailed on the Plans and field verification of the proposed or inplace slopes.

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A As-Built Signing Data

DO NOT INCLUDE *provisions in DIV ST to collect sign data for inventory management purposes. Use the Pay Item 2011.601 AS BUILT and follow the directions within DIV S to cover sign inventory management.*

B Fabrication & Warning Stickers

Use this provision if new sign panels or sign panel overlays are being installed for Type A, Type C and Type D signs (almost all projects)

Install Department-provided warning stickers on new Type C and D sign panels according to 2564.3H.2, "Traffic Signs and Devices: Construction Requirements: Sign Panels: Fabrication and Warning Stickers."

Give 30 days advance notice to the Department prior to picking up the Department-provided warning stickers:

Jeff Streeter *(Metro)-(for other districts, use maintenance area sign supervisor)*
651-366-5191

C Field Spotting of Signs

Use this provision when installing signs where location and orientation is critical (i.e. roundabouts, RCUTs, DDI)

Give the Engineer 14 calendar days advance notice prior to installing signs inside or within 50 feet of roundabouts.

The Engineer will contact the District Traffic Office, which will provide personnel to field spot the installation location and orientation of the signs:

Contact Name
Title
Phone Number
Email@state.mn.us

D Infiltration Area Marker

Furnish and install a new 3 lb/ft. flanged channel post at the location approved by the Engineer. Attach the furnished sign panel to the flanged channel post with new mounting hardware at the mounting height detailed on the Plans.

E Install Delineator and Marker

Use this provision when installing salvaged delineators and/or markers

For each salvaged delineator or marker being installed,

Furnish and install a new 3 lb/ft. flanged channel post at the location approved by the Engineer.

Attach the salvaged delineator or marker to the flanged channel post with new mounting hardware at the mounting height detailed on the Plans.

Install delineators under Item No. 2564.602 - Install Delineator.

Install markers under Item No. 2564.602 - Install Marker.

F Install Sign Panel Type Special

Use this provision when mounting salvaged street name signs above Type C signs on U-channel posts.

Attach the salvaged street name plate, attached bracket assembly, and salvaged mounting hardware to the sign post as directed by the Engineer.

Mount the bottom of the bracket assembly a minimum of six inches above the Type C sign panel.

G Install Sign Type C and D

Use this provision when installing Type C or Type D signs in areas of high winds such as Districts 1, 2, 4, 7, and 8

MM/DD/YY **DELETE: Updated 12/02/16** S.P. XXXX-XXX (T.H. XX)

Install signs with 3/8" stainless steel bolts and zinc-plated nylon insert lock nuts on the L-Bracket assembly when a knee brace is used.

Use this provision when installing Type C or Type D signs in areas of high winds in District 8

Install signs with zinc 9/16" head nylon insert lock nuts placed on all structural hardware. Use driven stub posts of at least 8 feet long and embedded a minimum of 54 inches. Use flanged channel posts with a 3/8 in diameter holes punched on 3 inch centers for all stringers and lateral braces.

H Install Sign Type Special

Install each salvaged Sign Type Special:

At the location approved by the Engineer

At the same embedment depth as the salvaged sign.

I Post-Award Data

Use this provision if requested by the District Traffic Office

SignCAD Millennium (Program Version 8.61) panel layout files for panel layouts shown on the Plans are available electronically upon project award. To request these files, please contact:

Contact Name
Title
Phone Number
Email@state.mn.us

MnDOT believes the electronic data it will provide is accurate, but MnDOT provides no guarantee or warranty, express or implied, concerning the accuracy of the data and the Contractor shall not act in reliance on the data without verifying the data against the contract documents. The documents originally provided with the Contract remain the basis of the Contract, and the electronic data that will be provided at the Request of the Contractor is provided only for the convenience of the Contractor. Therefore, if use of this data causes an error, omission, unacceptable work, or work not in conformance with the contract documents, then any costs to the Contractor to make corrections as a result of this error will not be considered "extra work", and the Contractor will not be entitled to an adjustment of contract time.

J Sign Panel Overlay Type _

For Districts 1, 2, 3, 4, 6, 7, 8 use the following provisions:

The provisions of 2564.3K, "Construction Requirements: Sign Panel Overlay Type_" are modified as follows:

Use retroreflective sheeting sign face material in accordance with 3352.2.A.2.f, "Sign Sheeting Type XI," except for the following:

(1) For a yellow background on sign panel overlays, use retroreflective sheeting as specified by 3352.2.A.2.f, "Sign Sheeting Type XI," FL fluorescent yellow, and
(2) For a brown background, use white retroreflective sheeting as specified by 3352.2.A.2.f, "Sign Sheeting Type XI."

Use sign legend material as specified by 3352.2.A.2.f, "Sign Sheeting Type XI" for the sign face material on each sign panel, except for the following:

(1) Use brown (1179), electronic Cuttable (EC) film produced by the same manufacturer that fabricates the retroreflective sheeting specified by 3352.2.A.2.f, "Sign Sheeting Type XI," for sign legend material on sign panel overlays with brown sheeting; and

(2) If brown EC film for sign panel overlays requires splicing, make splices vertical and butt spliced and spaced so splices do not occur through letters or arrows.

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For METRO Districts use the following provisions:
The provisions of 2564.3K, "Construction Requirements: Sign Panel Overlay Type_" are modified as follows:

Use retroreflective sheeting sign face material in accordance with 3352.2.A.2.f, "Sign Sheeting Type XI," except for the following:

(1) For a yellow background on sign panel overlays, use retroreflective sheeting as specified by 3352.2.A.2.f, "Sign Sheeting Type XI," non-fluorescent yellow, and
(2) For a brown background, use white retroreflective sheeting as specified by 3352.2.A.2.f, "Sign Sheeting Type XI."

Use sign legend material as specified by 3352.2.A.2.f, "Sign Sheeting Type XI" for the sign face material on each sign panel, except for the following:

(1) Use brown (1179), electronic Cuttable (EC) film produced by the same manufacturer that fabricates the retroreflective sheeting specified by 3352.2.A.2.f, "Sign Sheeting Type XI," for sign legend material on sign panel overlays with brown sheeting; and

(2) If brown EC film for sign panel overlays requires splicing, make splices vertical and butt spliced and spaced so splices do not occur through letters or arrows.

K Sign Panels Type C and D
Use this provision when installing Type C or D sign panels in areas of high winds such as Districts 1, 2, 4, 7, and 8
Install signs with 3/8" stainless steel bolts and zinc-plated nylon insert lock nuts on the L-Bracket assembly when a knee brace is used.

L Sign Panels Type Overlay
Use this provision when including an organization's official logo/pictograph and attaching them to the panel with rivets .
(pictograph = government agency; logo = private organization)
For Sign(s)/Sign Panel(s) A/D/OH-XX,

Use the official name of logo here for the logo/pictograph design on the sign panel.

If design requirements are publicly available:
Access the logo/pictograph's graphic design standards on the following website:

Insert website here

If design requirements are NOT publicly available:
Contact Company Name to obtain the logo/pictograph's graphic design standards:

Contact Name
Company Name
Telephone and/or email

Fabricate the sign panel(s) with the logo/pictograph at the size and location shown on Sheet No(s). XX on the Plans.

Attach the logo/pictograph to the sign panel according to 2564.3H, "Traffic Signs and Devices: Construction Requirements: Sign Panels", paragraph 1.

M Sign Panels Type Special
Use this provision if mounting new street name sign above Type C signs on U-channel posts.
Furnish and install street name plates, bracket assemblies, mounting hardware, and sign posts as detailed on the Plans.

MM/DD/YY **DELETE: Updated 12/02/16** S.P. XXXX-XXX (T.H. XX)

The Engineer will approve the location of each sign post in the field.

N Sign Replacement Projects
Use this provision on sign replacement projects
The provisions of 2564.3U, "Traffic Signs and Devices: Construction Requirements: Scheduling of Work" are supplemented as follows:

For signs not detailed in 2564.3U, "Traffic Signs and Devices: Construction Requirements: Scheduling of Work":

Schedule the work so that replacement Type C and Type D signs are installed the same work day that the in-place signs are removed.

