

Freeway Signing Plan Design Course Manual

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Office of
Traffic,
Safety
and Technology



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1. INTRODUCTION

1.1 Background

This Freeway Signing Plan Design Manual has been developed to provide training to traffic personnel to acquire basic design skills in assembling freeway signing plans. This two-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 sixteen (16) chapters that contain the following information:

- ✓ Chapter 1 – Introduction
- ✓ Chapter 2 – General Principals of Traffic Signing
- ✓ Chapter 3 – Regulatory Signs
- ✓ Chapter 4 – Warning Signs
- ✓ Chapter 5 – Guide Signs
- ✓ Chapter 6 – Traffic Engineering Manual (TEM) Chapter 6
- ✓ Chapter 7 – 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 8 – Signing Plan Sets
- ✓ Chapter 9 – Freeway Sample Plan (Urban)
- ✓ Chapter 10 – Freeway Sample Plan (Rural)
- ✓ Chapter 11 – Bridge Mounted Sign Cross Section Example
- ✓ Chapter 12 – Type OH Structure Design
- ✓ Chapter 13 – Type A Sign Structure Design Steps
- ✓ Chapter 14 – Sign Symbols Overview
- ✓ Chapter 15 – Post Sizing & Post Length Determination Charts
- ✓ Chapter 16 – 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 Freeway Signing Plan Design Course, participants will obtain the basic skills in assembling signing plans for freeways, including expressway interchanges. The Traffic Engineering Manual (Chapter 6) and MN MUTCD 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 Freeway Signing Plan Design 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

The screenshot shows the Minnesota Department of Transportation website. The main navigation bar includes 'Traffic Engineering Home', 'Publications', 'Training', 'Organizations', and 'Contacts'. The 'Traffic Engineering' section is active. On the left, there is a 'What we do' section. The main content area is titled 'Engineering solutions for traffic safety' and contains a list of links: Approved products, Bicycling, Cable median barriers, Corridor modeling, Guidestar, Intelligent Transportation Systems (ITS), Lighting, Pavement markings, Pedestrians, Reduced Conflict Intersections, Roundabouts, Rumble strips and stripes, Signals, Signing (highlighted with a red arrow), Speed limits, Temporary pedestrian access routes, Tort claims, Traffic safety, Traffic topics webinars, Training, Trivia and facts, and Work zones. To the right, there is a 'A multi-disciplinary approach' section with a 'TOWARD ZERO DEATHS' graphic and a list of services: Education, Enforcement, Emergency services, and Engineering.

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 screenshot shows the Minnesota Department of Transportation website's 'Signing' page. The main navigation bar is the same as in Exhibit 1-1. The 'Traffic Engineering' section is active. The 'Signing' section is highlighted. On the left, there are sections for 'Products and services' (Publications, Plans and special provisions, Training) and 'For more information' (Frequently asked questions about road signs, Logo signs, Reservation road signs and casino signing, State Sign Shop, Billboards, Campaign signs, advertising and other objects within highway right of way). The main content area is titled 'How do I get a traffic sign installed or fixed?' and includes a 'State highways' section with a table of sign types: Minnesota Hwys (blue square), Interstate Hwys (blue shield), and U.S. Hwys (white square with black border). Below the table, there is an 'Other questions?' section with contact information for Heather Lott, State Signing Engineer.



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 \(www.dot.state.mn.us/trafficeng/signing/plans.html\)](http://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
- ✓ Placement details
- ✓ Structural details

2. GENERAL PRINCIPALS OF TRAFFIC SIGNING

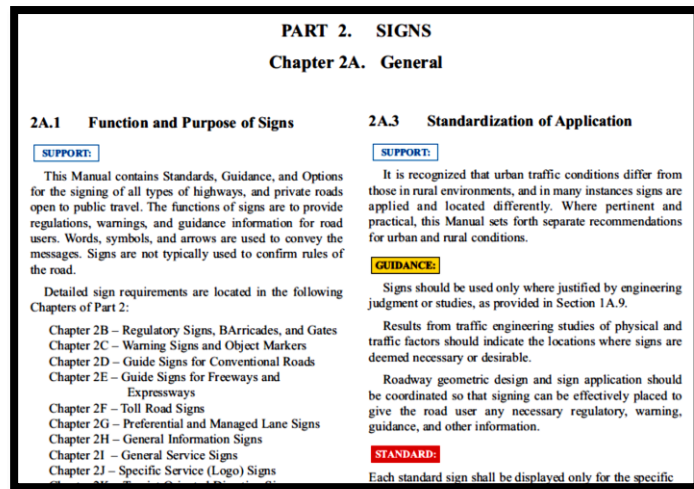
2.1 Minnesota Manual on Uniform Traffic Control Devices

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



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 7 of this manual.



2.2 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.

2.3 Traffic Engineering Manual

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



The TEM contains 14 chapters. Chapter 6 is related to Traffic Signs (see Exhibit 2-3). The most current version of the TEM can be found at:

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

Exhibit 2-3 MnDOT Traffic Engineering Manual (TEM)



Chapter 6 of the TEM related to Traffic Signs

May 2015	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
- ✓ 6-11.0 References

Pertinent section/pages of the TEM are included in Chapter 6 of this manual.



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 6 of this manual (Page 6-11).



2.7 Plan Set Sign Symbols

Typical technical symbols used for plan sets are shown in the Chapter 14.

2.8 Overhead Sign Installation

The information in this section is information found in the MN MUTCD 2A.17.

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

Supporting information states, 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.

The following options (in no particular order) may be considered in an engineering study to determine if OH 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 ground-mounted signs
- l) Junction of two freeways
- m) Left exit ramps

The use of over-crossing structures (bridges) may serve as the support for OH signs, and in some cases, may be the only practical solution.

2.9 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.

2.10 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.

2.11 Sign Lighting

Generally, overhead 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 6. In addition, see Chapter 10 of the TEM for information on Roadway Lighting (not included in this manual).

2.12 Lateral Offset

2.12.1 General

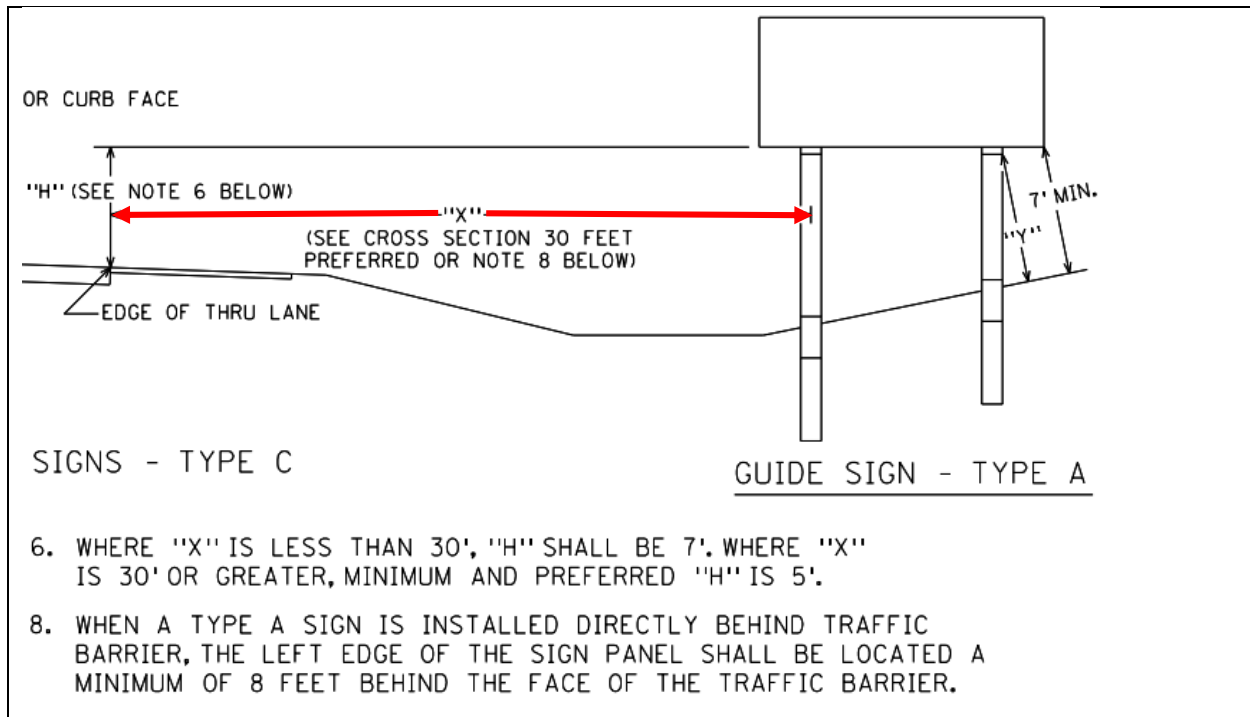
Information on lateral clearance can be found in the MN MUTCD 2A.19 and the TEM Chapter 6. In general, all supports should be located as far as practical from the edge of the shoulder. Advantage should be taken to place signs behind existing roadside barriers, on over-crossing structures, or other locations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

2.12.2 Type A Signs

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 2-4**.

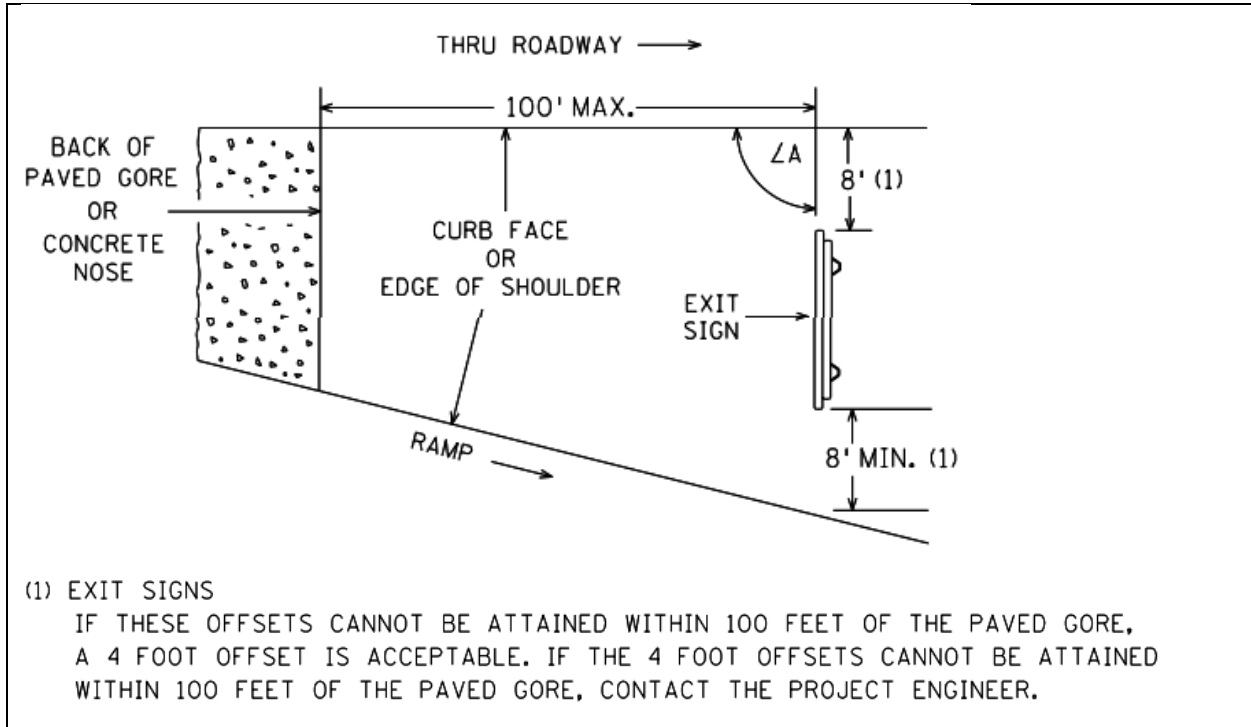
Exhibit 2-4 Type A Sign Lateral Offset



2.12.3 Exit Signs

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 2-5**.

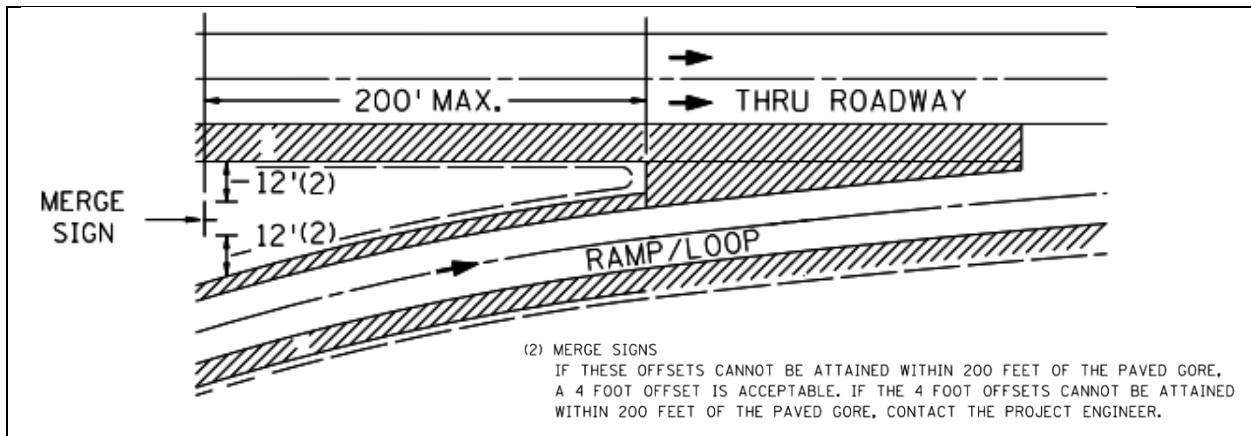
Exhibit 2-5 Exit Sign Lateral Offset



2.12.4 Merge Signs

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**

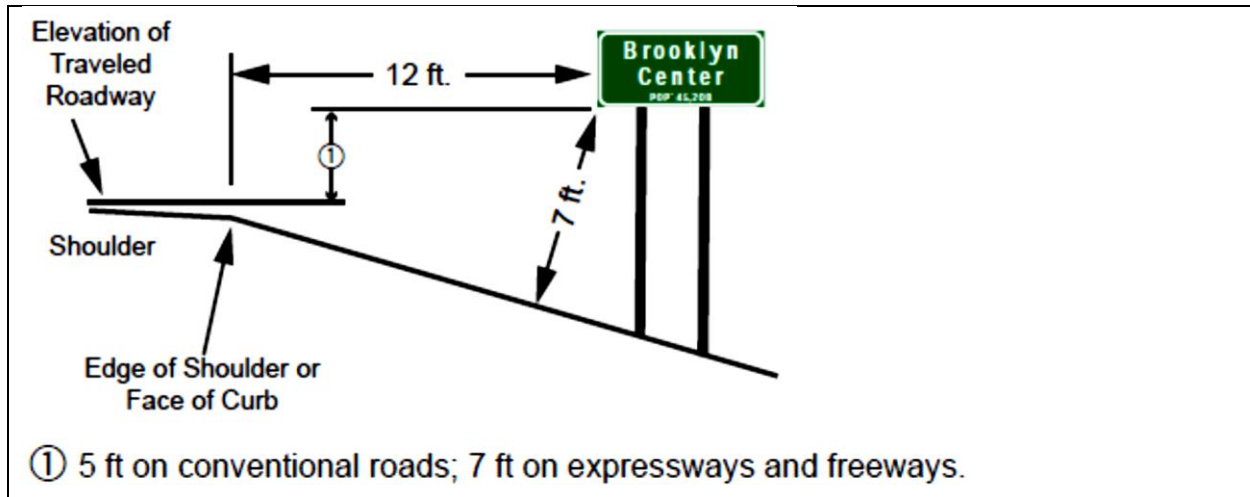
Exhibit 2-6 Merge Sign Lateral Offset



2.12.5 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 2-9](#).

Exhibit 2-7 Type C and D Lateral Offset Example



2.12.6 Type OH Sign

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.