ST-2.4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT
The Engineer will measure each item according to the Contract and the 2564, "Traffic Signs and Devices: Construction Requirements" section of these Special Provisions.

The Department will include all work described in the Contract and the 2564, "Traffic Signs and Devices: Construction Requirements" section of these Special Provisions as part of the contract unit price per unit of measure.

The contract square foot [square meter] prices for Sign Panels Type EA and Type EO includes the cost of providing and installing the flanged channel or S4x7.7 panel mounting posts.

The Department will pay for traffic signs and devices on the basis of the following schedule:
Include only pay items that contain work specified in the special provisions. For METRO projects, also include pay items which will have sign panels fabricated with sign sheeting Type IV.

Item No.:	Item:	Unit:
2564.531	Sign Panels Type _	Square foot
2564.535	Sign Panel Overlay Type _	Square foot
2564.536	Install Sign Panel Type _	Each
2564.537	Install Sign Type _	Each
2564.550	Delineator Type _	Each
2564.551	Reference Location Sign	Each
2564.552	Object Marker Type_	Each
2564.553	Bridge Number Marker X4-12A	Each
2564.602	Infiltration Area Marker X3-6A	Each
2564.602	Install Delineator	Each
2564.602	Install Marker	Each
2564.602	Install Sign Type Special	Each

The Department's payment for each item shall be compensation in full for all work, material, and costs involved in performing the work specified on the Plans and these Special Provisions.

ST-3 (3352) SIGNS, DELINEATORS AND MARKERS

ST-3.1 SCOPE
The Contractor shall fabricate traffic signs, delineators, and markers consisting of sign panels 3352, "Signs, Delineators and Markers" and these Special Provisions.

ST-3.2 REQUIREMENTS
The Contractor shall use materials according to 3352, "Signs, Delineators and Markers" and these Special Provisions.

METRO DISTRICT ONLY:

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A Sign Sheeting Type IV

The provisions of 3352.2.A.2.b, "Signs, Delineators, and Markers: Requirements: Sign Sheeting Type IV" are modified as follows:

Provide Sign Sheeting Type IV for highway signing, markers, and delineators. Provide white and fluorescent orange Sign Sheeting Type IV for reboundable plastic drums and weighted channelizers. Additionally, test to ensure the impact resistance of the material at 32 °F [0 °C].

The provisions of 3352.2.A.3, "Signs, Delineators, and Markers: Requirements: Warranty Requirements" are supplemented as follows:

Table 3352-3
Minimum Retroreflectivity Values

Sign Sheeting Type	Warranty Period, *years*	Minimum Allowable Retroreflection	Total Daytime Luminance Factor Minimum
Type IV Signs, Delineators, and Markers	1 - 7	80%	---
Type IV Signs, Delineators, and Markers	8 - 10	70%	---

ST-3.3 SAMPLING AND TESTING — (BLANK)

HANDOUT

8.4 Addendum

At times it may become necessary to provide additional information, corrections, additions, or deletions to the Special Provisions, Plans, and/or Spec Book after the Project is put on sale, but before the actual letting of the Project. This information is provided to bidders by creating an "addendum". This addendum is then sent out to Contractors, suppliers, etc. that have purchased the Contract documents for the specific project. This addendum is sent out with enough lead time to allow bidders the opportunity to consider the addendum in preparing their bid. The *addendum will be located in the front portion of the MnDOT project proposal.*

8.5 Supplemental Agreements

It is important that Plans and Special Provisions are clear, accurate, and adequately indicate the work that the Contractor is required to perform. However, when that does not happen, or if some item(s) is inadvertently omitted from the project documents, MnDOT will negotiate a supplemental agreement with the Contractor to rectify the situation. There are occasions when supplemental agreements are necessary due to field conditions that were not apparent at the time of the project design. It is, however, in the best interest of everyone to try and keep supplemental agreements to a minimum.

8.6 Pay Items and Bid Prices

8.6.1 Bid Pricing

Information on average bid pricing can be obtained from the following website:

www.dot.state.mn.us/bidlet/average-bid-price.html

Exhibit 8-3 Sample Average Bid Price

AVGPR16.Y01 3/31/2016

AVERAGE BID PRICES FOR AWARDED PROJECTS 08:15 Thursday, March 31, 2016 16
ENGLISH UNITS - SPEC YEAR 16

DOES NOT INCLUDE STATE AID PROJECTS
ALL ITEMS BETWEEN 01/01/15 AND 12/31/15
BY ITEM GROUP

18 CONTRACTS - AWARDED TOTAL: $48,485,379

ITEM GROUP	ITEM NUMBER	ITEM DESCRIPTION	UNITS	QUANTITY	DOLLARS (000S)	AVERAGE PRICE	CONTRACT OCCURR.
2563	2563.601/00001	TRAFFIC CONTROL SUPERVISOR	LS	1	$40	$40,000.00	1
	2563.601/00010	TRAFFIC CONTROL	LS	14	$576	$41,139.29	14
	2563.601/00200	DETOUR SIGNING	LS	2	$15	$7,250.00	2
	2563.602/00002	RAISED PAVEMENT MARKER TEMPORARY	EACH	4,212	$6	$1.50	3
	2563.602/00011	FLEXIBLE DELINEATOR TYPE A	EACH	7	$2	$250.00	1
	2563.602/00028	PORTABLE CONCRETE BARRIER DELINEATOR	EACH	30	$0	$10.00	1
	2563.602/00029	LINEAR DELINEATION PANEL	EACH	706	$10	$13.50	1
	2563.602/00030	MEDIAN BARRIER DELINEATOR	EACH	1,465	$12	$8.15	4
	2563.602/01100	PORTABLE CHANGEABLE MESSAGE SIGN	EACH	2	$8	$3,800.00	1
	2563.610/00020	POLICE OFFICER	HOUR	672	$67	$100.00	1
	2563.613/00100	DYNAMIC MERGE SYSTEM	UDAY	67	$34	$500.00	1
	2563.613/00610	WORK ZONE SPEED LIMIT	UDAY	55	$15	$265.91	2
	2563.613/01100	PORTABLE CHANGEABLE MESSAGE SIGN	UDAY	255	$26	$102.75	3
	2563.613/01110	PORTABLE SIGNAL SYSTEM	UDAY	720	$72	$100.00	1
2563					$881		
2564	2564.511/00012	CONCRETE FOOTINGS (TYPE OH SHAFT)	C Y	7	$6	$900.00	1
	2564.522/00122	STRUCT STEEL-POSTS FOR OH SIGNS (B)	LB	4,330	$16	$3.75	1
	2564.522/00222	STRUCT STEEL-TRUSSES FOR OH SIGNS (B)	LB	4,182	$16	$3.75	1
	2564.522/00522	STR STEEL-PANEL MT PST FOR OH SIGNS (B)	LB	366	$1	$3.75	1
	2564.531/00130	SIGN PANELS TYPE C	S F	15,489	$494	$31.90	7
	2564.531/00140	SIGN PANELS TYPE D	S F	8,080	$235	$29.08	4
	2564.531/00189	SIGN PANELS TYPE OVERLAY	S F	648	$5	$8.31	2
	2564.531/00190	SIGN PANELS TYPE OH	S F	187	$5	$28.00	1
	2564.535/00010	SIGN PANEL OVERLAY TYPE A	S F	88	$3	$32.50	1
	2564.535/00100	SIGN PANEL OVERLAY TYPE OH	S F	808	$24	$30.22	1
	2564.536/00013	INSTALL SIGN PANEL TYPE C	EACH	16	$1	$50.00	2
	2564.536/00040	INSTALL SIGN PANEL TYPE SPECIAL	EACH	3	$0	$50.00	1
	2564.537/00013	INSTALL SIGN TYPE C	EACH	167	$33	$198.05	7
	2564.537/00014	INSTALL SIGN TYPE D	EACH	30	$13	$440.07	6

8.7 Pay Items

In addition to the item number found in the average bid price in the previous section, this can also be obtained from the AASHTOWare Project Item List website:

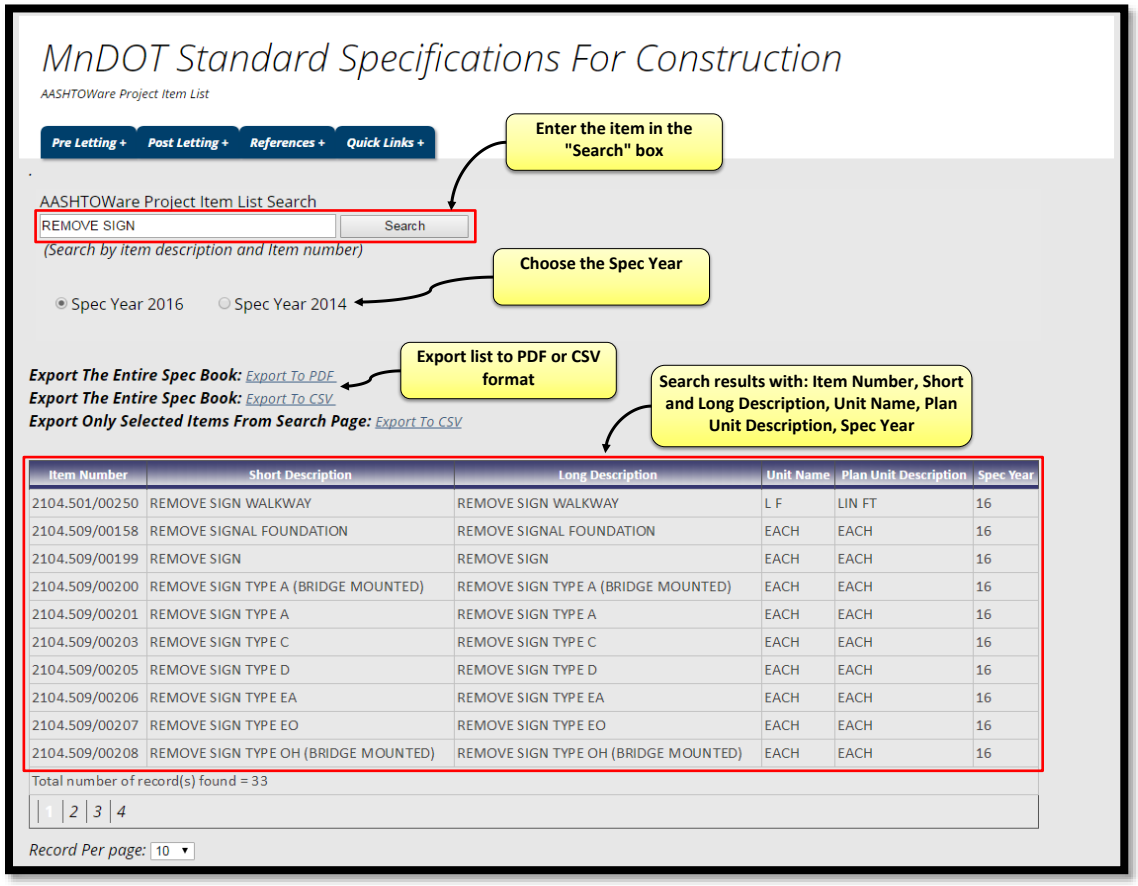
https://transport.dot.state.mn.us/reference/refItem.aspx

The website includes a search box to look for individual items (See **Exhibit 8-4**). The results will list the item by:

- ✓ Item Number
- ✓ Short Description
- ✓ Long Description
- ✓ Unit Name
- ✓ Plan Unit Description
- ✓ Specification Year

The results, or the entire AASHTOware list can be exported to PDF and CSV formats.

Exhibit 8-4 AASHTOware Website



9. APPENDIX

9.1 Frequently Asked Question

Source is from the MnDOT OTST Signing website

http://www.dot.state.mn.us/trafficeng/faq/faq-signing.html.

9.1.1 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/.

9.1.2 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

9.1.3 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.
- ✓ MnDOT Standard Signs and Markings Manual – listing of the standard signs used throughout Minnesota, including dimensioned drawings of sign panels for fabrication purposes
- ✓ MnDOT 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.

9.2 2001 ITE Traffic Control Devices Handbook Signing Priorities

c. Signing Priorities

At locations such as intersections or interchanges where there is a need to convey a lot of navigational information at a specific location, it is necessary to determine signing priorities. Each specific location needs to be considered individually to determine the priority of competing signs. However, in general, Regulatory and Warning signs take precedence over Guide signs. Regulatory signs such as Stop, Turn Prohibition, or One Way signs must be placed at specific locations of regulation with very little flexibility for moving. Likewise, critical warning signs must be located at a precise distance in advance of the situation of concern. For example, a Curve sign must be a specific minimum distance in advance of the curve, depending on the approach speed, to allow the appropriate adjustment of speed. Guide sign location is normally less critical because they can be relocated more easily than the other two sign categories. A good general order of priority for sign types is:

- Regulatory signs (location specific)—Stop, Turn Prohibition, One Way
- Warning signs—Curve, Signal Ahead, Lane Drop
- Regulatory signs (nonlocation specific)—Speed Limit, Wrong Way, Weight Limit
- Guide signs—Destination, Distance, Route Markers
- Motorist services—Gas, Food, Lodging, Attractions
- Traffic generator signs—Museums, ballparks, historic buildings
- General information signs—Time zone, county line, city limit

Decisions on prioritizing signs should be made on a systems basis, considering the entire traffic control system in the area. Thus, if more than one sign would normally be located in the same area, the lower-priority sign should be moved or eliminated based on the signing needs for the area. As an example, if a curve sign and a guide sign showing the distances to approaching towns are being considered at the same location, the curve sign would have priority because of the need to place it at a fixed distance in advance of the curve. The distance guide sign could either be moved ahead or beyond the curve or eliminated, depending on the existence of other similar signs along the route and the space available to accommodate both.

3. Sign Design

The purpose of guide signs is to provide simple and specific information to aid motorists in reaching their destination. Uniformity in design and placement of guide and motorists services signs is crucial in communicating the sign message to the driver. We live in a mobile society where citizens travel throughout the country and move from one part of the country to another on a much more frequent basis than in the past. This results in people driving automobiles frequently on streets and highways that may be unfamiliar to them. It is essential in communicating with these drivers that the traffic control devices (TCDs) they encounter throughout the country be uniform so they can take the required action without delay in understanding and analyzing the message. To accomplish this, all highway signing must have uniform shape, color, lettering and retroreflectorization plus provide a simple, clear message.

a. Color and Shape

Guide signs are rectangular in shape and generally have green backgrounds with white letters. Two exceptions exist and they are: Recreational and Cultural guide signs, which have a brown background with white letters, and Motorist Service signs, which have blue backgrounds with white letters.

Route markers used alone or as part of a guide sign have unique shapes and colors for the various classes of highways (i.e. U.S., State, County, Interstate). Figure 5–1 shows some typical combinations of guide signs and route marker designs.

b. Size of Signs

The size of distance and destination guide signs is variable because they are dependent on the length of the message and the size of the lettering. For Route Markers, however, the sizes are fixed and the proper size for a specific application can be found in Section 2D.11 of the *MUTCD*. The legend to be displayed on a guide sign must be determined first and then the size and style of letters for the type of facility determined. Together these will determine the outside dimensions of the sign.

c. Legend

The amount of legend on a guide sign must be limited in order to prevent overloading the drivers with more information than they can comprehend and

9.3 Signs Symbol Summary

Name	Symbol	Line Width Decimal of an Inch (B)	Line Length In Inches (B)	Size Timely Template T-41 In Inches (B)
Pedestrian Indication F. & I.		.021		1/8
Pedestrian Indication Inp.		.021		1/8
Pedestrian Push Button on a Signal Support		.021		1/8
Pedestrian Push Buttom Station		.021		
Anchor		.021		
Flashing Beacon F.&I. (3)		.021		1/8
Flashing Beacon Inp. (3)		.021		1/8
Sign (Type A or D)		.021		1/8
Sign (Type C)		.021		1/8
Overhead Sign F. & I. Span		.021		5/64
Cantilever		.021		5/64
Butterfly		.021		5/64
Overhead Sign Inp. Span		.021		5/64
Cantilever		.021		5/64
Butterfly		.021		5/64