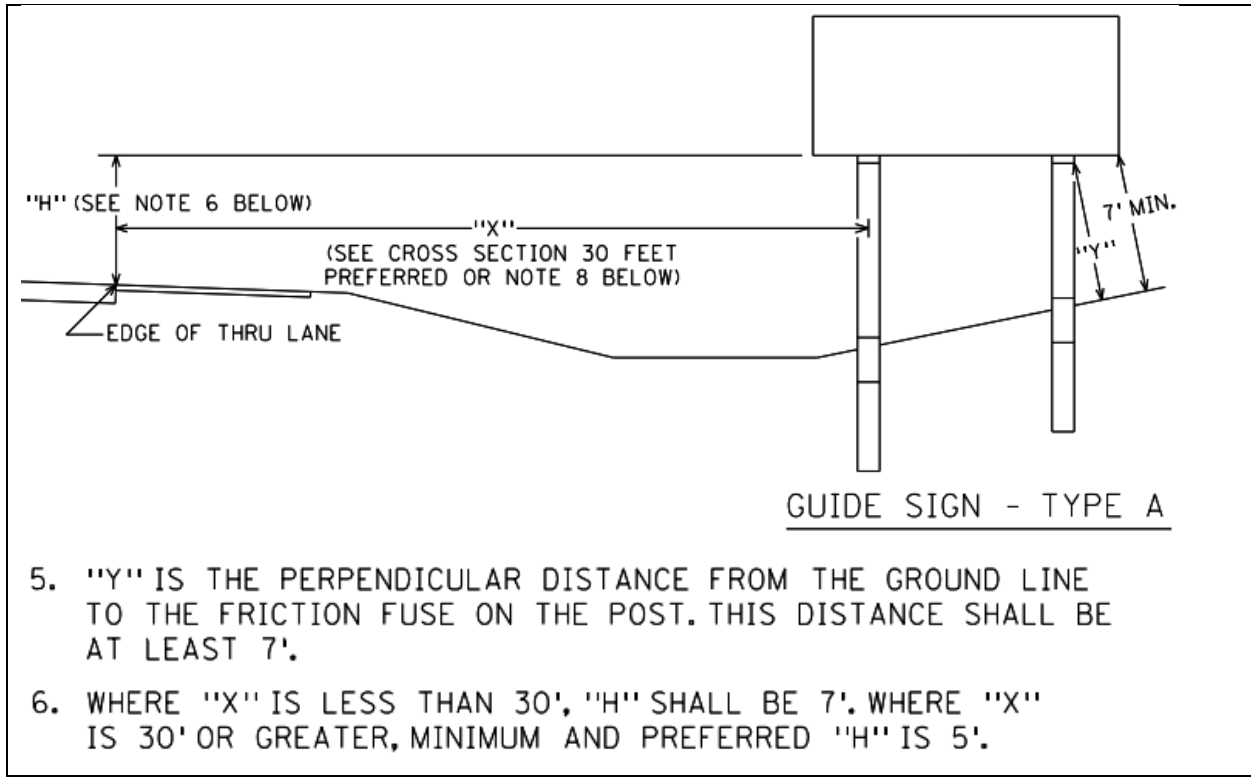
The lateral offset of sign posts is normally 7.5 feet from the edge of shoulder or the face of curb to the center of the post. Post locations and guardrail requirements will be in accordance with the current edition of the Road Design Manual.

2.13 Mounting Height and Vertical Clearance

2.13.1 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 2-8](#).

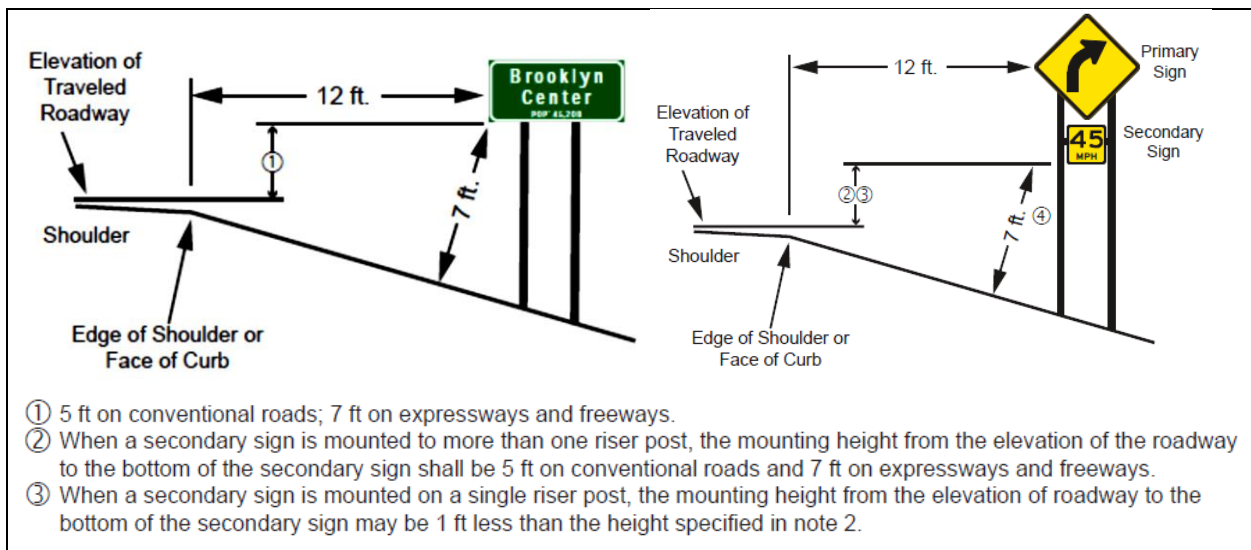
Exhibit 2-8 Type A Sign Vertical Clearance



2.13.2 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 2-9.

Exhibit 2-9 Type C and D Lateral Offset Example





2.13.3 Type OH Sign

The minimum vertical clearance over the high point of the roadway or mountable curb shall be 17.33 feet. In addition, per MN MUTCD 2A.18, 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.

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.

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 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 6).

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.

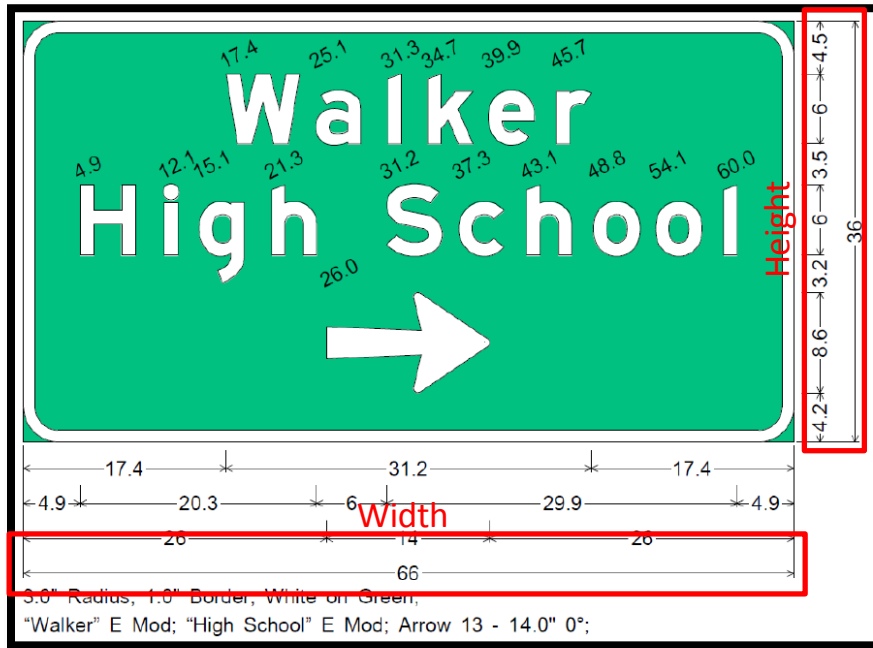
On a sign assembly with three or more riser posts, the posts and knee braces shall be spaced at least 45 inches on centers.

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 2-10**). 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 2-10**). There is one sign in this example that is 36” high.

Exhibit 2-10 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 2-11**). 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 2-12** 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 2-13**). 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 2-11 Example use of Chart 6.2 from TEM

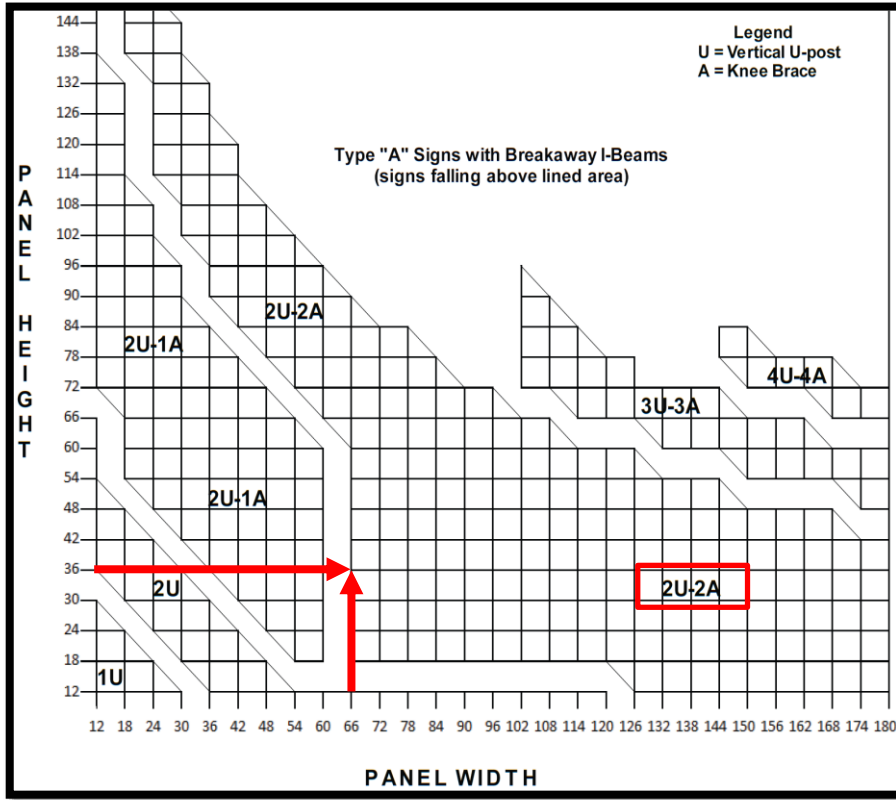


Exhibit 2-12 Example of 2 Vertical Posts and 2 Knee Braces (including Stringers)

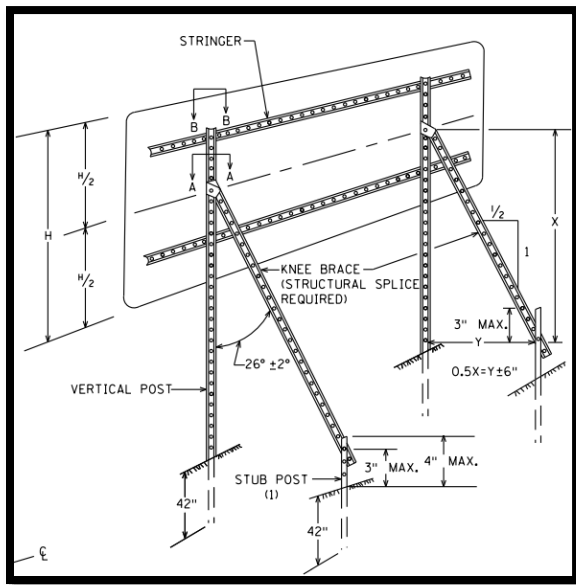




Exhibit 2-13 Example from Chart 6.3 of the TEM

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

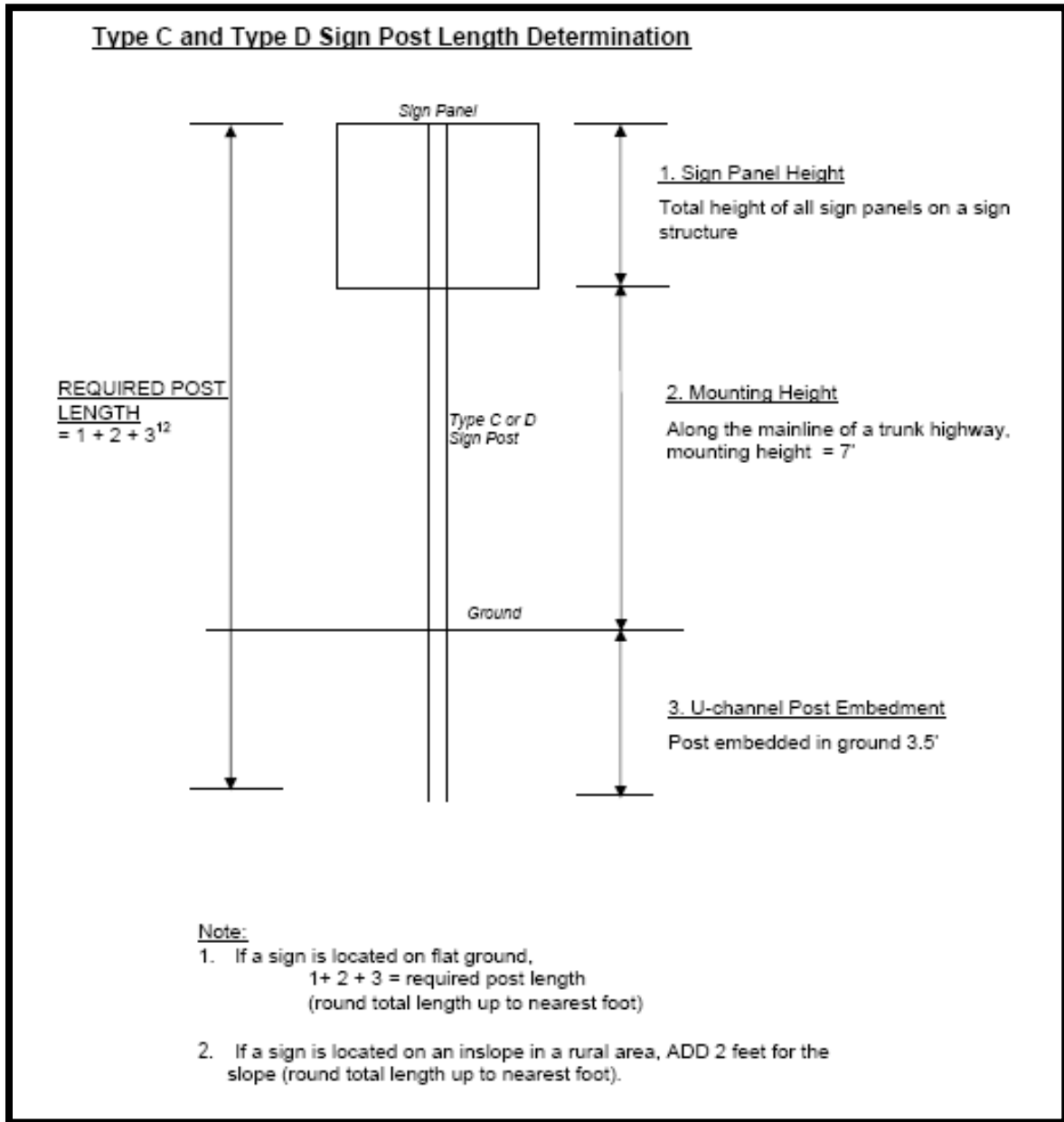
Use this chart if punch codes cannot be found in the Standard Signs Manual.

2.14.5 Post Length Determination

The post length determination is show in [Exhibit 2-14](#). 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 2-14 Post Length Determination





MnDOT Freeway Signing Plan Design Course Manual

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3. REGULATORY SIGNS

3.1 Overview

In this chapter, an overview of regulatory signs is presented. Additional detailed information is included in the TEM and MN MUTCD included as handouts in Section 6 and 7 of this manual.

3.2 Application of Regulatory Signs

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

Regulatory signs shall be retroreflective 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.

3.3 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.

3.4 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 7-16 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.

3.5 Speed Limit Sign

Speed limit information can be found in the TEM section 6-5.13 (refer to Chapter 6 of this manual).

Highlights from the section include:

- ✓ 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.

3.6 Minimum Speed Limit Sign

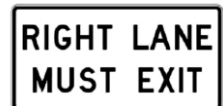
From the TEM:

- ✓ This sign shall be used on all freeways designated as interstates.
- ✓ The sign should be 40 mph unless a traffic investigation identifies a unique traffic patten justifying a different value.
- ✓ The sign shall be omitted whenever there are warning signs with advisory speeds advising motorists of a value lower than the minimum, and resume after the hazard is passed.
- ✓ Signs should be installed downstream of all entrance ramps.
- ✓ If spacing cannot be met due to high sign density, the sign should be placed at the first available location
- ✓ Rural Interstates
 - Use the 48" x 96" sign
 - The speed limit shall be 70 mph
 - Spacing b/w signs shall not exceed 10 miles
 - Install downstream of all entrance ramps
- ✓ Urban Interstates
 - The speed limit shall not exceed 70 mph
 - An R2-1 sign may be used if a traffic investigation determines min speed limit is not required

3.7 Right (Left) Lane Must Exit Sign

Information can be found in Section 2B.23 of the MN MUTCD. Details include:

R3-33



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

3.8 Mandatory Movement Lane Control Signs

Information can be found in Section 2B.20 of the MN MUTCD.



- ✓ The R3-33 sign (see the previous section) is preferred.
- ✓ The RIGHT LANE MUST EXIT (R16-x7) sign may be used if there are width restrictions or for existing poles.
- ✓ As with the R3-33, this may be used in advance of an exit ramp, in a lane drop situation, where there is no escape lane provided.
- ✓ This sign may be needed in addition to the black and yellow EXIT ONLY signs.

3.9 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.

3.10 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.



3.11 Selective Exclusion Signs

From the MUTCD Section 2B.39, there are multiple Exclusion Signs. Of importance:

- ✓ Minnesota has adopted the PEDESTRIANS BICYCLES MOTORIZED BICYCLES NON-MOTORIZED TRAFFIC PROHIBITED (R5-10d) as a separate variation which shall be used on all exit ramps from freeways and controlled access expressways.
- ✓ This sign shall be installed between the DO NOT ENTER sign and the WRONG WAY sign
- ✓ If an exclusion is governed by vehicle weight, a Weight Limit sign (see Section 2B.49) should be used instead of a Selective Exclusion sign.

3.12 ONE WAY Signs

From the MN MUTCD, Section 2B.40 (Also refer to the TEM Figure 6.12 on page 6-43 of this manual):

- ✓ 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.

Select figures from the TEM.

3.13 Emergency Restriction Signs

From the MN MUTCD:

- ✓ The Freeway Entrance Ramp Information sign (R16-X4) shall be used on all freeway entrance ramps near the beginning of the ramp.
- ✓ The Emergency Parking (Stopping) Only sign may be used to discourage or prohibit shoulder parking





4. WARNING SIGNS

4.1 Overview

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

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

4.2 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.

4.3 Horizontal Alignment Warning Sign

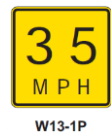
A Standard in the MN MUTCD Section 2C.6 states:

- ✓ 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 7-40 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.

4.4 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 (Page 6-31 of this manual). Highlights from the TEM are:

- ✓ 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.

4.5 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:

- ✓ 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.
- ✓ The handout on the following page is an Official MUTCD Interpretation from FHWA regarding the use of Horizontal Alignment Signs on exit ramps.
 - Exit ramps with deceleration lanes may not (with engineering judgment and documentation) necessarily require all the horizontal alignment signs as shown in MUTCD Table 2C-5. Each ramp should be evaluated as suggested in the Interpretation to prevent unnecessary costs and sign clutter.



W1-8

4.6 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.

4.7 Freeway or Expressway Ends Signs

Information on these signs are in MN MUTCD Section 2C.24.

4.8 Merge Sign and Added Lane Sign

Information on Merge signs can be found in MN MUTCD Section 2C.40 and on Added Lane Sign in MN MUTCD Section 2C.41. Merge signs are used on all entrance gores of interchanges in Minnesota which are a merge condition.



W4-1

The Added Lane Sign is used on entrance gores of interchanges which are an added lane (for lane adds that are approximately 1/2 mile or more). The TEM illustrates these uses in Figures 6.34A-D.



U.S. Department
of Transportation
Federal Highway
Administration

Memorandum

Subject: INFORMATION: 2(09)-17 (I) – Determination
of Speed Differential for Exit Ramps

Date: **SEP 22 2011**

From: *Mark R. Kehrli*
Director, Office of Transportation Operations

In Reply Refer To:
HOTO-1

To: Mr. Derrell E. Turner
Division Administrator (HDA-MN)
Saint Paul, MN

We have reviewed the e-mail dated September 2 from Mr. Will Stein of your office requesting an official interpretation regarding the applicability of Table 2C-5 in the 2009 MUTCD to exit ramps where a parallel deceleration lane is available to exiting drivers.

It is our official interpretation of Paragraph 2 of Section 2C.06 that highway agencies have the flexibility to use, based on engineering judgment, the approach speed in the parallel deceleration lane as it approaches the exit ramp curve, rather than the speed of the mainline freeway lanes, when applying Table 2C-5. Our reasoning for this interpretation is as follows.

Table 2C-5 (Horizontal Alignment Sign Selection) requires and recommends various types of horizontal alignment signing based upon the difference between the speed limit and the advisory speed. On June 2, 2010, the FHWA issued Official Ruling 2(09)-2 (I) that was based on the text of Paragraph 2 of Section 2C.06. In that interpretation, we established that the column heading in Table 2C-5 of “Difference Between Speed Limit and Advisory Speed” means the difference between the speed (posted or statutory speed limit, 85th-percentile speed, or prevailing speed) on the tangent approach to the curve and the advisory speed for the curve. Furthermore, we also stated that highway agencies have the flexibility to determine, based on engineering judgment, which speed value to use for the tangent approach to a horizontal curve (posted or statutory speed limit, 85th-percentile speed, or prevailing speed) when applying Table 2C-5 to a particular horizontal curve.

We recognize that there is a difference in driver expectation between a horizontal curve on a section of roadway and a horizontal curve on an exit ramp just beyond the theoretical gore when a parallel deceleration lane is present. A driver might be surprised to encounter a horizontal curve on an otherwise straight section of roadway and therefore might need additional warning in advance of the curve and within the curve, especially if the advisory speed for the horizontal curve is significantly lower than the prevailing speed on the tangent approach to the curve. On the other hand, a driver exiting a freeway or expressway onto an exit ramp via a parallel deceleration lane expects that a change in speed and alignment will be necessary and is usually

prepared to make those adjustments. Highway agencies can also install Exit Speed (W13-2) and Ramp Speed (W13-3) signs, even where not required or recommended in Table 2C-5, to give exiting drivers additional information about the severity of the exit ramp curvature.

Additionally, the purpose of a parallel deceleration lane is to provide exiting drivers with an opportunity to slow down to a more reasonable speed for the ramp prior to reaching the theoretical gore. The AASHTO design criteria for determining the length of a parallel deceleration lane are based on the need to decelerate from the highway design speed to the design speed of the ramp. Therefore, it might not be appropriate to use the posted speed limit on the mainline roadway from which the driver is exiting when applying Table 2C-5 to horizontal curves on exit ramps that are just beyond the exit gore.

Highway agencies should evaluate the design of the deceleration lane and the severity of the ramp curve to make an engineering judgment regarding the speed of vehicles in the deceleration lane as they approach the ramp curve, and use the differential between that speed and the advisory speed of the ramp curve in applying Table 2C-5. It may also be feasible to conduct a spot speed study to determine actual deceleration lane speeds at the theoretical gore. In either case, the basis for determining the deceleration lane speed on the approach to the ramp curve should be documented.

For recordkeeping purposes, we have assigned this official interpretation the following number and title: “2(09)-17 (I) – Determination of Speed Differential for Exit Ramps.” Please refer to this number and title in any future correspondence regarding this topic. If you have further questions, please contact Mr. Eric Ferron at 720-963-3206 or at eric.ferron@dot.gov.

HANDOUT

HANDOUT

HANDOUT

HANDOUT



5. GUIDE SIGNS

5.1 Purpose

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

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

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

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

5.2 Route Signs

Route signs include the following:

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

5.3 Auxiliary Signs

Auxiliary signs include the following:

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



5.4 Wrong Way Signs

Section 2E.53 of the MN MUTCD refers back to Section 2B.41 for information regarding the use of regulatory signs to deter wrong-way movements at intersections of freeway or expressway ramps with conventional roads and in the area where entrance ramps intersect with the mainline lanes.

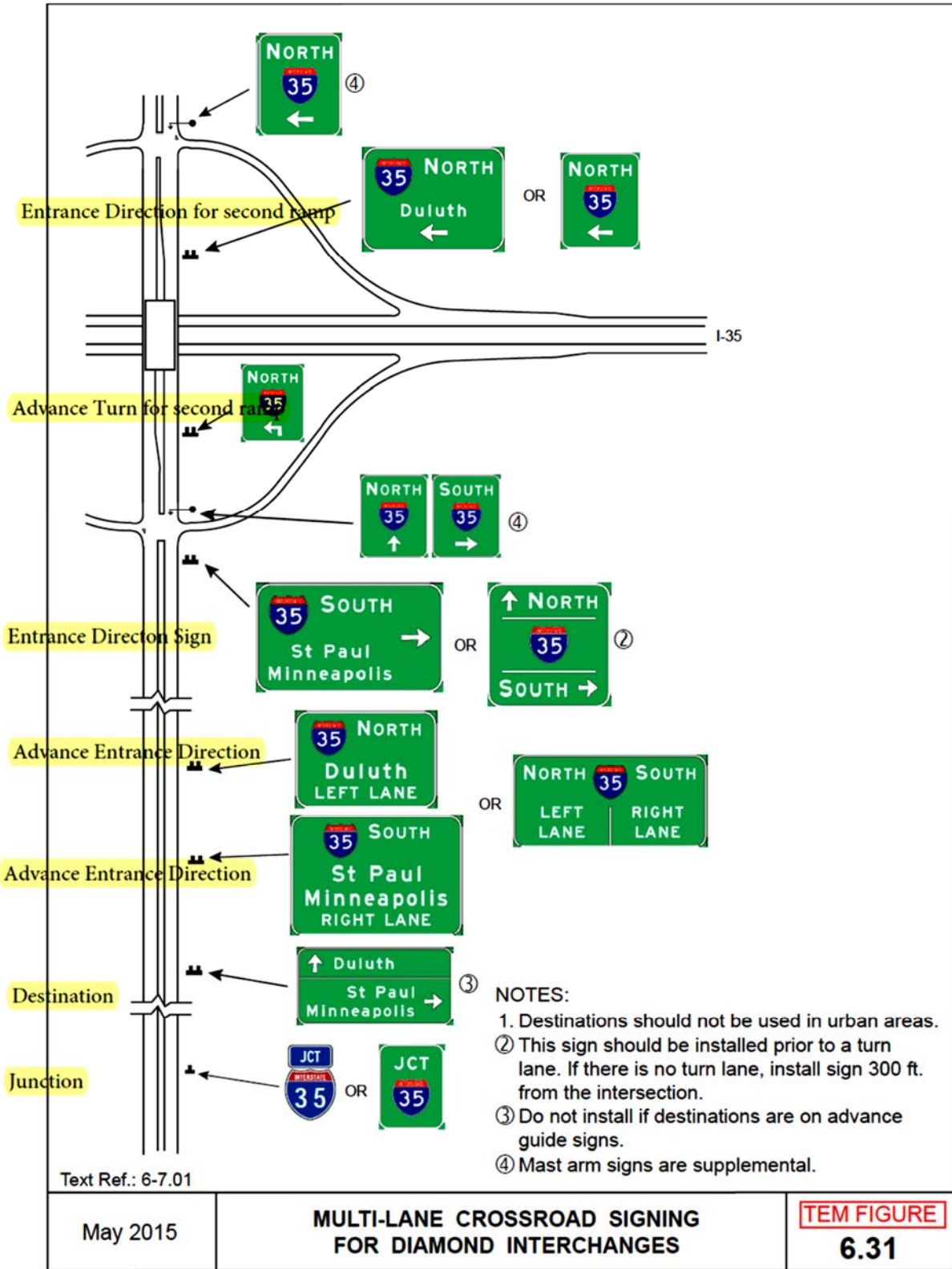
Section 2D.46 contains information regarding the use of a Directional assembly or a guide sign to mark the entrance to a freeway or expressway from a conventional road.

5.5 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 5-1** includes text tags (highlighted) on TEM Figure 6.31 pointing out which signs are which under the MNMUTCD language in Section 2D.45.



Exhibit 5-1 TEM to MN MUTCD Sign Type Cross Reference



5.6 Supplemental Signs and Costs

In order for a facility to receive supplemental guide signing, the sign location must meet engineering standards and the facility must meet MnDOT policy.

5.6.1 Supplemental Guide Signing

Supplemental Guide Signs - Guide signs which further orient the driver to geographical identification and secondary destinations. Destinations include cities, motorist services, and state parks. Exit numbers are included on interstate freeway signs. See **Exhibit 5-2** for some examples.

Exhibit 5-2 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:

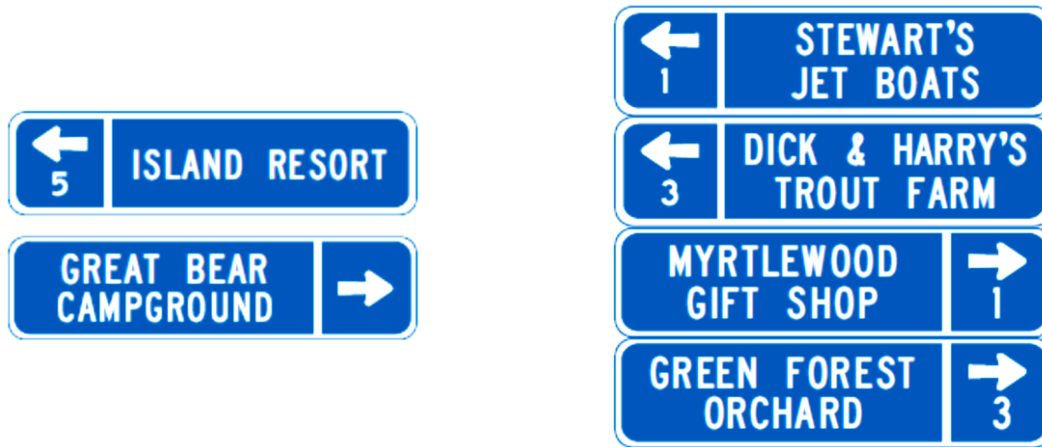
1. Geographical features, such as county lines, incorporated city limits, major river and stream crossings, highways and streets crossed by the freeway, and similar features which provide orientation for the driver.
2. A city in each direction along the intersected route.
3. National parks.
4. National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

5.6.2 Tourist-Oriented Directional Signs

Tourist-oriented directional signs and Specific Service signs are not considered advertising; rather they are classified as motorist service signs. The policy for Specific Service Signing on state highways as established in State Statutes 160.292 through 160.296 is contained in the TEM Chapter 6, Section 6-7.04.04. In addition, they are included in Chapter 2K of the MN MUTCD.

Exhibit 5-3 Sample Tourist-Oriented Directional Signs



5.6.3 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 5-4 Sample General Motorist Service Sign



5.6.4 LOGO (Specific Service)

Logo signs shall be defined as guide signs that provide road users with business identification and directional information for services and for eligible attractions. Eligible service categories shall be limited to gas, food, lodging, camping, attractions, and 24-hour pharmacies.

The Minnesota Sign Franchise Program, which allows for the installation and maintenance of Logo Signs was established by Minnesota Statute 160.80 in 1984. This sign franchise program is in general conformance with the Specific Service Signing guidelines in the Federal MUTCD. Eligibility criteria for gas, food, camping and lodging businesses, and 24-hour pharmacies are contained in Minnesota Statute 160.80.

Qualified requester shall pay for these types of signs.

Exhibit 5-5 Sample Logo (Specific Service) Sign



5.6.5 Major Traffic Generator

Supplemental guide signs may be provided to direct motorists to major traffic generators. These traffic generators are major regional attractions, events, or facilities which attract persons or groups from beyond a local community, city, or metropolitan area. They are significant because of their unique educational, cultural, historical, or recreational experience and public appeal. Predominantly retail, business, or manufacturing centers are not normally eligible for guide signing.

Major Traffic Generator signs may be installed on all trunk highways. In order to be considered for signing, all of the following criteria shall be met by the major traffic generator requesting signing:

- ✓ Parking for at least 1,000 vehicles.
- ✓ A minimum of ten events per year.
- ✓ Average event attendance of at least 5,000 persons.
- ✓ Located within ten miles of the trunk highway interchange/intersection where signs are requested.

Qualified requester shall pay for these types of signs.

Exhibit 5-6 Sample Major Traffic Generator Sign



Other major generators may include the following:

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

5.6.6 Minor Traffic Generators

Minor traffic generators are facilities which generally attract non-local persons or groups unfamiliar with the location of the generator but which do not qualify as major traffic generators. The use and installation of highway signing shall be limited to only those generators which have broad motorist appeal, serve non-familiar motorists, or are the kind of facility for which a motorist normally expects highway signing.

Refer to the TEM Section 6.07.09.11 for additional details.

Exhibit 5-7 Sample Minor Traffic Generator Sign



5.7 Supplemental Sign Handouts

The following is a handout from Appendix A of the TEM Chapter 6. The latest version can be downloaded from, www.dot.state.mn.us/trafficeng/publ/index.html.

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Supplemental Guide Signing Programs

In order for a facility to receive supplemental guide signing, the sign location must meet engineering standards and the facility must meet MnDOT policy.

Engineering Standards

Engineering standards involve the design and placement of signs. The main purpose of signing is to inform motorists of regulations such as speed limits and stops, warn them of any impending dangers such as sharp curves and steep grades, and help them find their destination by clearly marking routes and cross streets. Signs must be properly spaced so that motorists have time to perceive the information on signs and make the appropriate driving maneuver. For example, on a freeway, guide signs should be spaced approximately 800 feet apart.