(1) Use in conjunction with appropriate Signal Symbol
(2) Use smaller size except on Signing, Lighting and Signal Plans
(3) Arrow indicates Signal Face direction

9.4 Standard Signs Summary

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Standard Signs Summary

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Standard Sign Drawings

Sign Sizes
Application Key

B-P:	Bike Path
B/Rt:	Bike Route
M:	Minimum
CR-SL:	Conventional Road, Single Lane
CR-ML:	Conventional Road, Multiple Lanes
E:	Expressway
F:	Freeway
RA:	Ramp
O:	Oversize

R Series

No.	Drawing	Color	Use & Size
R1-1		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		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		Black on White	CR-SL 24 x 18 CR-ML 24 x 18 E 36 x 30 F 48 x 36
R1-3P		White on Red	CR-SL 18 x 6 CR-ML 18 x 6 O 30 x 12
R1-5b (R or L)		Black and Red on White	CR-SL 36 x 36 CR-ML 36 x 36 O 36 x 36
R1-5c (R or L)		Black and Red on White	CR-SL 36 x 48 CR-ML 36 x 48 O 36 x 48

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 above based on the number of approach lanes on the side street approach.

Multi-Lane - more than one lane moving in the same direction. A multi-lane street, highway, or roadway has a basic cross-section comprised of two or more through lanes in one or both directions. A multi-lane approach has two or more lanes moving toward the intersection, including turning lanes.

No.	Drawing	Color	Use & Size
R1-6a		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 *
R1-6c		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 *
R1-9b		Black and White on Fluorescent Yellow-Green	CR-SL 90 x 30 CR-ML 90 x 30
R1-X1		Black on White	24 x 30
R1-X3		Black on White	24 x 18 30 x 24
R2-1		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		White on Black	CR-SL 24 x 24 CR-ML 24 x 24 E, O 36 x 36 F 48 x 48
R2-4b		Black on White	CR-SL 24 x 48 CR-ML 24 x 48 E, F, O 48 x 96

Use in construction areas only

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R Series

No.	Drawing	Color	Use & Size
R2-4P	MINIMUM SPEED 40	Black on White	CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48 F 48 x 60
R2-6bP	$300 FINE Work zone use only	Black on White	CR-SL 24 x 18 CR-ML 24 x 18 E, F 36 x 24 O 48 x 36
R2-12	END WORK ZONE SPEED LIMIT	Black on White	CR-SL 24 x 36 CR-ML 24 x 36 E, F 36 x 54
R2-X5	BRIDGE SPEED LIMIT 15	Black on White	CR-SL 24 x 36 CR-ML 24 x 36
R3-1		Black and Red on White	CR-SL 24 x 24 CR-ML, E 36 x 36 O 48 x 48
R3-2		Black and Red on White	CR-SL 24 x 24 CR-ML, E 36 x 36 O 48 x 48
R3-3	NO TURNS	Black on White	CR-SL 24 x 24 CR-ML, E 36 x 36 O 48 x 48
R3-4		Black and Red on White	CR-SL 24 x 24 CR-ML, E 36 x 36 O 48 x 48
R3-4a		Black and Red on White	CR-SL 24 x 24 CR-ML, E 36 x 36 O 48 x 48
R3-5 (R or L)	ONLY * For overhead use	Black on White Right is shown	CR-SL 30 x 36 * CR-ML 30 x 36 * O 48 x 60 *
R3-5a	ONLY * For overhead use	Black on White	CR-SL 30 x 36 * CR-ML 30 x 36 * O 48 x 60 *
R3-6 (R or L)	 * For overhead use	Black on White Right is shown	CR-SL 30 x 36 * CR-ML 30 x 36 * O 48 x 60*
R3-7 (R, L, AR, AL)	RIGHT LANE MUST TURN RIGHT LEFT LANE MUST TURN LEFT ALL TRAFFIC MUST TURN RIGHT ALL TRAFFIC MUST TURN LEFT	Black on White	CR-SL 30 x 30 CR-ML 36 x 36
R3-9a	ONLY * For overhead use	Black on White	CR-SL 30 x 36 * CR-ML 30 x 36 *
R3-9b	CENTER LANE ONLY * For ground-mounted use	Black on White	CR-SL 24 x 36 * CR-ML 24 x 36 * O 36 x 48 *
R3-9cP	BEGIN	Black on White	CR-SL 30 x 12 CR-ML 30 x 12
R3-9dP	END	Black on White	CR-SL 30 x 12 CR-ML 30 x 12
R3-17	BIKE LANE	Black on White	B/RT 24 x 18

R Series

No.	Drawing	Color	Use & Size
R3-17aP	AHEAD Use with R3-17	Black on White	B/RT 24 x 8
R3-17bP	ENDS Use with R3-17	Black on White	B/RT 24 x 8
R3-18		Black and Red on White	CR-SL 24 x 24 CR-ML, E 36 x 36 O 48 x 48
R3-27		Black and Red on White	CR-SL 24 x 24 CR-ML, E 36 x 36 O 48 x 48
R3-33	RIGHT LANE MUST EXIT	Black on White	E, F 78 x 36
R3-X3 (R or L)	RAMP 2 PERSON CAR POOLS BUSES AND MOTORCYCLES ONLY	Black on White	RA 36 x 60

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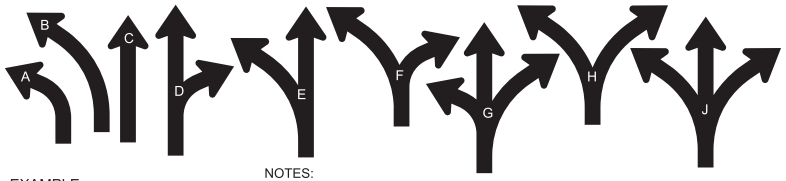
R Series

R3-8 LANE-USE CONTROL SIGNS



EXAMPLE:

R3-8AED
54 X 30

NOTES:
1. ONLY shall be used under all single-headed arrows (A-C).
2. Signs are to be designated first by panel height, and then by the arrows used, from left to right.
3. Arrows are first identified by letter A through J. On three section panels using arrows B or E follow the arrow letter identifier with the right (R) or left (L) designation in cases where the arrows could logically face either way.
4. Panels are 30" high for ground mount and 48" high for overhead mounting. Overhead mounting is not allowed where there are 3 or more lanes of approach.
5. Panel widths will vary with legend on sign.

R3-8AA 36 X 30

R3-8AB 36 X 30
R3-8AB 54 X 48

R3-8ABC 54 X 30

R3-8ABCA 66 X 30

R3-8ABCD 72 X 30

R3-8ABD 54 X 30

R3-8ABLA 54 X 30

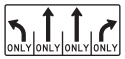
R3-8ABRA 54 X 30

R3-8AC 36 X 30

R3-8ACA 54 X 30

R3-8ACC 54 X 30

R3-8ACCA 66 X 30



R3-8ACD 48 X 30

R3-8AD 36 X 30
R3-8AD 54 X 48

R3-8AE 30 X 30

R3-8AEBA 66 X 30

R3-8AEC 48 X 30

R3-8AECA 66 X 30

R3-8AELA 48 X 30

R3-8AERA 48 X 30

R3-8AF 36 X 30

R3-8AG 36 X 30

R3-8AHA 48 X 30

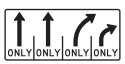
R3-8AJA 54 X 30

R3-8BA 36 X 30
R3-8BA 54 X 48

R3-8CA 36 X 30

R3-8CCA 54 X 30

R3-8CCBA 66 X 30



R3-8CD 36 X 30

R3-8CEA 48 X 30

R3-8DA 36 X 30

R3-8DCA 54 X 30

R3-8ACC 54 X 30

R3-8EA 30 X 30
R3-8EA 60 X 48

R3-8EE 42 X 30

R3-8FA 36 X 30

R3-8GA 36 X 30

R3-8H 30 X 30

R Series

No.	Drawing	Color	Use & Size
R4-1		Black on White	B-P 12 x 18 B/Rt 18 x 24 CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48 F 48 x 60
R4-2		Black on White	B-P 12 x 18 B/Rt 18 x 24 CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48 F 48 x 60
R4-3		Black on White	B-P 12 x 18 B/Rt 18 x 24 CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48 F 48 x 60
R4-3a	 Interstate use only	Black on White	F 84 x 36
R4-4		Black on White	CR/SL 36 x 30 CR/ML 36 x 30
R4-5		Black on White	CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48 F 48 x 60
R4-6		Black on White	CR/SL 24 x 30 CR/ML 24 x 30 E 48 x 60
R4-7		Black on White	B-P 12 x 18 B/Rt 18 x 24 CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48 F 48 x 60
R4-7c		Black on White	CR-SL 18 x 30 CR-ML 18 x 30