Furthermore, different types of signs (regulatory, warning, and guide) can not be combined. For example, mixing a golf course sign with a speed limit sign is not allowed. This leaves limited space for supplemental guide signs.

MnDOT Policy

There is tremendous demand for signing along our highway system; many businesses, organizations and agencies feel that they need and deserve signing to advertise, inform and/or aid the motorist in locating their establishment. As discussed under engineering standards, it is necessary to limit all signing to only that which is sufficient to aid drivers in safely arriving at their destination. As such, MnDOT policy and state law set out criteria that a facility must meet in order to be eligible for signing.

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LOGO



- Gas, food, lodging, camping, 24-hour pharmacies and attractions.
- Signs may be installed on interstates and certain other controlled-access (freeway) highways.
- Each facility must meet certain criteria related to hours of operation, licensing, distance from interchange, etc.
- The cost of fabrication, installation, and maintenance are paid by the business.
- This program is managed by Minnesota Logos, Inc. under an agreement with MnDOT.

General Motorists Services

- Gas, food, lodging, camping and hospitals.
- Signs may be installed at rural freeway and expressway interchanges.
- Each facility must meet certain criteria related to hours of operation, licensing, distance from interchange, etc.
- The cost of fabrication, installation, and maintenance are paid by MnDOT. MnDOT provides trailblazing signs.



Major Traffic Generators

- Major regional attractions that attract persons or groups beyond the local area.
- Facilities must have parking for at least 1,000 vehicles, a minimum of 10 events per year, and average event attendance of at least 5,000 persons.
- Signs may be installed on any trunk highway.
- The cost of fabrication, installation, and maintenance of these signs are paid by the traffic generator. Trailblazing must be provided by the facility or local road authority.



Other Traffic Generators

- Include Airports, Casinos, Educational Institutions, National Parks, Regional Shopping Centers, and State Parks. Criteria vary.
- Signs may be installed on any trunk highway.
- The cost of fabrication, installation, and maintenance of these signs are paid by the traffic generator. Trailblazing must be provided by the facility or local road authority.



Minor Traffic Generators

- Facilities that generally attract non-local persons or groups, but do not qualify as major generators. These facilities should have broad motorist appeal, serve non-familiar motorists, and are the type of facility for which a motorist normally expects highway signing.
- Facilities are typically cultural, recreational, or historic attractions.
- Facilities must meet certain criteria related to hours of operation, etc.
- These signs may be installed at at-grade interchanges and some expressway interchanges.
- The cost of fabrication, installation, and maintenance of these signs are paid by the traffic generator. Trailblazing must be provided by the facility or local road authority.



Specific Services

- Gas, food, lodging, places of worship, rural agricultural businesses and tourist-oriented businesses.
- The criteria for installation of these signs (hours, types of businesses, etc.) are primarily defined in Minnesota Statutes 160.292 – 160.297.
- These signs can only be installed in rural areas at at-grade interchanges 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.



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MnDOT Supplemental Guide Signs Appendix A



www.dot.state.mn.us/trafficeng/signing/publications.html

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APPENDIX A SUPPLEMENTAL GUIDE SIGNS

In order for a facility to receive supplemental guide signing, the sign location must meet engineering standards and the facility or business must meet the criteria set forth in this appendix.

Engineering standards involve the design and placement of signs. The main purpose of signing is to inform motorists of regulations such as speed limits and stops, warn them of any impending dangers such as sharp curves and steep grades, and help them find their destination by clearly marking routes and cross streets. Signs must be properly spaced so that motorists have time to perceive the information on signs and make the appropriate driving maneuver. For example, on a freeway, guide signs should be spaced approximately 800 feet apart. Furthermore, different types of signs (regulatory, warning, and guide) cannot be combined. For example, mixing a golf course sign with a speed limit sign is not allowed. This leaves limited space for supplemental guide signs.

There is tremendous demand for signing along our highway system. Many businesses, organizations, and agencies feel that they need and deserve signing to advertise, inform and/or aid the motorist in locating their establishment. As discussed under engineering standards, it is necessary to limit all signing to only that which is sufficient to aid drivers in safely arriving at their destination. As such, MnDOT policy and state law set out criteria that a facility must meet in order to be eligible for signing.

This appendix is an alphabetized list of various facility types falling into several different signing programs available for signing on MnDOT trunk highways if engineering standards can be met. Unless otherwise indicated, the General Criteria listed below apply to all facilities. In addition to the General Criteria, each facility type is listed with additional details regarding sign design, location from the intersection/interchange, roadway type allowed, and facility specific criteria.

A list of ineligible facilities is at the end of this appendix.

Contents

General CriteriaA-1
Facility Type, Sign Design, Sign Program and Specific CriteriaA-4
Logo Signs.....A-33
Specific Services Signing Program.....A-34
Ineligible Facilities.....A-37

GENERAL CRITERIA

Unless specifically noted under a particular signing program, the following general criteria apply to all of MnDOT's signing programs.

- 1. MnDOT shall fabricate, install, and maintain signs on trunk highways unless otherwise specified by the District Traffic Engineer.
2. The cost of fabrication, installation, and maintenance shall be paid by the requester.
3. Appropriate trailblazing signs shall be the responsibility of the facility and approved by the road authority.
4. Signs shall not be allowed from intersections or interchanges that do not provide the closest or most direct route from a trunk highway to a facility.
5. MnDOT retains the authority to specify message content (including abbreviations), size of sign, sign location, and combination of messages, in accordance with standards for acceptable signing practice.
6. Location and placement of signs is dependent upon space availability as determined by the District Traffic Engineer.
7. Mainline signs shall not be installed for a facility if there is no space available to install signs on the ramp and vice versa.
8. All sign installations on trunk highways shall conform to MnDOT's current sign design and sign sheeting standards.
9. Signs not meeting MnDOT's current criteria shall be removed through attrition.
10. Only one sign per facility may be installed in each direction along a trunk highway.
11. The criteria for installing logos (business panels) on Specific Service and LOGO signs are specified in Section 6-7.09.01 and 6-7.09.02, respectively.

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General Criteria, continued.

12. Pictographs are defined as a pictorial representation used to identify a governmental jurisdiction, an area of jurisdiction, a governmental agency, a military base or branch of service, a governmental approved university or college, a toll payment system, or a government approved institution. They are allowed on certain signs as specifically designated in the MN MUTCD. The following are examples of such facilities allowed:

- Casinos
- Educational Institutions (post-secondary)
- National Parks, National Monuments
- State Parks
- Trail Access

If used, pictographs shall meet the following guidelines:

- a. Pictographs shall not resemble a traffic control device.
 - b. Inappropriate pictographs shall not be permitted.
 - c. There shall be only one pictograph per sign.
 - d. The pictograph shall supplement the text message.
 - e. The pictograph shall not exceed 33 percent of the size of the sign panel.
 - f. The pictograph shall fit within the border of the sign panel. Pictographs shall not be a separate attachment outside the limits of the sign panel.
 - g. The pictograph designs shall be reviewed and approved by the District Traffic Office prior to fabrication.
 - h. The pictograph shall be fabricated on sheet aluminum conforming to MnDOT specification 3352 and installed as an overlay.
13. Signs may be considered on trunk highways that intersect with local roads which serve as logical, primary routes for motorists approaching from other directions.
14. Signs shall not be provided if the facility is readily visible or if effective off right-of-way directional signing is present or can be provided.
15. MnDOT retains the authority to deny requests for signing where acceptable standards cannot be met, including locations where other supplemental guide signs are already in place. At the discretion of

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General Criteria, continued.

the District Traffic Engineer, signing requests denied based on MnDOT policy may be appealed to the External Sign Variance Committee. Requests denied based on Minnesota statutes or engineering standards (i.e. insufficient space and design standards found in the MN MUTCD) may not be appealed.

16. If a district traffic office decides that a contract for signing a minor traffic generator is required, the following process shall be used:
- a. The requester should obtain proposals from at least three consulting engineering firms to prepare the signing contract.
 - b. The requester evaluates the proposals and enters into a contract with one of the consulting engineering firms to provide all of the following:
 - A complete design of a signing plan (including field cross sections if necessary), assembly of special provisions, and proposal. Technical assistance is available from the State Signing Engineer, Office of Traffic, Safety, and Technology (OTST).
 - Submit the plan and proposal to the signing contractors. Typically allow 10 days for the contractor to review and submit bids.
 - Review the bids and award the contract to the signing contractor.
 - Inspect the signing contractor's work with technical assistance provided by MnDOT's district staff.

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MnDOT Freeway Signing Plan Design Course Manual

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Agricultural Equipment	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
Airports	<ul style="list-style-type: none"> D1-X4  I-5  E10-3*  <p>*Modified according to #3 under installation guidelines.</p>	15	15	<ul style="list-style-type: none"> Freeway Expressway Conventional 	<p>In addition to the general criteria for all signing programs, all of the following criteria apply to the Airport Signing Program. In order to be considered for signing, the following criteria shall be met by the requesting facility:</p> <ol style="list-style-type: none"> Private airports requiring owner's permission to use shall not be eligible for signing. Signing from one trunk highway onto a second trunk highway may be allowed if the airport is located within: 10 miles for an Air Carrier/Commercial Service airport, and 7.5 miles for a General Aviation airport. These guidelines may also be applied to heliports. <p>Signs should be installed in accordance with the following:</p> <ol style="list-style-type: none"> Individual airport names may be used on signing, as necessary, to ensure adequate identification for motorists. The AIRPORT (D1-X4) sign with arrow will be adequate for most intersections at which airport signing is permitted. At interchanges, a green version of the E10-3 sign design (with the word AIRPORT or proper name replacing the word HOSPITAL) shall be installed on ramp(s). The D1-X4 sign, or custom guide sign if proper name is used, shall be installed on ramp(s). The message on the ramp sign shall match the message on the mainline sign. Trailblazing signing on local roads, when needed, shall utilize the Airplane Symbol sign (I-5) with appropriate arrow.
AMTRAK/ Train Stations	<ul style="list-style-type: none"> I-7  E10-3*  <p>*Modified according to #3 under installation guidelines.</p>	1	1	<ul style="list-style-type: none"> Freeway Expressway Conventional 	<p>Signs should be installed in accordance with the following:</p> <ol style="list-style-type: none"> Signing from one trunk highway may be allowed if the AMTRAK station is located within 10 miles. At interchanges, a green version of the E10-3 sign design (with the word AMTRAK replacing the word HOSPITAL) shall be installed on the mainline. Ramp signing should be done in accordance with the following. <ol style="list-style-type: none"> If a custom guide sign is used, the message on the ramp sign shall match the message on the mainline sign. If a Federal passenger station symbol sign panel (I-7) is used, it shall have a plaque including the word AMTRAK mounted below it. Trailblazing signing on local roads, when needed, shall utilize the Federal passenger station symbol (I-7) with a plaque including the word AMTRAK mounted below it.

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Amusement Park	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Tourist Oriented Business
	<ul style="list-style-type: none"> Brown Custom Design  	10	10	<ul style="list-style-type: none"> Freeway Expressway Conventional 	See Major Traffic Generator
Antiques/ Gift Shops	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Tourist Oriented Business
Arboretum	<ul style="list-style-type: none"> Brown Custom Design  	3	3	<ul style="list-style-type: none"> Expressway Conventional 	<p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply. The facility should provide:</p> <ol style="list-style-type: none"> Parking for at least 50 vehicles. Walking or driving trails along with viewing facilities. An interpretive program, and/or audio/visual self-guiding presentations.
Archery Range	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Tourist Oriented Business
Attractions	<ul style="list-style-type: none"> Logo Sign  	3	15	<ul style="list-style-type: none"> Freeway 	<p>For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and http://www.dot.state.mn.us/logosigns/</p> <p>For Eligibility Criteria refer to: http://www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf</p> <p>Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.aspx</p>
Bait and Tackle	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Tourist Oriented Business
Bed and Breakfasts	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Motel

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Boat Launch	<ul style="list-style-type: none"> D9-X7  	1	10	<ul style="list-style-type: none"> Expressway Conventional 	See Public Access to Lakes/Rivers
Bookstore	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Tourist Oriented Business
Bus Station	<ul style="list-style-type: none"> I-6  	1	1	<ul style="list-style-type: none"> Expressway Conventional 	See Minor Traffic Generator This facility is a bus terminal with staffed ticket counters and public waiting rooms providing inter-city and inter-state motor coach bus services.
Business District	<ul style="list-style-type: none"> D1-X1  	N/E	3	<ul style="list-style-type: none"> Expressway Conventional 	See Downtown
Camping	<ul style="list-style-type: none"> Logo Sign  	10	15	<ul style="list-style-type: none"> Freeway 	For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and http://www.dot.state.mn.us/loqosigns/ For Eligibility Criteria refer to: http://www.interstatelogos.com/interstatelogosfiles/pdfs/participation085_None_Eligibility%20Criteria.pdf Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.aspx
	<ul style="list-style-type: none"> E10-1  	N/E	10	<ul style="list-style-type: none"> Freeway Expressway 	In addition to the criteria under the General Motorist Service Signing Program , the business shall meet the following requirements: <ol style="list-style-type: none"> 1. Have a State Department of Health license as required by Minnesota Statutes, Chapter 327.15. 2. Provide at least 20 spaces available for camping and parking. 3. Provide modern sanitary facilities (flush, chemical, or incinerator toilets). 4. Provide services 24-hours per day, seven days per week. 5. Be located within ten miles of the interchange via an all-weather road with adequate trailblazing signing provided by the operator to enable the traveler to reach the site.

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Camping, cont.	<ul style="list-style-type: none"> D9-X4  				See Resorts for the Resort and Camping Signing Program defined by Minnesota Statute 160.283.
	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Recreational Camping Area See Resorts
Camps, Private	<ul style="list-style-type: none"> Brown Custom Design  	N/E	10	<ul style="list-style-type: none"> Expressway Conventional 	This facility is generally a specialized, rural summer camp. It is operated or sponsored by church, fraternal, scouting, or similar organizations and is not open to the general public for overnight camping. The facility generally accommodates prearranged sessions of several days duration and is oriented toward recreation, education, training, or combinations thereof. Visitors are usually not familiar with the camp location. In addition to the general criteria for the Minor Traffic Generator Signing Program , all of the following criteria apply. The facility shall: <ol style="list-style-type: none"> 1. Provide full-time staff on site to accommodate clientele. 2. Be a private operation. 3. Accept prearranged accommodations only. 4. Not allow public, overnight camping. For a seasonal camp, MnDOT may incorporated signing indicated periods of closure where appropriate.
Casinos	<ul style="list-style-type: none"> Brown Custom Design  	10	10	<ul style="list-style-type: none"> Freeway Expressway Conventional 	In order to be considered for signing, the following criteria shall be met by the requesting facility: <ol style="list-style-type: none"> 1. Events or activities shall be held continuously throughout the year. 2. Events or activities shall be non-local in scope and draw visitors from outside the local area. 3. The facility shall provide adequate on-site parking or parking in the immediate area of the facility. 4. The facility shall provide seating for at least 200 people. The facility should be located within ten miles of the trunk highway intersection or interchange where signs are requested. Casino signs should be installed in accordance with all of the following: <ol style="list-style-type: none"> 1. Distances to casinos located two miles or more from the trunk highway intersection or interchange shall be shown on the sign. 2. Signs shall only be allowed from the nearest trunk highway and signs shall not be provided if the facility is readily visible or if effective off right-of-way directional signing is present or can be provided. 3. Additional proposed signing locations on other trunk highways are to be processed with MnDOT in accordance with the following procedures (developed and concurred with the Indian Affairs Council in 2003): <ol style="list-style-type: none"> a. The Tribe assembles the proposed signing package (road system map, locations of proposed signing, and casino business local panel design).

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Casinos, cont.					<ul style="list-style-type: none"> b. The Tribe assembles the proposed signing package to the MnDOT District Engineer for evaluation (including field review of roadway network and existing signing). This may include coordination with local road authorities (county, city) if any proposed signing is to be installed on local roads. c. In order to assist in the decision making process, the MnDOT district office will contact the State Traffic Engineer and State Signing Engineer to field review the proposed signing locations. d. After completion of the field review and evaluation, MnDOT staff shall assemble a response package (sign panel designs, private sign company contracts, sign fabrication specifications) and meet with the Tribe to present to MnDOT's proposed sign locations. e. Upon concurrence of acceptable sign locations by the Tribe, the Tribe shall submit completed application form(s) and business logo panel design to the District Traffic Engineer for review and approval. f. After approval by MnDOT, the Tribe shall submit sign panel designs, business logo panel design, and fabrication specifications to a private sign company(ies) for bid(s). g. The private sign vendor will invoice the Tribe and fabricate and deliver sign panel(s) to the Tribe. h. The Tribe coordinates with the MnDOT district office to arrange for installation of signs. Sign installation costs are to be paid for by the Tribe. <p>4. In place casino signs shall be replaced through attrition in accordance with both the general and above criteria. Existing casino signs should remain eligible for signing.</p>
Churches	<ul style="list-style-type: none"> ▪ D9-X6 				See Places of Worship
Civic/ Convention Centers	<ul style="list-style-type: none"> ▪ Green Custom Design 	1	1	<ul style="list-style-type: none"> ▪ Expressway ▪ Conventional 	<p>This facility accommodates various types of activities and is primarily oriented toward conventions, meetings, expositions, and performances.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply. The facility shall:</p> <ol style="list-style-type: none"> 1. Hold events or activities that are non-local in scope and draw visitors from outside the local area. 2. Hold events or activities continuously throughout the year on an average of at least once a month (rural environment) and three times a month (urban environment). 3. Provide adequate on-site parking or parking in the immediate area of the facility. 4. Provide seating for at least 1000 people (urban environment).
Colleges					See Educational Institutions

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Commodity Storage/ Elevators	<ul style="list-style-type: none"> ▪ D9-X6 	N/E	15	<ul style="list-style-type: none"> ▪ Expressway ▪ Conventional 	See Specific Services - Rural Agricultural Business
Community Centers					See Multi-Purpose Facilities
Community Wayfinding	<ul style="list-style-type: none"> ▪ Custom Design 			<ul style="list-style-type: none"> ▪ Conventional 	Signs shall comply with the Community Wayfinding Signs section of the Minnesota Manual on Uniform Traffic Control (MN MUTCD), Part 2D.50 and the MnDOT policy found in Chapter 6-8.03 of the Traffic Engineering Manual (TEM).
Correctional Institutions	<ul style="list-style-type: none"> ▪ Green Custom Design 	3	3	<ul style="list-style-type: none"> ▪ Expressway ▪ Conventional 	<p>This facility may be a state or federal penal institution that generates a significant number of non-local visitors.</p> <p>The general criteria for the Minor Traffic Generator Signing Program apply to this type of facility.</p>
County Fairgrounds	<ul style="list-style-type: none"> ▪ D7-X16  <ul style="list-style-type: none"> ▪ Green Custom Design 	1	5	<ul style="list-style-type: none"> ▪ Expressway ▪ Conventional 	The general criteria for the Minor Traffic Generator Signing Program apply to this type of facility.
Demolition Landfills					See Sanitary Landfills
Disc Golf Course	<ul style="list-style-type: none"> ▪ D7-X22  <ul style="list-style-type: none"> ▪ Brown Custom Design 	N/E	10	<ul style="list-style-type: none"> ▪ Expressway ▪ Conventional 	<p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply.</p> <p>The facility shall:</p> <ol style="list-style-type: none"> 1. Be its own entity located on its own property (not located on or in another facility that can be signed as a minor traffic generator). 2. Have at least 18 holes. 3. Be a member of the Professional Disc Golf Association (PDGA).

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Downtown	<ul style="list-style-type: none"> D1-X1  D1-X1A  	N/E	3	<ul style="list-style-type: none"> Expressway Conventional 	<p>Signing may be provided to direct motorists to the primary business district of a rural city when a conventional highway does not pass through it.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply.</p> <ol style="list-style-type: none"> 1. Signing is allowed to designate the primary business center, NOT to designate any other business or shopping area. 2. The signs shall use either the legend "DOWNTOWN" or "BUSINESS DISTRICT", based on the preference of the city administration. <p>See also Business District</p>
Drivers License/Road Test Exam Stations	<ul style="list-style-type: none"> Green Custom Design  	1	3	<ul style="list-style-type: none"> Expressway Conventional 	<p>This facility shall be a permanent site.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply. The facility shall:</p> <ol style="list-style-type: none"> 1. Provide a complete staff, including road testing of drivers. 2. Be an official facility operated or designated by the Minnesota Department of Public Safety.
Educational Institutions (post secondary schools)	<ul style="list-style-type: none"> Green Custom Design  	5	10	<ul style="list-style-type: none"> Freeway Expressway Conventional 	<p>All of the following criteria apply to the Educational Institution Signing Program.</p> <ol style="list-style-type: none"> 1. The school grants two or four-year degrees and is accredited by the North Central Association of colleges and schools. Examples are the University of Minnesota, state universities, state community colleges, private two and four-year colleges, private professional schools, private vocational schools, and technical colleges. 2. The minimum on-campus average daily student enrollment for credit shall be 400 students except in the Metro District where the minimum enrollment shall be 1500 students. 3. In rural districts, schools which front directly on trunk highways may be allowed signs to assist the motorist in making proper entrance turns. 4. In the Metro District, signs shall only be allowed from the nearest trunk highway intersection. Signs directing motorist from one trunk highway to another trunk highway shall not be allowed. <p>Educational Institution signs should be installed in accordance with the following:</p> <ol style="list-style-type: none"> 1. Signs on freeways shall have the institution name on the top line and EXIT XXX on the bottom line if the exit is numbered. If the exit is not numbered, the bottom line shall read NEXT (or SECOND) RIGHT. 2. Signs on freeway ramps shall display the institution name and appropriate arrow without extraneous legend. 3. Distances to schools located two miles or more from the trunk highway intersection or interchange shall be shown on the ramp or intersection sign.

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Fairgrounds					See County Fairgrounds
Farm Implement Dealers	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
Feed, Seed, Fertilizer Stores	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
Food	<ul style="list-style-type: none"> Logo Sign  	3	15	<ul style="list-style-type: none"> Freeway 	<p>For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and www.dot.state.mn.us/logosigns/</p> <p>For Eligibility Criteria refer to: www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf</p> <p>Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.asp</p>
	<ul style="list-style-type: none"> E10-1  E10-6  	N/E	2	<ul style="list-style-type: none"> Freeway Expressway 	<p>In addition to the criteria under the General Motorist Service Signing Program, the business shall meet the following requirements:</p> <ol style="list-style-type: none"> 1. Serve three meals each day, seven days per week. 2. Be licensed by the State and/or the appropriate political subdivision. 3. Be located within two miles of the interchange.
	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Restaurant
Gas, Diesel, LP Gas, E85, Gasoline Service Stations	<ul style="list-style-type: none"> Logo Sign  	3	15	<ul style="list-style-type: none"> Freeway 	<p>For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and www.dot.state.mn.us/signs/</p> <p>For Eligibility Criteria refer to: www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf</p> <p>Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.asp</p>

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Gas, Diesel, LP Gas, E85, Gasoline Service Stations, cont.	<ul style="list-style-type: none"> E10-1 E10-5 E10-10 E10-11 E10-12 	N/E	2	<ul style="list-style-type: none"> Freeway Expressway 	In addition to the criteria under the General Motorist Service Signing Program , the business shall meet the following requirements: <ol style="list-style-type: none"> Provide vehicle services including fuel and oil. Provide restroom facilities and drinking water. Provide continuous staffed operation for at least 12 hours per day, 7 days per week. Provide public access to a telephone. Be located within two miles of the interchange.
	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Gasoline Service Station
General Motorist Service	<ul style="list-style-type: none"> E10-1 	N/E	Varies	<ul style="list-style-type: none"> Freeway Expressway 	General Motorist Service signs may be provided for all of the following (see each facility type for specific criteria): <ol style="list-style-type: none"> Gas, Diesel, and/or alternative fuels (LP Gas, E85) Food Lodging Camping Hospitals In addition to the general criteria for all signing programs, the following criteria apply: <ol style="list-style-type: none"> Signs may be installed at rural freeway and expressway interchanges. Cost of fabrication, installation, and maintenance of the signs shall be paid by MnDOT. If a business or effective advertising is visible at an interchange and the business requests signing, that service (gas, food, lodging or camping) will be signed based on the following: <ol style="list-style-type: none"> If there are in place General Motorist Service signs, the service will be added to in place signs if the service is not currently displayed. If there are no in place General Motorist Service signs, and there is space available, signs will be installed for only that type of service. Design of the mainline sign (font sizes and series for services and action line message) will be based on Standard Sign E10-1.

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Geological Markers	<ul style="list-style-type: none"> D7-X1 D7-X2 D5-X1c 			<ul style="list-style-type: none"> Expressway Conventional 	The Geological Society of Minnesota (GSM), a non-profit corporation, has constructed and maintained geological markers throughout the state for many years. The markers consist of descriptive bronze plaques, approximately 24" x 36" mounted on stone work pedestals or walls. Many geological markers exist in MnDOT rest areas, wayside rests, scenic overlooks, and/or wayside historical marker sites. The markers detail the geological significance of the area near their location. Signing of the sites began in 1997 and continues in accordance with the following guidelines. Criteria: <ol style="list-style-type: none"> Sites shall be approved by the GSM. Sites shall be easily accessible as part of a wayside development such as wayside rests, scenic overlooks, historical marker sites, adjacent city parks, or similar sites. Sites within state parks shall not be signed. Signing Method: <ol style="list-style-type: none"> Sites with geological markers only: <ol style="list-style-type: none"> Install advance sign D7-X1 GEOLOGICAL MARKER 1/2 MILE ON RIGHT/LEFT. Install sign D7-X2 GEOLOGICAL MARKER with arrow at the entrance road or turnout. Sites located in other facilities (as listed above): <ol style="list-style-type: none"> Install sign D5-X1c beneath the in place advance sign. If there is no advance sign in place for the facility, install sign D5-X1c below the directional sign. Sign fabrication, installation, and maintenance costs will be paid by MnDOT.
Gifts, Crafts, Art Sales	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Tourist Oriented Business
Golf Courses (public)	<ul style="list-style-type: none"> D7-X21 Brown Custom Design 	3	10	<ul style="list-style-type: none"> Expressway Conventional 	In addition to the general criteria for the Minor Traffic Generator Signing Program , all of the following criteria apply. The facility shall: <ol style="list-style-type: none"> Have at least nine holes. Be open to the public. See also Miniature Golf/Driving Ranges , and Disc Golf Course .

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Great River Road Amenity Sites	<ul style="list-style-type: none"> M1-X1 Brown Custom Design 	1	3	<ul style="list-style-type: none"> Expressway Conventional 	<p>This facility includes parks, boat/canoe access sites, picnic areas, campsites, historic sites, and other points of interest that are directly related to the officially designated national Great River Road (GRR) route.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply for a GRR amenity site:</p> <ol style="list-style-type: none"> Only those sites directly tied to the national GRR system and identified on GRR maps or brochures may be signed. The sign format and size shall be determined by MnDOT's Office of Traffic, Safety and Technology. The district traffic office should coordinate sign requests with the Office of Environmental Services.
Greenhouses	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
High Schools	<ul style="list-style-type: none"> D7-X19  <ul style="list-style-type: none"> Green Custom Design 	1	3	<ul style="list-style-type: none"> Expressway Conventional 	<p>This is a multi-purpose facility which hosts a variety of activities throughout the year. Some of these facilities may have a remote stadium or athletic complex which generates traffic and also qualifies for signing.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply.</p> <p>The facility shall:</p> <ol style="list-style-type: none"> Hold events or activities that are non-local in scope and draw visitors from outside the local area. Provide adequate on-site parking.
Historic District	<ul style="list-style-type: none"> D7-X11a  <ul style="list-style-type: none"> Brown Custom Design 	1	10	<ul style="list-style-type: none"> Expressway Conventional 	<p>Listing in the National Register of Historic Places means that the district has been judged by professional historians to be worthy of preservation because its significance speaks to the broad themes of human history and because it retains enough integrity to accurately document that experience. Historic Districts so listed are worthy of public attention and serve the useful purpose of cultural heritage education.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, the following criteria apply:</p> <ol style="list-style-type: none"> Requests for signs will be accepted from a local government agency. Requests for directional signage shall include: <ol style="list-style-type: none"> Location: Historic District boundaries must be distinguishable through local street signage. The application must include a map of the district and photographic evidence of distinguishing signage.

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Historic District, cont.					<ol style="list-style-type: none"> Interpretation: Historic Districts shall provide information regarding the district in a publicly accessible location within the district such as a self-service kiosk or welcome center. A copy of that information must be included with the application. The information must supplement the National Register nomination with new information. Requests for signing of Historic Districts shall be submitted to the State Signing Engineer, OTST. These requests shall be forwarded to the Minnesota Historical Society (MHS) for recommendations. The MHS recommendations shall govern MnDOT's approval or denial of requests. The Historic District shall be listed in the National Register of Historic Places, a federal program of the National Park Service. The MHS will confirm whether a district is listed. <p>Signing Method:</p> <ol style="list-style-type: none"> A city could potentially qualify for a Downtown or Business District sign and a Historic District sign. The Historic District may or may not include the whole city. Therefore, directions to different locations may be required. Signing for both would be accepted if both qualify and there is space. If spacing is an issue, both requests could be combined on the same sign if signed at the same trunk highway intersection. Three sizes of Historic District signs have been developed and included in the Standard Signs Manual. Optional guide signs (other than the standard sign design) may be used: <ol style="list-style-type: none"> "[City Name] Downtown & Historic District" "[City Name] Historic & Business District" with directional arrow(s)
Historical Markers and State Monuments	<ul style="list-style-type: none"> D5-X1b  <ul style="list-style-type: none"> D7-X5  <ul style="list-style-type: none"> D7-X6 	1	10	<ul style="list-style-type: none"> Expressway Conventional 	<p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply:</p> <ol style="list-style-type: none"> Minnesota Historical Society (MHS) sites and monuments: <ol style="list-style-type: none"> Requests for signing to State historical markers and monuments maintained by the MHS shall be submitted to the State Signing Engineer, OTST. All costs for MHS historical marker and monument signs shall be paid by MnDOT. Non-MHS sites and monuments: <ol style="list-style-type: none"> Requests for the signing of non-MHS historical markers and monuments shall be submitted to the State Signing Engineer, OTST. These requests shall be forwarded for the MHS for recommendations. The MHS recommendations shall govern MnDOT's approval or denial of the request. A historical marker or monument shall: <ol style="list-style-type: none"> Document a topic with historical significance. Fifty years is a general rule of thumb of the time require to develop historical perspective and to establish significance. Topics that explain the recent past shall be exceptionally significant to be considered for approval. To establish significance, requesters should explain why a topic played a role or why it made a difference in the context of local, regional, or state history. Requesters shall provide a copy of the text and a photograph of the historical marker. As a general rule, signing shall not be approved for historical markers or monuments that represent ubiquitous historical phenomena or places that were common everywhere. Examples of these places include: the sites of towns, communities, or settlements that no longer exist; the birthplaces or grave sites of significant individuals; and cemeteries. <p style="text-align: right;">continued..</p>

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Historical Markers and State Monuments, cont.					II. Be located on public land and accessible to the public. III. Be legible using letters at least 5/8 inches high (typically a font size 22 or greater). c. The requester shall be responsible for maintaining and ensuring access to the historical marker or monument. d. There shall be at least three year-round parking spaces located off the road or street. Within city limits, parking spaces may be located on-street. e. All costs shall be paid by the requester. f. See National Monuments as applicable.
Historic Sites	<ul style="list-style-type: none"> D7-X5a  D7-X11    	1	10	<ul style="list-style-type: none"> Expressway Conventional 	In addition to the general criteria for the Minor Traffic Generator Signing Program , requests for signing of historic sites shall be submitted to the State Signing Engineer, OTST. These requests shall be forwarded to the Minnesota Historical Society (MHS) for recommendations. The MHS's recommendations shall govern MnDOT's approval or denial of the request.