No.	Drawing	Color	Use & Size
R4-8		Black on White	B-P 12 x 18 B/Rt 18 x 24 CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48 F 48 x 60
R4-8c		Black on White	CR-SL 18 x 30 CR-ML 18 x 30
R4-17a		Black on White	CR-SL 30 x 36 CR-ML 30 x 36 E, F 48 x 54
R4-18a		Black on White	CR-SL 30 x 36 CR-ML 30 x 36 E, F 48 x 54
R4-X1		Black on White	36 x 48
R4-X4		Black on White	36 x 36
R4-X5		Black on White	CR-SL 30 x 24 CR-ML 36 x 24 E, F 48 x 36
R4-X6		Black on White	78 x 42
R4-X7		Black on White	42 x 48

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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
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

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		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 MN PARKING 800 AM TO 500 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
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

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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		Black and Orange on White	CR-SL 9 x 12 CR-ML 9 x 12
Alternate legends available			
R10-3d		Black and Orange on White	CR-SL 9 x 12 CR-ML 9 x 12
Alternate legends available			
R10-3e		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
R10-7a	DO NOT BLOCK CROSSWALK	Black on White	CR-SL 30 x 30 CR-ML 30 x 30

No.	Drawing	Color	Use & Size
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			
R10-15a	TURNING VEHICLES STOP TO	Black, Red, Fluorescent Yellow on White	CR-SL 30 x 30 CR-ML 30 x 30 E 30 x 30
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	RA 24 x 30 O 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 42 x 48 *
* For overhead use			
R10-X13	U-TURN YIELD ON FLASHING YELLOW ARROW	Black on White	CR-SL 36 x 42 CR-ML 36 x 42 O 42 x 48 *
* For overhead use			

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
R11-3b	BRIDGE OUT 10 MILES AHEAD LOCAL TRAFFIC ONLY	Black on White	72 x 30
R11-3c	BRIDGE CLOSED 14 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 8T 12T 16T	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
R13-X1	TRUCK & COMBINATIONS OVER 10,000 LBS MUST ENTER WEIGH STATION WHEN FLASHING	Black on White	CR-SL 114 x 60 CR-ML 114 x 60 E 156 x 78 F 192 x 96
R14-1	TRUCK ROUTE	Black on White	CR-SL 24 x 18 CR-ML 24 x 18

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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	78 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
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-X15	STATE LAW MOVE OVER FOR STOPPED EMERGENCY AND MAINTENANCE VEHICLES	Black on White	132 x 78
R16-X16	DO NOT CROSS SOLID DOUBLE WHITE LINE	Black on White	CR-SL 30 x 54 CR-ML 30 x 54 E, F, O 48 x 78
R16-X33	CHECK YOUR TURN SIGNAL	Black on White	24 x 30

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
W1-6		Black on Yellow	B-P 24 x 12 B/Rt 36 x 18 CR-SL 48 x 24 CR-ML 48 x 24 E 72 x 36 F 96 x 48
W1-7		Black on Yellow	B-P 24 x 12 B/Rt 36 x 18 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
W1-11		Black on Yellow	CR-SL 30 X 30 CR-ML 30 X 30 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".

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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
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		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 O 48 x 48
W2-X12		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		Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W3-5		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 x 48
W3-8		Black on Yellow	36 x 36

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
W3-X4		Black on Yellow	66 x 42
W3-X5		Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W3-X6		Black on Yellow	72 x 24 96 x 36
W3-X8		Black on Yellow	66 x 42
W3-X8a		Black on Yellow	48 x 48
W3-X8aP		Black on Yellow	42 x 24
W3-X8b		Black on Yellow	36 x 36
W16-13P		Black on Yellow	30 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		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)		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		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		Black on Yellow	CR-SL 18 x 24 CR-ML 18 x 24 E 24 x 30
W4-6 (R or L)	 Right is shown	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48
W4-X1 (R or L)		Black on Yellow	E, F 48 x 48 O 60 x 60
W5-1		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".

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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
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
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".

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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	5 4 3 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".

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		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		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		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		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	 Mounted on structure	Black on Yellow	84 x 24
W13-1P		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		Black on Yellow	CR-SL 24 x 30 CR-ML 24 x 30 E 36 x 48 F, O 48 x 60
W13-3		Black on Yellow	CR-SL 24 x 30 CR-ML 24 x 30 E 36 x 48 F, O 48 x 60
W13-4P		Black on Orange	36 x 36
W13-6		Black on Yellow	CR-SL 24 x 42 CR-ML 24 x 42 E, F 36 x 60 O 48 x 84
W13-7		Black on Yellow	CR-SL 24 x 42 CR-ML 24 x 42 E, F 36 x 60 O 48 x 84
W14-1		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".

W Series

No.	Drawing	Color	Use & Size
W14-3		Black on Yellow	CR-SL 64 x 64 x 48 CR-ML 64 x 64 x 48
W14-X1		Black on Yellow	CR-SL 30 x 30 CR-ML 30 x 30 E, F 36 x 36
W14-X2		Black on Yellow	48 x 48
W14-X3		Black on Yellow	36 x 36
W14-X9		Black on Yellow	30 x 36
W14-X10		Black on Yellow	12 x 18
W14-X11		Black on Orange	CR-SL 36 x 36 CR-ML 48 x 48 E, F, 48 x 48
W14-X12		Black on Orange	48 x 48
W14-X13		Black on Orange	48 x 48
W14-X15		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		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)	 Right is shown	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 36 x 24 O 42 x 30
W16-6mP (R or L)	 Right is shown	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 36 x 24 O 42 x 30
W16-7mP (R or L)	 Use at crossing Right is shown	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 36 x 24 O 42 x 30
W16-8P	 Use with W2 and W3 Series, W10-2, W10-3, and W10-4 signs	Black on Yellow	Varies x 8
W16-8aP	 Use with W2 and W3 Series, W10-2, W10-3, and W10-4 signs	Black on Yellow	Varies x 15
W16-9P		Black on Yellow-green or Yellow	Use With Diamond / Pentagon 30" / 30" 24 x 12 36" / 36" 30 x 18 48" / 48" 36 x 24
W16-13P		Black on Yellow	24 x 18 30 x 24
W16-15P		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
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
W20-100P	500 FEET, 1/4 MILE, 15 MILES, 2 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 18 Use w/48" diamond 42 x 24 Use w/60" diamond 48 x 36
Alternate legends available			

No.	Drawing	Color	Use & Size
W20-X3 (R or L)	MERGE	Black on Orange or Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
Right is shown Arrow is demountable when used on orange			
W20-X4	BRIDGE CLOSED AHEAD	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-X5	RIGHT LANE CLOSED AHEAD; LEFT, CENTER, 1000 FT, 1/2 MILE	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
Right and Ahead are shown			
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 2 LANES CLOSED	Black on Orange	E, F 48 x 48
Right is shown			

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
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
W20-X19	BEGIN MERGE	Black on Orange	E, F 48 x 48
W21-1a		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 ** Use as delineator (rotate 45 degrees)			
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	Black on Orange	60 x 20 80 x 26
Use with W21-X4			
W21-X4a (R or L)	SHOULDER; RAMP; LEFT; RIGHT LANE CLOSED	Black on Orange	66 x 24 96 x 36
Right is shown			
W21-X5 (R, L or C)	RIGHT LANE CLOSED; LEFT, CENTER	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
Right is shown			
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	Stop: White on Red Slow: Black on Yellow	18 x 18 * 36 x 36
* Automated flagging device size			
W21-X8	MINIMUM MAINTENANCE ROAD	Black on Yellow	36 x 30
Not for use on MnDOT or federal state aid roads			
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		Black on Orange	60 x 36 72 x 42
W21-X11 Striper Train Sign Arrow is demountable		Black on Orange	54 x 22
W21-X12 Striper Train Sign		Black on Orange	72 x 18
W21-X13 Striper Train Sign		Black on Orange	72 x 36 90 x 42
W22-1		Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W22-2 Blasting Area Prohibition		Black on Orange	42 x 36
W22-3		Black on Orange	M 36 x 30 CR-SL 42 x 36 CR-ML 42 x 36 E, F 42 x 36
W23-2		Black on Yellow or Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W24-1 (R or L) Right is shown		Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48

No.	Drawing	Color	Use & Size
W24-1a (R or L) Right is shown		Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W24-1b (R or L) Right is shown		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".