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Hospitals	<ul style="list-style-type: none"> D9-2a  D9-2b  E10-1  E10-3  E10-4  E10-8  	10	10	<ul style="list-style-type: none"> Freeway Expressway Conventional 	In addition to the general criteria for all signing programs, the following criteria apply. <ol style="list-style-type: none"> Hospitals requesting signing shall meet all of the following criteria: <ol style="list-style-type: none"> Accept all emergency cases without discrimination for any reason (including ability to pay). Be readily accessible from the nearest intersection or interchange (normally within a ten mile radius). Provide 24-hour emergency medical care with a physician on the premises (metropolitan area) or on-call (rural areas). The costs of fabrication, installation, and maintenance of signs shall be paid by MnDOT. Signing directing motorists from one trunk highway onto another may be allowed if the facility is within ten miles of the intersection of the two trunk highways. Signs directing motorists from one freeway to another freeway shall not be allowed. In place EMERGENCY HOSPITAL signs shall be removed through attrition and replaced with HOSPITAL signs. Mainline signing and ramp signing at an interchange shall be replaced at the same time. HOSPITAL signs should be installed in accordance with the following: <ol style="list-style-type: none"> Interchange signs (E10-1, E10-3, E10-4, and E10-8) <ol style="list-style-type: none"> At rural interchanges where General Motorist Service signs (E10-1) are in place, the word HOSPITAL (E10-1 Supplement) may be included on the General Motorist Service sign if the word CAMPING is not displayed. At urban or rural interchanges where General Motorist Services are not signed, the E10-3 sign shall be installed at the interchange nearest the hospital. The appropriate signing (E10-4 or E10-8) shall be installed on the ramp(s). If the hospital is located less than two miles from an interchange, the E10-8 sign shall be installed on the ramp(s). If the hospital is located two miles or more from an interchange, the E10-4 sign shall be installed on the ramp(s). Trailblazing signs on trunk highways shall display the number of miles in one mile increments (E10-8 or E10-4 if mileage is required). Trailblazing signs (D9-2a) on local roads shall display the number of blocks from the trunk highway to the facility. At-grade intersection signs (D9-2a and D9-2b) <ol style="list-style-type: none"> The D9-2b sign shall be ground-mounted in advance of the intersection (or on a traffic signal mast arm at the intersection) with the road leading to the hospital. Trailblazing signing (D9-2a) on trunk highways and/or local roads shall display either the number of blocks or miles (in one mile increments) to the facility. Trailblazing signs on local roads directing motorists to the facility shall display the appropriate distance and arrow.
Hotels					See Lodging
Household Hazardous Waste Site					See Sanitary Landfills

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Humane Societies	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
Indoor Ice Arenas	<ul style="list-style-type: none"> Brown Custom Design 	1	3	<ul style="list-style-type: none"> Expressway Conventional 	This is a high use facility build primarily to accommodate ice skating activities, both competitive and recreational in nature. The general criteria for the Minor Traffic Generator Signing Program apply to this type of facility.
Industrial Parks	<ul style="list-style-type: none"> D7-X17 	N/E	3	<ul style="list-style-type: none"> Expressway Conventional 	In addition to the general criteria for the Minor Traffic Generator Signing Program , all of the following criteria apply. The facility shall: <ol style="list-style-type: none"> Be in a rural environment. Be serviced mainly by non-local delivery vehicles. Be open to both local and non-local customers.
Interpretive Centers	<ul style="list-style-type: none"> Brown Custom Design 	1	3	<ul style="list-style-type: none"> Expressway Conventional 	This facility provides explanations and interpretations of historical, cultural, and educational subject matter. In addition to the general criteria for the Minor Traffic Generator Signing Program , the facility shall have on premise staff and/or guides to present continuing service to visitors.
Kennels	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
Landfills					See Sanitary Landfills
Libraries	<ul style="list-style-type: none"> I-8 	1	1	<ul style="list-style-type: none"> Expressway Conventional 	The general criteria for the Minor Traffic Generator Signing Program apply to this type of facility.

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Lock and Dam Sites	<ul style="list-style-type: none"> Brown Custom Design 	1	5	<ul style="list-style-type: none"> Expressway Conventional 	This facility is operated and maintained by the US Army Corps of Engineers. The visitors to this facility are interested in viewing boating operations through the locks and/or utilizing other available recreational facilities. In addition to the general criteria for the Minor Traffic Generator Signing Program , all of the following criteria apply for a lock and dam site: <ol style="list-style-type: none"> The facility shall provide viewing provisions for the public The facility should provide parking for at least 15 vehicles. The facility should provide restroom facilities. The facility should have a telephone available.
Lodging	<ul style="list-style-type: none"> Logo Sign 	3	15	<ul style="list-style-type: none"> Freeway 	For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and www.dot.state.mn.us/logosigns/ For Eligibility Criteria refer to: www.interstatelogos.com/interstatelogofiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: d-desutter@interstatelogos.com Website: www.minnesota.interstatelogos.com/state/home.aspx
	<ul style="list-style-type: none"> E10-1 	N/E	10	<ul style="list-style-type: none"> Freeway Expressway 	In addition to the criteria under the General Motorist Service Signing Program , the business shall meet the following requirements: <ol style="list-style-type: none"> Provide lodging 24-hours per day throughout the year. Be licensed by the State and/or the appropriate political subdivision. Be located within ten miles of the interchange.
	<ul style="list-style-type: none"> E10-7 				
	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Motel, Resort

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Major Traffic Generators	<ul style="list-style-type: none"> Brown Custom Design Green Custom Design  	10	10	<ul style="list-style-type: none"> Freeway Expressway Conventional 	<p>These traffic generators are major regional attractions, events, or facilities which attract persons or groups from beyond a local community, city, or metropolitan area. They are significant because of their unique educational, cultural, historical, or recreational experience and public appeal. Predominately retail, business or manufacturing centers are not normally eligible for signing.</p> <p>The business shall meet the following criteria:</p> <ol style="list-style-type: none"> Parking for at least 1000 vehicles. A minimum of ten events per year. Average event attendance of at least 5000 persons. <p>Signs should be installed in accordance with the following:</p> <ol style="list-style-type: none"> Distances to major generators located two miles or more from the trunk highway intersection or interchange shall be shown on the sign approaching the intersection or on the ramp at an interchange. Signs directing motorists from one trunk highway to another trunk highway may be allowed except when they direct a motorist from one freeway to a second freeway. In the Metro District, Major Traffic Generator signs may have a dynamic element specifying an alternate route for the purpose of traffic management and in accordance with the following criteria: <ol style="list-style-type: none"> Alternate Route Guidance: <ol style="list-style-type: none"> The alternate route must be a direct route to the facility. The alternate route exit/turn must be located within the next two interchanges/intersections. There needs to be verification of traffic data showing that the alternate route is a better option than the primary signed route. Some things to consider are travel times, construction impacts, signal timing, train schedules, etc. Sign Location: <ol style="list-style-type: none"> Only one structure is allowed per direction of travel. A second structure will not be installed on the mainline at the alternate route exit/turn. Signing is required on both the primary exit ramp and alternate route exit ramp. Trailblazing is required on both the primary and alternate routes. There must be an agreement between MnDOT and another government agency for these types of signs. The agreement will include: <ol style="list-style-type: none"> All costs to be paid by the requester, including fabrication, installation, maintenance, replacement, relocation, utility, etc. MnDOT will operate the signs. Another government agency may operate the signs, but the message must be approved by MnDOT and they must supply the alternate route traffic data for MnDOT to approve before the signs are changed. Maintenance of the signs is the responsibility of the requester. Replacement of the signs and associated elements is the responsibility of the requester. The life of the static sign and dynamic elements should be the same as MnDOT's guidelines for service life replacement. Relocation of the signs and associated elements is the responsibility of the requester. For example, if a construction project needs to relocate the signs, the requester is responsible for relocating it. The requester must obtain a permit when work is performed on MnDOT right-of-way.

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Malls					See Regional Shopping Centers and Outlet Malls
Marina, Boat Launch, Guide Service	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Public Access to Lakes/Rivers See Specific Services - Tourist Oriented Business
Miniature Golf and Driving Range	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Tourist Oriented Business
Minor Traffic Generators	<ul style="list-style-type: none"> Standard Sign (if applicable) Brown Custom Design Green Custom Design 	Varies	Varies	<ul style="list-style-type: none"> Expressway Conventional 	<p>Minor traffic generators are facilities that generally attract non-local persons or groups unfamiliar with the location of the generator but do not qualify as major traffic generators. The use and installation of highway signing shall be limited to only those generators which have broad motorist appeal, serve non-familiar motorists, or are the kind of facility for which a motorist normally expects highway signing.</p> <p>In addition to the general criteria for all signing programs, the following criteria apply for the Minor Traffic Generator Signing Program.</p> <ol style="list-style-type: none"> Minor Traffic Generator signs may be installed on conventional highways, at at-grade intersections on expressways, and on rural bypasses that have interchanges at non-trunk highways. In order to be considered for signing, the following criteria must be met by the minor traffic generator requesting signing: <ol style="list-style-type: none"> Unless specified otherwise, facilities shall be open at least 40 hours per week and a minimum of five days per week. For seasonal generators, MnDOT may incorporate signing indicating periods of closure where appropriate. Signing shall not be permitted within the corporate limits of one city directing motorists to a facility located in another city. Generators shall be located within specified distances from the trunk highway intersection or interchange at which signing is permitted. These distances vary depending on the type of generator and whether the signed intersection is located within an urban or rural environment. <ol style="list-style-type: none"> Urban Environment - typical characteristics are highly developed areas having slower speeds, higher proportion of local traffic, increased difficulty in finding acceptable locations for traffic signs, and a more complicated driving environment. Rural Environment - typical characteristics are relatively undeveloped or agricultural lane, higher speeds, higher proportion of non-local traffic, easy ability to find acceptable locations for traffic signs, and relatively uncomplicated driving environment. Small cities in otherwise rural areas are included in this definition. The local governing body(ies) shall prioritize which facilities may be signed when MnDOT determines that the number of qualifying generators that a community is requesting signing for cannot all be accommodated on signing at the same intersection due to driver information overload and sign spacing guidelines. Signs shall only be allowed from the nearest trunk highway intersection. Signs directing motorists from one trunk highway to another trunk highway shall not be allowed. <p style="text-align: right;">continued..</p>

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Minor Traffic Generators, cont.					<p>3. Signing shall not be provided if the facility is readily visible or if effective off right-of-way directional signing is present or can be provided. Visibility from the approach to an intersection may be determined by adding 175 feet to Condition B (deceleration to 10 mph from the posted speed) in MN MUTCD Table 2C-4. Signing is not allowed if the facility can be readily identified or if effective off highway right-of-way directional signing is legible at or beyond this distance.</p> <p>Minor Traffic Generator Signs should be designed in accordance with the following:</p> <ol style="list-style-type: none"> Distances to generators are to be shown in one-mile increments. When designing sign panels to be installed on rural expressways for private minor generators: <ol style="list-style-type: none"> Use the appropriate chart (Charts 6.1A, 6.1B, or 6.1C in MnDOT's Traffic Engineering Manual) to determine the required font size for guide signs on expressways. The next smaller font size may be used to design the sign panels for private generators if existing guide signing to other private generators on the highway section were designed with one font size smaller than that specified in the charts.
Hotels					See Lodging
Multi-Purpose Facilities	<ul style="list-style-type: none"> Green Custom Design 	N/E	3	<ul style="list-style-type: none"> Expressway Conventional 	<p>The general criteria for the Minor Traffic Generator Signing Program apply to this type of facility. This facility includes but is not limited to public community centers and National Guard Armories.</p> <p>A public community center is a public building designed for a community's social, cultural, educational, and recreational activities. A National Guard Armory is a facility where arms and military equipment are stored and/or is used for training military reserve personnel. It is frequently used for other public purposes.</p>
Museum	<ul style="list-style-type: none"> D7-X12  <ul style="list-style-type: none"> Brown Custom Design 	1	5	<ul style="list-style-type: none"> Expressway Conventional 	<p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply:</p> <ol style="list-style-type: none"> Requests for signing shall be submitted to the State Signing Engineer, OTST. These requests shall be forwarded to the Minnesota Historical Society (MHS) for recommendations. The MHS recommendations shall govern MnDOT's approval or denial of the requests. Seasonal museums may qualify but shall have a CLOSED plaque installed on signs during the months that they are not open for business. A non-profit museum is required to be a Federal Tax Exempt Organization, Internal Revenue Code [IRC] 501(c)(3).

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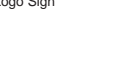



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National Monuments	<ul style="list-style-type: none"> Brown Custom Design 	15	15	<ul style="list-style-type: none"> Freeway Expressway Conventional 	General Criteria Only
Nurseries/ Tree Farms	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
Orchards/ Produce Sales	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
Outlet Malls	<ul style="list-style-type: none"> Green Custom Design 	2	2	<ul style="list-style-type: none"> Freeway Expressway Conventional 	<p>In order to be considered for signing, all of the following criteria shall be met by the outlet mall:</p> <ol style="list-style-type: none"> At least 400,000 square feet of retail floor space available for lease. Minimum of 100 stores. Primary function of the mall is to house tenants who are manufacturers that sell their stock directly to the public. Located outside of the downtown or central business district except in the Metro District.
Parks (City, County, Regional)	<ul style="list-style-type: none"> D7-X10  <ul style="list-style-type: none"> D7-X15  <ul style="list-style-type: none"> Brown Custom Design 	3	10	<ul style="list-style-type: none"> Expressway Conventional 	<p>This is a recreational facility, open to the public, of varying size, type, and purpose. It can be operated by various agencies or jurisdictions. The facility typically provides picnic tables, playground equipment, drinking water, trash barrels, and restroom facilities.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply:</p> <ol style="list-style-type: none"> The facility shall meet Minnesota Department of Health standards regarding water supply and restroom facilities. The facility shall be maintained in a sanitary and park-like condition.

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Parks (National)	<ul style="list-style-type: none"> Brown Custom Design  	15	15	<ul style="list-style-type: none"> Freeway Expressway Conventional 	General Criteria Only
Parks (State)	<ul style="list-style-type: none"> D7-X9  Brown Custom Design  	15	15	<ul style="list-style-type: none"> Freeway Expressway Conventional 	In addition to the general criteria for the Minor Traffic Generator Signing Program , all of the following criteria apply. The facility shall: <ol style="list-style-type: none"> Meet Minnesota Department of Health standards regarding water supply and restroom facilities. Be maintained in a sanitary and park-like condition. Have water, restrooms, and picnic areas. Have accommodations for at least 35 overnight camp sites.
Pharmacy (24-Hour)	<ul style="list-style-type: none"> Logo Sign  	3	3	<ul style="list-style-type: none"> Freeway 	For the Logo Sign Franchise Program refer to TEM 6-7.09.01 and www.dot.state.mn.us/logosigns/ For Eligibility Criteria refer to: www.interstatelogs.com/interstatelogsfiles/pdfs/participation/085_None_Eligibility%20Criteria.pdf Refer Applicants to: Dave DeSutter of Minnesota Logos, Inc. Toll Free: 800-769-3197, Phone: 952-895-8079 Email: ddesutter@interstatelogs.com Website: www.minnesota.interstatelogs.com/state/home.aspx
Places of Worship	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Places of Worship
Public Access to Lakes/Rivers	<p>Trunk Highways:</p> <ul style="list-style-type: none"> D7-X7  D7-X7A  	1	10	<ul style="list-style-type: none"> Expressway Conventional 	See Section 21.5.1 of the MN MUTCD for Public Water Access Signs including the Minnesota Department of Natural Resources (DNR) sign (DNR NRM 8.2.35). In addition to the general criteria for the Minor Traffic Generator Signing Program , all of the following criteria apply: <ol style="list-style-type: none"> All requests for signing to State provided public access sites shall be approved by the Department of Natural Resources (DNR). Requests for signing to all other access sites shall be approved by MnDOT. The facility shall have: <ol style="list-style-type: none"> An access road that is maintained in passable condition. A parking area at the access site with a gravel, bituminous, or concrete surface. The parking area should have space for at least 20 vehicles. A smaller parking area is acceptable at remote access sites. A concrete boat launching ramp or equivalent for trailered boats. Free admission.

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Public Access to Lakes/Rivers cont.	<p>Local Roads:</p> <ul style="list-style-type: none"> D7-X8  D7-X8A  DNR Sign (DNR NRM 8.2.35)  				<ol style="list-style-type: none"> The public access sign shall be one of the following: <ol style="list-style-type: none"> Trunk Highway: Standard D7-X7 or D7-X7A. Local Road/Trailblazing: Standard Sign D7-X8 or D7-X8A DNR Public Water Access Sign <p>The DNR may continue its current sign replacement program (replacing existing 12" x 18" signs with new 18" x 24" signs) in accordance with all of the following:</p> <ol style="list-style-type: none"> DNR staff will remove any PUBLIC WATER ACCESS sign panel attached to a MnDOT sign structure and install it on its own structure which shall be an FHWA accepted breakaway sign support. The location of the DNR sign structure shall be authorized by the MnDOT district traffic office. The sign installation shall not hide from view nor interfere with the effectiveness of any official traffic control device.
Public Office Buildings	<ul style="list-style-type: none"> Green Custom Design  	1	3	<ul style="list-style-type: none"> Expressway Conventional 	This facility includes public administrative offices (federal, state, and local) where the general public visits on a regular basis to conduct business. The general criteria for the Minor Traffic Generator Signing Program apply to this type of facility.
Recreational Rentals: Bikes, Boats, Canoes, Jet Skis, Snowmobiles	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Tourist Oriented Business
Recycling Centers	<ul style="list-style-type: none"> D1-X6  Green Custom Design (no symbol) 	1	5	<ul style="list-style-type: none"> Expressway Conventional 	This facility shall comply with the permit rules of, and be officially designated by, the Minnesota Pollution Control Agency (MPCA). Reference Minnesota Statute 173.086 and 115A.555. In addition to the general criteria for the Minor Traffic Generator Signing Program , all of the following criteria apply for a recycling center. The facility shall: <ol style="list-style-type: none"> Be open to receive materials at least 12 hours per week, 12 months per year. Accept at least four different types of recyclable materials. Comply with Minnesota Rule 7035.2845 regarding the permitting of recycling facilities.
Regional Human Services/Treatment Centers	<ul style="list-style-type: none"> Green Custom Design 	1	3	<ul style="list-style-type: none"> Expressway Conventional 	This is a public treatment facility operated by the Minnesota Department of Human Services. Reference Minnesota Statutes Chapters 252, 253, and 254). The general criteria for the Minor Traffic Generator Signing Program apply to this type of facility.