M Series

No.	Drawing	Color	Use & Size
M1-1 * 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		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		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		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		Black on White	18 x 18 22.5 x 18* 24 x 24 30 x 24* 24 x 24 30 x 24* 36 x 36 45 x 36*
M1-4b 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 Overlay use *3 digit		White on Green	24 x 24 30 x 24* 24 x 24 30 x 24* 36 x 36 45 x 36*
M1-5a 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*

No.	Drawing	Color	Use & Size
M1-5b Overlay use *3 digit		White and Gold on Blue	18 x 18 22.5 x 18* 24 x 24 30 x 24* 24 x 24 30 x 24* 36 x 36 45 x 36*
M1-5ab Independent 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*
M1-5bb Overlay use *3 digit		White on Green	18 x 18 22.5 x 18* 24 x 24 30 x 24* 24 x 24 30 x 24* 36 x 36 45 x 36*
M1-6 Independent use		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		White and Yellow on Blue	18 x 18 22.5 x 18* 24 x 24 30 x 24* 24 x 24 30 x 24* 36 x 36 45 x 36*
M1-9x		White and Blue on Green	CR-SL 18 x 24 CR-ML 18 x 24 E 18 x 24 B-P, B-Rt 12 x 18
M1-10a		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		Green on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F 36 x 18

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M Series

No.	Drawing	Color	Use & Size
M1-X3	TWP 21	Black on White	CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
M1-X4 Independent use	CARVER 5 COUNTY	Black on White	CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
M1-X4a Overlay use	COUNTY 5	Black on White	24 x 24 24 x 24 36 x 36
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
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

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, T, R45, L45, ATR, ATR45, ATL, ATL45, ATR90, or ATL90) Right is shown	DETOUR	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24 E, F, O 42 x 36
M4-9ma (R, L, or T) Right is shown	DETOUR	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24
M4-9mb (R, L, or T) Right is shown	DETOUR	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24
M4-9mc (R, L, or T) Right is shown	DETOUR	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24
M4-10 (R or L) Right is shown	DETOUR	Black on Orange	CR-SL 48 x 18 CR-ML 48 x 18
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) 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
M5-1a (R or L) Right is shown		White on Blue, Brown or Green	B-P, B/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
M5-2 (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
M5-2a (R or L) Right is shown		White on Blue, Brown or Green	B-P, B/Rt 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
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 18 CR-ML 24 x 18 E, F, O 36 x 24
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		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		White on Blue, Brown or Green	B-P, B/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)		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			
M6-2a (R or L)		White on Blue, Brown or Green	B-P, B/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	
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, B/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, B/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)		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			
M6-5a (R or L)		White on Blue, Brown or Green	B-P, B/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	

No.	Drawing	Color	Use & Size
M6-6 (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			
M6-6a (R or L)		White on Blue, Brown or Green	B-P, B/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	
M6-7 (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			
M6-7a (R or L)		White on Blue, Brown or Green	B-P, B/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	
M6-X2		Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-X2a		White on Blue, Brown or Green	B-P, B/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	

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		**M1-X5j** White on Brown		**M1-X5s** 18 x 24 White on Brown		**M1-X5dd** 24 x 24 White on Green	
M1-X5a 24 x 24 White on Green		**M1-X5k** 24 x 24 Red & Black on White		**M1-X5t** 24 x 24 White on Green		**M1-X5ee** White on Brown	
M1-X5b White on Brown		**M1-X5l** White on Brown		**M1-X5u** White on Brown		**M1-X5ff** White on Brown	
M1-X5c White on Brown		**M1-X5m** 24 x 24 Blue on White		**M1-X5v** White on Brown		**M1-X5gg** White on Brown	
M1-X5d White on Brown		**M1-X5n** White on Brown		**M1-X5w** White on Brown		**M1-X5hh** White on Brown	
M1-X5e White on Brown		**M1-X5o** 24 x 24 Various on White		**M1-X5x** White on Brown		**M1-X5jj** White on Brown	
M1-X5f White on Brown		**M1-X5p** 24 x 24 White on Blue		**M1-X5y** White on Brown		**M1-X5kk** White on Brown	
M1-X5g 24 x 24 White on Green		**M1-X5q** White on Brown		**M1-X5bb** White on Brown		**M1-X5ll** White on Brown	
M1-X5h 24 x 24 White on Green		**M1-X5r** White on Brown		**M1-X5cc** White on Brown		**M1-X5mm** White on Brown	

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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 Annes 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-X5mw	Moms Way
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.
M1-X515	Officer Tom Decker Mem. Hwy.
M1-X516	Officer Richard Crittenden Sr. Mem. Hwy.
M1-X517	Nicholas Patrick Spehar Mem. Hwy.
M1-X518	Michael Duane Clickner Mem. Br.
M1-X519	Trooper Glen Skalman Mem. Hwy.
M1-X520	Sergeant Joseph Bergeron Mem. Hwy.
M1-X521	Officer Scott Patrick Mem. Hwy.
M1-X522	Officer Michael Alan Hogan Mem. Hwy.
M1-X523	Staff Sergeant Kevin Witte Mem. Hwy.

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
G20-5aP	WORK ZONE	Black on Orange	CR-SL 24 x 18 CR-ML 24 x 18 E, F 36 x 24 O 48 x 36
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 MARKERS 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	WORK ENDS	Black on Orange	60 x 24
Mount under G20-1			
G20-X4 (R, L or T) Construction Zone Business Signing	SHEA HARDWARE JOHNSON CAR SALES PAUL AND SONS PLUMBING	Black on Orange	72 x 18
G20-X5 Contractor Identification Signing	X5 CONSTRUCTION BY Contractor 24 X5a CONSTRUCTION BY Contractor Name 30 X5b CONSTRUCTION BY Contractor and MnDOT 30	Black on Orange	60 x 24 60 x 30
G20-X6 (R, L or T) Business Access Signing	BUSINESS ACCESS	Black on Orange	CR-SL 36 x 24 CR-ML, E 48 x 36 O 66 x 48

No.	Drawing	Color	Use & Size
G20-X7	EXIT Variable arrow angle	Black on Orange	E, F 48 x 48
G20-X8 (R, T or L)	Newtown City GROCERY LODGING Middleview GROCERY LODGING Middleview GROCERY FOOD LODGING GAS CAMPING Newtown City GROCERY FOOD LODGING GAS CAMPING	Black on Orange	54 x Var. 66 x Var. 78 x Var. 84 x Var. 96 x Var. 102 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
G20-X16	DO NOT FOLLOW INTO WORK AREA	Black on Orange	48 x 18
G20-X17	STOPPED OR SLOW TRAFFIC WHEN FLASHING	Black on Orange	96 x 48