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MnDOT Freeway Signing Plan Design Course Manual

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Regional Shopping Centers	<ul style="list-style-type: none"> Green Custom Design 	2	2	<ul style="list-style-type: none"> Freeway Expressway Conventional 	In order to be considered for signing, all of the following criteria shall be met by the regional shopping center: <ol style="list-style-type: none"> At least 600,000 square feet of retail floor space, all under one roof, available for lease. At least two major department stores owned by a national or regional chain organization. Located outside of the downtown or central business district, except in the Metro District.
Resorts	<ul style="list-style-type: none"> D9-X3  <ul style="list-style-type: none"> D9-X4 	N/E	?	<ul style="list-style-type: none"> Expressway Conventional 	Resort and Camping Signing Program Signs direct the motorist to campgrounds or resorts in rural areas where the Advertising Regulation Law has restricted the installation of private advertising signs off the highway right-of-way. These signs may only be installed where resort information (or County Sign Program) are in place on local roads in accordance with Minnesota Statutes 160.283-160.285. See Figure 6.26. In addition to the general criteria for all signing programs, the following criteria apply: <ol style="list-style-type: none"> Signs may be installed in rural areas on conventional highways and at at-grade intersections on expressways. Signs shall only be allowed from the nearest trunk highway intersection. Signs directing motorists from one trunk highway to another trunk highway shall not be allowed. The cost of fabrication, installation, and maintenance of the signs shall be paid by MnDOT. One guide sign from each direction in advance of a private road or entrance is allowed when the following conditions exist: <ol style="list-style-type: none"> The main access from the trunk highway is via a private road or entrance. The resort or campground is located near, but not visible from, the trunk highway. The sign located on private property cannot be effectively seen by approaching drivers because of the width of the highway right-of-way and/or growth of vegetation. Where the access to resorts or private campgrounds is via county, township, or other public road, and the road is identified with a road name or destination sign, the sign panel or panels may be combined with the in place sign. Minimum height to the bottom of the lowest sign panel shall be seven feet. Businesses signed under this signing program shall not be signed under the Specific Service Signing Program. Normally, these signs are installed where SPECIFIC SERVICE signs are not erected at intersections. Resorts shall have a State Department of Health license as required by Minnesota Statute 157.16. A resort is defined in Minnesota Statute 157.15, subd. 11. Private campgrounds shall have a State Department of Health license as required by Minnesota Statute 327.15, modern sanitary facilities (flush, chemical, or incinerator toilets), and no restrictions on type of camping (tent, RV, trailer, etc.).
	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Resorts

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Restaurants					See FOOD
Riding Stable	<ul style="list-style-type: none"> D9-X6 	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Tourist Oriented Business
Sanitary Landfills Demolition Landfills Solid Waste Transfer Stations Household Hazardous Waste Sites	<ul style="list-style-type: none"> D1-X3  <ul style="list-style-type: none"> D1-X5  <ul style="list-style-type: none"> D1-X7  <ul style="list-style-type: none"> D1-X8 	3	5	<ul style="list-style-type: none"> Expressway Conventional 	These facilities shall be approved by the Minnesota Pollution Control Agency (MPCA). MPCA literature refers to a household hazardous waste site as a HHW Center. In addition to the general criteria for the Minor Traffic Generator Signing Program , all of the following criteria apply: <ol style="list-style-type: none"> The facility shall be open to the public as well as commercial and governmental users. Compost sites shall not be signed.
Scientific and Natural Areas	<ul style="list-style-type: none"> Brown Custom Design 	1	10	<ul style="list-style-type: none"> Expressway Conventional 	These facilities offer various types of displays in a natural setting. They are developed by the Department of Natural Resources or other state or federal agencies. In addition to the general criteria for the Minor Traffic Generator Signing Program , all of the following criteria apply: <ol style="list-style-type: none"> The facility shall provide viewing areas. The facility should provide: <ol style="list-style-type: none"> Parking for at least 20 vehicles. An on-site explanation (audio, visual, or staff person) of the subject matter. Restroom facilities.
Schools					See Educational Institutions or High Schools

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Ski Areas	<ul style="list-style-type: none"> Brown Custom Design D7-X13  D7-X14  	5	10	<ul style="list-style-type: none"> Expressway Conventional 	<p>This is a public or private winter recreational site which provides downhill and/or cross-country skiing.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply for a ski area:</p> <ol style="list-style-type: none"> The facility shall be open to the public. The facility should provide parking for at least 100 vehicles at downhill sites and at least 30 vehicles at cross-country sites. Downhill skiing facilities shall provide adequate staff in case of an emergency. Cross-country facilities shall have trails which are maintained with trail guide signs or maps placed at key locations indicating location and distances. The message on the ski area signs shall be as follows: <ol style="list-style-type: none"> Trunk highway signing: SKI AREA or name of ski area with left (right) arrow at an intersection or NEXT RIGHT at an interchange. Local road trailblazing signing: downhill symbol sign (D7-X13) or cross-country symbol sign (D7-X14) with appropriate arrow.
Solid Waste Transfer Stations					See Sanitary Landfills
Specific Services	<ul style="list-style-type: none"> D9-X6 Series  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	<p>See the Traffic Engineering Manual, Chapter 6, for more information on the history of the Specific Signs Program in Minnesota and for definitions, sign installations, and sign panel design. See the last page of this appendix for a list of ineligible facilities.</p> <p>The Specific Services Signing Program is described starting on page 34 of this appendix.</p>

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Star Lake or River Sign				<ul style="list-style-type: none"> Expressway Conventional 	<p>Before installing signs along county, city, or township roads, permission must be granted by the road authority. Before installing signs at boat landings or other public or private facilities, written permission must be granted by the facility owner.</p> <p>The requirements for installing signs on state highways are as follows:</p> <ol style="list-style-type: none"> Signs shall be fabricated and installed by MnDOT. The cost of fabrication, installation, and maintenance shall be paid by the requester. Maintenance includes replacing damaged or missing signs, and replacement of signs that have reached the end of their useful life (expected life of a sign panel is 12-15 years). One sign may be erected at each approach to a lake or river within the right-of-way of an interstate or other highway that passes over a lake or river in the Department of Transportation's eight-county metropolitan district or near or over a lake or river in greater Minnesota. Signs shall not be installed contrary to other federal and state highway sign standards. The 24" X 12" sign may be installed below existing named river or lake standard guide signs on the post furthest from roadway. The Variable X 36" sign may be installed in lieu of the river or lake standard guide sign on conventional roadways. <p>More information regarding MN Star Lakes and Rivers can be found here: http://www.starlakes.org/home.html</p>
State Recreational Areas					See Parks (State)
Tourist Information	<ul style="list-style-type: none"> D9-10A  D9-10  	1	3	<ul style="list-style-type: none"> Expressway Conventional 	<p>In addition to the general criteria for all signing programs, Tourist Information signs may be installed on conventional highways, at at-grade intersections on expressways, and on rural bypasses that have interchanges at non-trunk highways.</p> <p>In order to be considered for signing, all of the following criteria must be met:</p> <ol style="list-style-type: none"> Only Office of Tourism sites may be signed. Requests shall only be accepted from a community group (e.g. Chamber of Commerce), business association, or governmental unit. Only one site in a city or area may be approved for signing. A sign shall be in place on the outside of the facility, clearly stating the operator and means of contact. If the facility is operated seasonally, the signs shall be removed, covered, or the closure clearly indicated.

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Travel Information Center					Contact MnDOT's Office of Traffic Safety and Technology at www.dot.state.mn.us/trafficeng/index.html for assistance with signing for MnDOT Travel Information Centers.
Township Hall	<ul style="list-style-type: none"> D1-X9  Green Custom Design  	2	2	<ul style="list-style-type: none"> Expressway Conventional 	<p>In addition to the General Criteria in the Minor Traffic Generator Signing Program, the following criteria apply. The facility:</p> <ol style="list-style-type: none"> Shall hold monthly meetings that are open to the public. Township halls are not required to be open eight hours per day, five days per week. Shall be primarily intended for use as a town hall. Should provide adequate on-site parking or parking in the immediate area. Shall post contact information that is visible from the exterior of the building. <p>Signing Method:</p> <ol style="list-style-type: none"> All costs associated with township hall signing shall be paid by the township. The sign shall have the legend "TOWN HALL" with directional arrow. If a township hall is in close proximity to another township hall, and the district traffic engineer determines that using the standard sign could be confusing for motorists, the name of the township may be included on the sign.
Trail Access	Brown Custom Design 	10	10	<ul style="list-style-type: none"> Freeway* Expressway Conventional * See Criteria #1	<p>Signing may be permitted for access points to major recreational trails having improved and well maintained surfaces for hiking, biking, etc. All trails shall provide complete marking or trail maps for user guidance.</p> <p>In addition to the general criteria for all signing programs, the following criteria apply:</p> <ol style="list-style-type: none"> Trail Access signs may be installed on all trunk highways, except in the Metro District where signs shall not be installed on freeways. Parking shall be provided at the site or within the immediate vicinity. The parking facility shall be surfaced and maintained year-round. Parking shall be provided for at least 40 vehicles at freeway signed sites and at least 20 vehicles at other sites. Smaller lots are acceptable at remote areas with the approval of the district traffic engineer. The minimum trail length shall be five miles. All requests for signing to DNR provided public trails shall be approved by the DNR and MnDOT. Signing for other trails is at the discretion of MnDOT. <p>Signing Method:</p> <ol style="list-style-type: none"> Signing shall only be allowed from the nearest trunk highway intersection or interchange. Signs directing motorists from one trunk highway to another trunk highway shall not be allowed. The format of the Trail Access signs should be as follows: <ol style="list-style-type: none"> Freeway - the official trail name and the freeway exit number. Expressway interchanges - the official trail name and the message NEXT RIGHT At-grade intersections - the word ACCESS plus the official trail name and a directional arrow.

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Trap and Skeet Shooting Ranges	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services – Tourist Oriented Business
Tree Farms/Nurseries	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services – Rural Agricultural Business
Universities					See Educational Institutions
Veterans and War Memorials	<ul style="list-style-type: none"> Brown Custom Design  	1	3	<ul style="list-style-type: none"> Expressway Conventional 	<p>This is an independently located outdoor site built to commemorate veterans of U.S. military actions and/or the actions themselves. In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply:</p> <ol style="list-style-type: none"> The facility shall provide adequate on-site parking or parking in the immediate area of the memorial. The facility should: <ol style="list-style-type: none"> Be of a unique size and presence. Be easily available for public viewing. Not be part of any other building or facility.
Veterinary Clinics	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
Welding and Machine Shops for Agricultural Equipment	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services - Rural Agricultural Business
Wildlife Park/Animal Park	<ul style="list-style-type: none"> D9-X6  	N/E	15	<ul style="list-style-type: none"> Expressway Conventional 	See Specific Services – Tourist Oriented Business

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Facility Type	Sign Design Sign #'s refer to designation in the MnDOT Standard Signs Summary	# of Miles from an Intersection or Interchange		Roadway Type	Sign Program and Facility-Specific Criteria Unless otherwise indicated, the General Criteria apply for all facilities. See MnDOT's Traffic Engineering Manual for placement of signs.
		Urban	Rural		
Wildlife Refuges and Wildlife Management Areas	<ul style="list-style-type: none"> Brown Custom Design  	1	10	<ul style="list-style-type: none"> Expressway Conventional 	<p>This is a facility which is open to the public and offers viewing of a variety of wildlife. In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply:</p> <ol style="list-style-type: none"> The facility shall provide interpretive facilities or programs or provide viewing areas or nature trails. The facility should provide: <ol style="list-style-type: none"> Parking for at least 20 vehicles in rural areas and at least 50 vehicles in urban areas. Restroom and telephone facilities.
Workforce Centers	<ul style="list-style-type: none"> D7-X18  <ul style="list-style-type: none"> Green Custom Design 	1	3	<ul style="list-style-type: none"> Expressway Conventional 	<p>This facility is formed through a partnership between locally based community, county, and state agencies that the general public visits on a regular basis to obtain employment and training services.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, the facility shall have adequate on-premise signing visible to the motorist.</p>
Zoos	<ul style="list-style-type: none"> Brown Custom Design 	5	10	<ul style="list-style-type: none"> Expressway Conventional 	<p>This is a zoological garden or park where a wide variety of living wild animals are kept and safely displayed for public exhibition.</p> <p>In addition to the general criteria for the Minor Traffic Generator Signing Program, all of the following criteria apply:</p> <ol style="list-style-type: none"> The facility shall be registered and approved by the American Association of Zoological Parks and Aquariums. The facility shall provide identification and explanation of displays and wildlife.

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Logo Attraction Sign Categories and Criteria	
Historic Sites or Districts	<p>Historic Sites shall have definite historical significance as determined and approved by the Minnesota Historical Society (MHS) and State Signing Engineer. Requests shall be forwarded to the State Signing Engineer. Historic District requests shall be listed on the National Register of Historic Places. Requests will be accepted from a local government agency and shall contain the following:</p> <ul style="list-style-type: none"> A map of the district. Photographic evidence of street signage. Historic District must be distinguishable through local street signage. Evidence that the district is providing information regarding the district in a publicly accessible location within the district such as a self-service kiosk or welcome center. Include the location of the kiosk, hours open to the public, and a copy of the information provided to the public, such as a pamphlet. Requests shall be forwarded to the State Signing Engineer.
Cultural Sites	<p>Sites shall be limited to include any facility for the live performing arts, exhibits, or concerts. In lieu of hours of operation, the facility must have a seating capacity of 2,500 seats and hold at least 50 events per year.</p>
Recreational Sites	<p>Recreational Area Areas that include recreational activities such as: hiking, bicycling, boating, fishing, kayaking, rafting, public golfing, skiing, and off-highway vehicle riding.</p> <p>Amusement Park A permanent area which is open to the general public for entertainment rides and foods services.</p> <p>Arenas A stadium, sports complex, auditorium, fairgrounds, civic or convention center or racetrack. In lieu of hours of operation, the facility must have a seating capacity of at least 2,500 seats and hold at least 50 events per year.</p> <p>Natural Interest Area An area of natural or scenic beauty shall be limited to a naturally occurring area of interest to the general public, including State or National Parks, forests, nature preserve, wilderness areas, or mountain ranges. A feature created by nature or naturally occurring area of outstanding interest to the general public. Examples include, but are not limited to, unusual rock formations, caves, lakes, rivers, fossil beds, waterfalls, and similar areas.</p>
Educational Sites	<p>Zoo, Aquarium or Botanical Park A non-retail facility in which living animals, insects, fish, or plants are kept and exhibited to the public.</p> <p>Facility Tour Location A facility such as a factory, institution, or plant which conducts daily public tours on a regular scheduled basis during hours of operations.</p> <p>Museum A museum shall be limited to facilities open to the public in which works of historic, artistic, or scientific value are cared for and exhibited. Requests for signing shall be submitted to the State Signing Engineer. These requests will be forwarded to the MHS for recommendations. The Society's recommendations shall govern the Minnesota Department of Transportation's approval or denial of requests. A non-profit museum is also required to be a Federal tax exempt organization [IRC (Internal Revenue Code) 501 (c) (3)].</p>

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Specific Services Signing Program

Specific Services signs may be provided for the following (Minnesota Statute Sections 160.292-160.296).

1. **Gasoline Service Station or other retail motor fuel business** - defined in Minn. Stat. Sec. 160.292, Subd. 13 as "A business that provides vehicle services including fuel and oil; restroom facilities and drinking water; staff for continuous operation at least 12 hours per day, seven days per week; and public access to a telephone."
2. **Motel** - defined in Minn. Stat. Sec. 157.15, Subd. 7 as "a building, structure, enclosure, or any part thereof used as, maintained as, advertised as, or held out to be a place where sleeping accommodations are furnished to the public and furnishing accommodations for periods of less than one week." It shall be licensed by the State Department of Health. Bed and breakfast facilities were previously allowed signing as a tourist-oriented business that met the motel criteria, but are now eligible for signing as a motel.
3. **Resort** - defined in Minn. Stat. Sec. 157.15, Subd. 11 as "a building, structure, enclosure, or any part thereof located on, or on property neighboring, any lake, stream, skiing or hunting area, or any recreational area for purposes of providing convenient access thereto, kept, used, maintained, or advertised as, or held out to the public to be a place where sleeping accommodations are furnished to the public, and primarily to those seeking recreation for periods of one day, one week, or longer and having for rent five or more cottages, rooms, or enclosures."
4. **Place of Worship** (no legislative definition provided) - MnDOT defines a place of worship as any church, chapel, temple, synagogue, mosque, building, area, space, plaza, or dwelling wherein or whereat respect, reverence, or devotion is paid to a Divine Being. There is no restriction on time or frequency of devotional activities. However, the place or structure should be primarily intended for such purpose, and may not be a private home or school or any other site which is not primarily a place of worship.