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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		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		Black on White	CR-SL 24 x 30 CR-ML 24 x 30
S4-1P		Black on White	CR-SL 24 x 10 CR-ML 24 x 10 O 36 x 18
S4-2P		Black on White	CR-SL 24 x 10 CR-ML 24 x 10 O 36 x 18
S4-3P		Black on Fluorescent Yellow-Green	CR-SL 24 x 8 CR-ML 24 x 8 O 36 x 12
S4-4P		Black on White	CR-SL 24 x 10 CR-ML 24 x 10 O 36 x 18
S4-5		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		Black on White	CR-SL 24 x 10 CR-ML 24 x 10 O 36 x 18
S4-7P		Black on Fluorescent Yellow-Green	CR-SL 24 x 12 CR-ML 24 x 12 O 30 x 18
S5-1		Black on Fluorescent Yellow-Green and White	CR-SL 24 x 48 CR-ML 24 x 48 O 36 x 72
S5-2		Black on White	CR-SL 24 x 30 CR-ML 24 x 30 O 36 x 48

D Series

No.	Drawing	Color	Use & Size
D1-1 (R or L) Left is shown		White on Green	CR-SL Var. x 24 CR-ML Var. x 24 E Var. x 30
D1-1a (R or L) Left is shown		White on Green	CR-SL Var. x 24 CR-ML Var. x 24 E Var. x 30
D1-2		White on Green	CR-SL Var. x 42 CR-ML Var. x 42 E Var. x 54
D1-2a		White on Green	CR-SL Var. x 42 CR-ML Var. x 42 E Var. x 54
D1-2d		White on Green	CR-SL Var. x 42 CR-ML Var. x 42
D1-3		White on Green	CR-SL Var. x 60 CR-ML Var. x 60 E Var. x 72
D1-3a		White on Green	CR-SL Var. x 60 CR-ML Var. x 60 E Var. x 72
D1-3d		White on Green	CR-SL Var. x 60 CR-ML Var. x 60
D1-X1 (R or L) Right is shown		White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 54 x 48
D1-X1a (R, L or T) Right is shown		White on Green	M 30 x 18 CR-SL 54 x 24 CR-ML 54 x 24 E 66 x 36
D1-X2 (R, L or DH) Right is shown		White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 66 x 48
D1-X3 (R or L) Right is shown		White on Green	M 36 x 24 CR-SL 54 x 36 CR-ML 54 x 36 E 66 x 48
D1-X4 (R or L) Right is shown		White on Green	CR-SL 48 x 12 CR-ML 48 x 12 E 60 x 18
D1-X5 (R or L) Right is shown		White on Green	M 48 x 24 CR-SL 72 x 36 CR-ML 72 x 36 E 96 x 48
D1-X6 (R or L) Right is shown		White on Green	M 54 x 24 CR-SL 78 x 36 CR-ML 78 x 36 E 108 x 48
D1-X7 (R, L or T) Right is shown		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
D1-X8 (R, L or T) Right is shown		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
D1-X9 (R or L) Right is shown		White on Green	CR-SL 30 x 36 CR-ML 30 x 36 E 42 x 48
D2-1		White on Green	CR-SL Var. x 18 CR-ML Var. x 18 E Var. x 24
D2-2		White on Green	CR-SL Var. x 30 CR-ML Var. x 30 E Var. x 36
D2-3		White on Green	CR-SL Var. x 42 CR-ML Var. x 42 E Var. x 48
D3-X1 * For bridge/mast arm use.		White on Green	Var. x 24
D3-X2 * For bridge/mast arm use.		White on Green	Var. x 24
D3-X3 * For bridge/mast arm use.		White on Green	Var. x 48

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D Series

No.	Drawing	Color	Use & Size
D4-1		Green on White	30 x 24
D4-2 (R or L)	 Right is shown Transit logo to be specified	White on Green	CR-SL 30 x 36 CR-ML 30 x 36 E 36 x 48 O 54 x 72
D4-2a	 For on site use	White on Green	36 x 42
D5-1		White on Blue	CR-SL 90 x 36 CR-ML 90 x 36 E 114 x 48 F 132 x 60
D5-1a		White on Blue	CR-SL 90 x 36 CR-ML 90 x 36 E 114 x 48 F 132 x 60
D5-1c		White on Blue	F 138 x 114
D5-2a		White on Blue	CR-SL 42 x 48 CR-ML 42 x 48 E 66 x 72 F 78 x 78
D5-6		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)		White on Blue	36 x 36
D5-X1a	 For use with D5-X1	White on Blue	36 x 12
D5-X1b		White on Brown	36 x 18
D5-X1c		White on Brown	36 x 18
D5-X2 (R or L)	 Right is shown	White on Blue	36 x 30
D6-2a (R or L)		White on Blue	36 x 36
D6-3a (R or L)	 Right is shown	White on Blue	36 x 30
D7-X1 (R or L)		White on Brown	36 x 36
D7-X2 (R or L)	 Right is shown	White on Brown	36 x 30
D7-X5 (R or L)		White on Brown	36 x 36

D Series

No.	Drawing	Color	Use & Size
D7-X5a (R or L)		White on Brown	36 x 36
D7-X6 (R or L)	 Right is shown	White on Brown	36 x 30
D7-X7 (R or L)	 Public Boat Launch Right is shown	White on Brown	Var. x 30
D7-X7a (R or L)	 Public Canoe Access Right is shown	White on Brown	Var. x 30
D7-X8	 Public Boat Launch Trailblazer	White on Brown	24 x 24
D7-X8a	 Public Canoe Access Trailblazer	White on Brown	24 x 24
D7-X9 (R, L or T)	 Right is shown	White on Brown	M 18 x 24 CR-SL 30 x 36 CR-ML 30 x 36 E 42 x 48
D7-X10 (R, L or T)	 Right is shown	White on Brown	M 18 x 24 CR-SL 30 x 36 CR-ML 30 x 36 E 42 x 48
D7-X11 (R, L or T)	 Right is shown	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 60 x 48
D7-X11a (R, L or T)	 Right is shown	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 54 x 48
D7-X12 (R, L or T)	 Right is shown	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 54 x 48
D7-X13		White on Brown	24 x 24
D7-X14		White on Brown	24 x 24
D7-X15 (R, L or T)	 Right is shown	White on Brown	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48
D7-X15a (R or L)	 Right is shown	White on Brown	CR-SL 48 x 36 CR-ML 48 x 36 E 66 x 48
D7-X16 (R, L or T)	 Right is shown	White on Green	M 36 x 24 CR-SL 54 x 36 CR-ML 54 x 36 E 66 x 48
D7-X17 (R, L or T)	 Right is shown	White on Green	M 36 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 66 x 48
D7-X18 (R, L or T)	 Right is shown	White on Green	M 36 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 66 x 48
D7-X19 (R, L or T)	 Right is shown	White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 54 x 48

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D Series

No.	Drawing	Color	Use & Size
D7-X20 (R, L or T)	PICNIC GROUNDS →	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36
Right is shown			
D7-X21 (R, L or T)	GOLF COURSE →	White on Brown	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36
Right is shown			
D7-X22 (R, L or T)	DISC GOLF COURSE →	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 48 x 36
Right is shown			
D7-Xp	**Approved Recreational & Cultural Interest Symbol Signs**	White on Brown	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
D8-X1	WEIGH STATION 1 MILE	White on Green	CR-SL 66 x 48 CR-ML 66 x 48 E 84 x 60 F 102 x 72
D8-X2	WEIGH STATION NEXT RIGHT	White on Green	CR-SL 66 x 36 CR-ML 66 x 36 E 90 x 48 F 114 x 60
D8-X3 (R, L or variable angle)	WEIGH STATION → / WEIGH STATION ↗	White on Green	CR-SL 48 x 36* CR-ML 48 x 36* E 66 x 48* E 66 x 54** F 84 x 72**
* R or L ** Variable arrow angle			
D9-1		White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
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	H / 4 BLKS →	White on Blue	24 x 48
Right is shown			
D9-2b (R or L)	H →	White on Blue	CR-SL 48 x 24 CR-ML 48 x 24 E 60 x 30
For non-freeway use Right is shown			
D9-6		White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30

D Series

No.	Drawing	Color	Use & Size
D9-10a (R or L)	TOURIST INFO →	White on Blue	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 60 x 48
Right is shown			
D9-X1 (R or L)		White on Blue	48 x 24
Use with freeway services Right is shown			
D9-X3 (R &/or L)	← RESORTS →	White on Blue	66 x 12
D9-X4 (R &/or L)	← CAMPING →	White on Blue	66 x 12
D9-X6 (R or L) Specific Service	4 ISLAND RESORT ROUND LAKE CAMPGROUND → CLOSED 15 x 10 plate ← FREDDIE'S FEEDS 18 x 12 logo 4 → 48 x 12 logo NEXT RIGHT 72 x 12 for mainlines at interchanges	White on Blue	72 x 18
D10-1 Reference Location	MILE 2	White on Green	CR-SL 10 x 18 CR-ML 10 x 18 E, F 12 x 24
For one digit use			
D10-2 Reference Location	MILE 2 5	White on Green	CR-SL 10 x 27 CR-ML 10 x 27 E, F 12 x 36
For two digit use			
D10-3 Reference Location	MILE 2 5 8	White on Green	CR-SL 10 x 36 CR-ML 10 x 36 E, F 12 x 48
For three digit use			
D10-5a Enhanced Reference Location	WEST INTERSTATE 94 16 .2	White on Green	18 x 48
Route marker colors shall be as shown in the M Series			
D10-X2 Highway Number Plate	HWY 280	White on Green	10 x 10
Use with Reference Location			
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		White on Green	CR-SL 24 x 36 CR-ML 24 x 36
I2-3		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* * For use with two line names
I2-5		White on Green	CR-SL Var. x 24 CR-ML Var. x 24 E, F Var. x 36
I2-10		Various	66 x 42
I2-12		Various	66 x 42
I3-1		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* * For use with two line names
I-5		White on Green	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
I-6		White on Green	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
I-7		White on Green	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
I-8		White on Green	CR-SL 24 x 24 CR-ML 24 x 24 E 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		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		White on Blue	24 x 24

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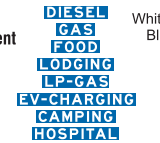
E Series

No.	Drawing	Color	Use & Size
E1-5aP		Black on Yellow	E, F 72 x 30
E1-5bP		Black on Yellow and White on Green	E, F Var. x 54
E1-5P		White on Green	E, F Var. x 30
E1-6		White on Green	RA 36 x 18
E3-X1		White on Blue	E, F 90 x 16
E5-1		White on Green	E 72 x 60
E5-1a		White on Green	E, F 72 x 60 For one digit only
E5-1b		White on Green	E, F Var. x 84 For two or more digits
E5-1bP		White on Green	E, F 42 x 30
			E, F 72 x 30
			E, F 120 x 30

No.	Drawing	Color	Use & Size
E10-1 Motorist Services		White on Blue	E, F 144 x 84 Variable legends. Overlays may be used.
E10-1 Supplement		White on Blue	Var. x 12 Overlays for use on E10-1
E10-3		White on Blue	E, F 120 x 48 E, F 132 x 48
E10-4 (R or L)		White on Blue	78 x 36
E10-5 (R &/or L)		White on Blue	RA 48 x 12
E10-6 (R &/or L)		White on Blue	RA 48 x 12
E10-7 (R &/or L)		White on Blue	RA 48 x 12
E10-8 (R or L)		White on Blue	RA 48 x 12
E10-9 (R &/or L)		White on Blue	RA 48 x 12
E10-10 (R &/or L)		White on Blue	RA 48 x 12
E10-11 (R &/or L)		White on Blue	RA 48 x 12

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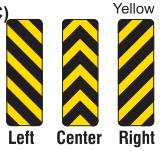
E Series

No.	Drawing	Color	Use & Size
E10-12 (R &/or L)		White on Blue	RA 48 x 12
E10-13 (R or L)		White on Blue	RA 48 x 12
E11-1b	ONLY	Black on Yellow	CR-ML 42 x 14 E, F 52 x 16
Overlay			
E11-2	LEFT	Black on Yellow	CR-ML 44 x 16 E, F 54 x 18
Overlay			
E11-X2	PROHIBITED VEHICLES	White on Red	M 114 x 10 CR-SL 150 x 14 CR-ML 150 x 14 E, F 186 x 16
Overlay			
E13-1P	35 MPH	Black on Yellow	E, F 72 x 24

X Series

No.	Drawing	Color	Use & Size
X1-1		Black on White	60 x 36
X1-2		Black on White	60 x 36
X1-3		Black on White	24 x 18
X1-5		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		Green on White	9.5 x 12.75
X3-2		Black on White	12 x 8
X3-3 Scenic Easement Marker		Green on White	9.5 x 12.75
X3-4		Black on White	12 x 8
Used for scenic easement			
X3-6a		Black on Yellow	18 x 12
X4-2 Type 1 Object Marker		Yellow on Black or Yellow Yellow w/o Buttons	18 x 18

No.	Drawing	Color	Use & Size
X4-3 Type 2 Object Marker		Yellow	6 x 12
X4-4 (R, L, or C) Type 3 Object Marker		Black on Yellow	12 x 24 * CR-SL 12 x 36 CR-ML 12 x 36 E, F 18 x 36 12 x 12 ** 12 x 18 ** 18 x 18 **
* 12 x 24 (center) shall only be used on exit gores of interchange ramps for snowplow operations. ** Guardrail approach ends			
X4-5 Snowplow Marker		Black on Yellow	6 x 12
Raise Blade shown			
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		Red on Black or Red Red w/o Buttons	18 x 18
Used for end of roadway			
X4-12a Bridge Number		Black on White	6 x 15 * 6 x 18 **
* 4-digit ** 5-digit			
X4-13 Cylinder Style Delineator		White or Yellow on Black	9 - 12 high 6 - 8 diameter

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X Series

No.	Drawing	Color	Use & Size
X4-24 Fire Hydrant Marker		Red on White	8 x 12 12 x 18
X5-1		White on Green	12 x 6
X5-2		Black on Yellow	8 x 9

No.	Drawing	Color	Use & Size

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9.5 Uniform Pay Item Designation

Uniform Pay Item Designation

General

Since about 2000, the Special Provision boilerplates have followed a uniform pay item numbering convention. This consistent convention has helped the Department to maintain a higher level of quality by providing a simple way to determine the correct units for a particular work task. As we update to the 2018 Standard Specifications for Construction, we intend to roll this same numbering convention into the spec book. This will allow for a higher degree of quality, in addition to making our estimating and specification updating more consistent moving forward.

Impacts

Short-term impacts as a result of this change (in addition to those resulting from updating the specifications) should be minimal for most functional group and specialty offices. Long-term results will include easier updates of the spec book from the Special Provisions, as the pay items will already be consistent. This change will also create a more uniform bid history and limit some of the wholesale changes that we have seen in the recent past. In essence, we will have a planned and uniform method for adding and incorporating pay items based on their numbering.

Convention

The specific numbering convention that we are adopting is in the following table. Please note: pay items with a .6XX numbering convention are for our Special Provisions, while pay items with a .5XX numbering convention are for our Standard Specifications for Construction.

Special Provision Numbering	Standard Specification Numbering	Unit Description	Plan Unit Description
.601	.501	Lump Sum	LUMP SUM
.602	.502	Each	EACH
.603	.503	Linear Foot	LIN FT
.604	.504	Square Yard	SQ YD
.605	.505	Acre	ACRE
.606	.506	Gallon	GALLON
.607	.507	Cubic Yard	CU YD
.608	.508	Pound	POUND
.609	.509	Ton	TON
.610	.510	Hour	HOUR
.611	.511	Day	DAY
.612	.512	Week	WEEK
.613	.513	Unit Day	UNIT DAY
.614	.514	Structure	STRUCTURE
.615	.515	Assembly	ASSEMBLY
.616	.516	System	SYSTEM

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Special Provision Numbering	Standard Specification Numbering	Unit Description	Plan Unit Description
.617	.517	Square Foot/Day	
.618	.518	Square Foot	SQ FT
.619	.519	Road Station	ROAD STA
.620	.520	Yard	
.621	.521	Dollar	DOLLAR
.622	.522	Thousand Board Feet	MBM
.623	.523	Thousand Gallons	M GALLON
.624	.524	Tree	TREE
.625	.525	Shrub	SHRUB
.626	.526	Vine	VINE
.627	.527	Plant	PLANT
.628	.528	Signal System	SIG SYS

For More Information

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