Minnesota Statute 173 allows religious notices signs to be permitted in areas adjacent to trunk highway right-of-way. If this type of signing is permissible and effective, specific service signs shall not be installed.
5. **Recreational Camping Area** - defined in Minn. Stat. Sec. 327.14, Subd. 8 as "any area, whether privately or publicly owned, used on a daily, nightly, weekly, or longer basis for the accommodation of five or more tents or recreational camping vehicles free of charge or for compensation. "Recreational camping area" excludes:
 - Children's camps
 - Industrial camps
 - Migrant labor camps as defined in Minnesota Statutes and state commissioner of health rules.
 - United States Forest Service camps
 - State Forest Service camps
 - State wildlife management areas or state-owned public access areas which are restricted in use to picnicking and boat landing, and
 - Temporary holding areas for self-contained recreational camping vehicles created by and adjacent to motor sports facilities if the chief law enforcement officer of an affected jurisdiction determines that it is in the interest of public safety to provide a temporary holding area.

The recreational camping area shall meet the following criteria:

 - I. Be licensed by the State Department of Health.
 - II. Provide at least 15 camping spaces.
 - III. Provide modern sanitary facilities (flush, chemical, or incinerator toilets) and drinking water.
 - IV. Services available 24-hours per day.
 - V. Accept all forms of campers (tent, trailer, motor home, etc.) unless restriction is included in the official name ("Smith's Tent Camping" or "Joe's RV Camping").
6. **Restaurant** - defined in Minn. Stat. Sec. 157.15, Subd. 12 as "a food and beverage service establishment, whether the establishment serves alcoholic or nonalcoholic beverages, which operates from a location for more than 21 days annually. Restaurant does not include a food cart or a mobile food unit." A restaurant shall meet the following criteria:
 - a. Provide a continuously staffed food service operation open at least four hours per day, five days per week except holidays as defined in Minn. Stat. Sec. 645.44, Subd. 5, and except as provided for seasonal restaurants.
 - b. Provide seating for at least 20 people.
 - c. Serve meals prepared on the premises (reheated, prepackaged, ready-to-eat food is not food prepared on the premises).
 - d. Possess any required state or local licensing or approval.
 - e. Seasonal restaurants shall provide a continuous staffed food service operation at least four hours per day, five days per week during their months of operation.
 - f. Coffee shops are eligible for signing as restaurants provided that they meet the same criteria with the exception of criteria c.

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Specific Services Signing Program, continued.

7. **Rural Agricultural Business** - defined in Minn. Stat. Sec. 160.292, Subd. 20, as "includes but is not limited to (1) a grain-handling facility, (2) a business providing care and well-being to animals, and (3) the sale of feed or seed."

MnDOT further defines a rural agricultural business as any commercial activity engaged in as a means of livelihood or profit, located completely outside any urban district or suburban area or residence district or business district, which receives the major portion of its income from providing goods, services, commerce trade, or industry directly related to agriculture or providing for the care and well-being of animals. Year-round businesses shall be open a minimum of eight hours per day, six days per week, and 12 months per year. Seasonal businesses shall be open eight hours per day and six days per week during the normal seasonal period.

Agriculture is the science or art of cultivating the soil, producing crops, or raising livestock of any kind and in varying degrees preparing these products for marketing and consumer use. Rural agricultural businesses shall be located in rural areas in order to be eligible.

The following is a list of eligible rural agricultural businesses (see last page of this appendix for a list if ineligible facilities):
 - Agricultural Equipment
 - Commodity storage/elevator
 - Farm implement dealer
 - Food, seed, fertilizer store
 - Greenhouse
 - Humane society
 - Kennel
 - Orchard/produce sales
 - Tree farm, nursery
 - Veterinary clinic
 - Welding and machine shop for agricultural equipment
8. **Tourist Oriented Business** - Minn. Stat. Sec. 160.292 Subd. 25 defines a tourist-oriented business as "(a) a business, service, or activity that receives a major portion of its income or visitors during the normal business season from motorists not residing in the immediate area of the business or activity. (b) Tourist-oriented business includes, but is not limited to (1) a greenhouse or nursery, (2) a bait and tackle shop, (3) a marina, and (4) a gift or antique shop."

A Tourist Oriented business shall have a majority of its retail floor space dedicated to the specific type of business for which signing is being requested. Year-round businesses shall be open a minimum of eight hours per day, six days per week, and 12 months per year. Seasonal businesses shall be open eight hours per day and six days per week during the normal seasonal period.

The following is a list of businesses that are eligible for signs (see last page of this appendix for a list of ineligible facilities).
 - Amusement park
 - Antiques, antique shop (where greater than 50% of total inventory is 50+ years old)
 - Archery range
 - Bait and tackle
 - Bookstore (where greater than 25% of total inventory is 50+ years old)
 - Gift, craft, art sales
 - Marina, boat launch, guide service
 - Miniature golf
 - Recreational rentals (bicycle, boat, canoe, jet ski, snowmobile)
 - Riding stable
 - Trap and skeet shooting range
 - Wildlife park, animal park.

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Specific Services Signing Program, continued.

In addition to the general criteria for all signing programs, all of the following criteria apply for the Specific Service Signing Program:

1. Specific Service signs may be installed in rural areas at at-grade intersections on conventional highways and expressways, and on rural bypasses of outstate municipalities that have interchanges at intersections of trunk highways with local roads or with other trunk highways.
2. A Specific Service sign is allowed on an approach to an intersection if either one or both sides of the approach meets less than four of the following factors:
 - Within corporate limits and/or zoned (residential, commercial, industrial)
 - Curb and gutter
 - Sidewalk/trail
 - Continuous street lighting
 - Posted speed limit of 45 mph or less
 - Multi-lane divided highway
 - Established local road system
 - Frontage roads
3. Minnesota Statutes are not perfectly clear on urban qualifying businesses to be signed from rural intersections. The general authorization for each of the four basic combinations of specific service/intersection locations is summarized as follows:
 - a. Service rural, intersection rural - authorized
 - b. Service rural, intersection urban - not qualified
 - c. Service urban, intersection urban - not qualified
 - d. Service urban, intersection rural - need consideration of the following:
 - I. The environment of the rural intersection as well as municipal boundaries.
 - II. Straight ahead signing if overlapping routes are involved and one route does not serve the municipality.
4. In order to be considered for signing on trunk highways, the following criteria shall be met by the specific service requesting signing:
 - a. Businesses shall conform with all applicable laws and rules concerning the provisions for public accommodation without regard to race, religion, color, sex, or national origin.
 - b. Businesses shall be located within 15 miles of the signed intersection or interchange.
5. Signing shall not be provided if the facility is readily visible or if effective off right-of-way directional signing is present or can be provided. Visibility from the approach to an intersection may be determined by adding 175 feet to Condition B (deceleration to 10 mph from the posted speed) in MN MUTCD Table 2C-4. If the facility can be readily identified or if effective off right-of-way directional signing is legible at this distance or beyond, then signing is not allowed.
6. A facility is limited to signing at one intersection or interchange on the trunk highway system. Additional signing may be considered when the facility is located between, or approximately equal distance from, two or more trunk highways.
7. When a place of business is located off a conventional highway and can be served by two intersections with a local road (e.g. a bypass), one sign may be installed at each of the two intersections to provide the shortest route for motorists on the conventional highway. See Figure 6.36B.
8. A facility that meets eligibility criteria from only one approach to an intersection or interchange shall only be signed from that approach.

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Ineligible Facilities

NOTE: This list is not all-inclusive. It only contains frequently requested signs that are routinely denied or have been determined by MnDOT to be ineligible for signing.

American Legion/VFW and other "fraternal" Facilities	Live Theater (orchestra, band concert)
Athletic Fields	Lumber Yards
Barber Shops	Movie Theaters
Bowling Alleys	Nursing/Senior Citizens Homes or Centers
Butcher Shops	Office Buildings or Facility (Private)
Car Sales/Service/Rentals	Office Parks
Car Washes	Performing Arts Theaters
Carpet Sales	Pet Shops
Cemeteries (except national cemeteries)	Post Offices
Compost Sites	Recreation Equipment Sales/Service
Convenience Stores	Recreational Vehicle sales/service/rental
Correctional Facilities (local and regional)	Rehabilitation Centers
Dance Halls	Repair Business
Day Care Centers	Road Maintenance Facilities
Drive-In Theaters	RV sales/service/rental
Fish Hatcheries	Schools (Elementary, Junior High)
Flea Markets	Second Hand Stores
Forest Preserves (county, state, or federal)	Shopping Centers (other than regional malls)
Game Farms and Preserves	Softball, Baseball, Soccer Fields
Grocery Stores	Sportsman Clubs
Gun Shops	Storage Facilities
Half-way House/Shelter Houses	Swimming Beaches/ Pools
Hardware Stores	Tennis Courts
Health Clubs	Veterans Homes
Ice Cream Shops	Wildlife Treatment Facilities
Laundromats	Any other predominately retail, business or manufacturing center

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5.8 Requester Pay Memo


The following is a handout of Technical Memorandum No. 12-02-T-01 dated January 23, 2012.

Updates to Tech Memos can be found at <http://techmemos.dot.state.mn.us/>.



MINNESOTA DEPARTMENT OF TRANSPORTATION
Engineering Services Division
Technical Memorandum No. 12-02-T-01
 January 23, 2012

To: Electronic Distribution Recipients

From: Jon M. Chiglo, P.E. 
 Division Director, Engineering Services

Subject: Requester-Pay Signing Costs

Expiration

This Technical Memorandum (TM) supersedes TM 11-08-T-03 and will remain in effect until January 23, 2017, unless superseded prior to that date.

Implementation

This technical memorandum, which updates signing costs currently specified in the Traffic Engineering Manual, shall be effective immediately.

Introduction

Requester-pay signs include, but are not limited to, signs for local street and road identification, airports, educational institutions, regional shopping centers, tourist and travel information, economic development and major and minor traffic generators. Major traffic generators are regional attractions which are unique due to their educational, cultural, historical, or recreational experience and public appeal. Examples of minor traffic generators include museums, public water accesses, parks, ski areas, and recycling centers. Requester-pay signs also include Specific Service Signs. Further explanation of these signs can be found in Chapter 6 of the MnDOT Traffic Engineering Manual. Requester-pay sign costs are currently specified in Chapter 6 in the MnDOT Traffic Engineering Manual.

Purpose

The purpose of this technical memorandum is to establish current costs for all types of requester-pay signs, including Specific Service Signs. The costs in this technical memorandum will be reviewed annually and reissued in new technical memoranda as necessary.

Guidelines**Requester-Pay Signing Costs**

The cost for requester-pay signs is composed of a base cost plus a fabrication cost. The base cost includes preparation and installation expenses. The fabrication cost is a per square foot cost based on current prices for full cube prismatic retroreflective sheeting, new aluminum substrate, colored electronic cuttable film, and labor for fabricating each sign. Overhead charges are included in all costs.

The assumptions used to develop the costs in the original Technical Memorandum 97-19-T-06 were also used to develop the current costs contained in Tables 1-3 (see attachment).

All labor costs are based on average hourly wages and benefits for each classification of worker. The average trip is assumed to be 40 miles. The return trip is not charged because it is assumed that other work will be done on the trip. No costs have been included for maintenance.

Specific Service Signs

The charges in Table 4 for Specific Service Signs have been derived from the other attached tables and cost analysis chart for a 9-square-foot sign panel.

-MORE-

Technical Memorandum No. 12-02-T-01
Requester-Pay Signing Costs
January 23, 2012
Page 2

Questions

For information on the technical contents of this memorandum, please contact **Heather Lott**, State Signing Engineer at **(651) 234-7371**.

Any questions regarding publication of this Technical Memorandum should be referred to the Design Standards Unit, DesignStandards.DOT@state.mn.us. A link to all active and historical Technical Memoranda can be found at <http://techmemos.dot.state.mn.us/techmemo.aspx>.

To add, remove, or change your name on the Technical Memoranda mailing list, please visit the web page <http://techmemos.dot.state.mn.us/subscribe.aspx>

Attachments:

- A. Tables (1 - 4)
- B. Cost analysis chart

-END-

Attachment A
 TM 12-02-T-01
 January 23, 2012
 Page 1 of 2

REQUESTER PAY SIGN COSTS

Table 1: Initial Sign Structure and Sign Panel

Sign size	Total Cost [Base Cost] + [(Cost per sq ft) * sq ft of sign panel]	
	Base Cost (1)	Cost per sq ft (2)
up to 20 sq ft	\$678.00	\$19.60
20 - 50 sq ft	\$777.00	\$19.60
50.1 - 90 sq ft	\$904.00	\$20.50

Notes:

- (1) Includes structural materials, equipment, and installation labor costs.
- (2) Includes aluminum, sheeting materials and panel fabrication costs.

Table 2: Replace Sign Panel Only

Sign size	Total Cost [Base Cost] + [(Cost per sq ft) * sq ft of sign panel]	
	Base Cost (1)	Cost per sq ft (2)
up to 20 sq ft	\$216.00	\$19.60
20 - 50 sq ft	\$258.00	\$19.60
50.1 - 90 sq ft	\$300.00	\$20.50

Notes:

- (1) Includes structural materials, equipment, and installation labor costs.
- (2) Includes aluminum, sheeting materials and panel fabrication costs.

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Attachment A
TM 12-02-T-01
January 23, 2012
Page 2 of 2

Table 3: Sign Relocation Costs

Sign size	Cost to move in place sign
0 - 20 sq ft	\$339.00
20.1 - 50 sq ft	\$382.00
50.1 - 90 sq ft	\$424.00

Table 4: Specific Service Sign Costs

Work Type	Total Cost
Initial Sign Structure and Panel Installation	\$854.00
Replace Sign Structure and Sign Panel	\$629.00
Replace Sign Structure or Relocate	\$453.00
Replace Sign Panel	\$392.00

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Attachment B
 TM 12-02-T-01
 January 23, 2012
 1 of 1

REQUESTER-PAY SIGN COSTS

	SIGN SIZE BY CATEGORY												
	up to 20 sq ft				20 - 50 sq ft				50 - 90 sq ft				
	hr	equal	hr	equal	hr	equal	hr	equal	hr	equal	hr	equal	
Labor (includes the Labor Additive of 27.2% AND Maintenance/Billing Overhead of 21.5%)													
1 TGS to field spot sign location and draw up plans for TSS work order	45	\$ 112.50	2.5	\$ 112.50	2.5	\$ 112.50	2.5	\$ 112.50	2.5	\$ 112.50	2.5	\$ 112.50	
1 TGS to locate	45	\$ 45.00	1	\$ 45.00	1	\$ 45.00	1	\$ 45.00	1	\$ 45.00	1	\$ 45.00	
2 TC's to install	42.18	\$ 168.72	5	\$ 210.90	5	\$ 210.90	6	\$ 253.08	6	\$ 253.08	2	\$ 84.36	
2 TC's to relocate and/or remove 1 sign	42.18	\$ 84.36	2	\$ 84.36	2	\$ 84.36	2	\$ 84.36	2	\$ 84.36	0	\$ 494.94	
		\$ 410.58	0	\$ 452.76	0	\$ 452.76	0	\$ 494.94	0	\$ 494.94	0	\$ 494.94	
Sign Structure (includes the Material Handling Charge of 12.59%)													
		\$ 113.49	0	\$ 170.24	0	\$ 170.24	0	\$ 170.24	0	\$ 170.24	0	\$ 170.24	
Equipment (includes Maintenance/Billing Overhead of 21.5%)													
Use average trip mileage of 40 miles	rate / mile	miles	equal										
1/2 ton extended cab pickup for field spotting	0.7	40	\$ 28.00										
1/2 ton extended cab pickup for locating	0.7	40	\$ 28.00										
Sign Truck for sign installation	2.44	40	\$ 97.60										
			\$ 153.60										
TOTAL BASE COST			\$ 677.67				\$ 776.60				\$ 903.89		
SIGN PANEL FABRICATION COST PER SQ. FT.			\$ 19.56				\$ 19.56				\$ 20.45		

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6. 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.

TRAFFIC SIGNS AND DELINEATION

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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.

HANDOUT

HANDOUT

HANDOUT

HANDOUT

6-3.0 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 [MN MUTCD](#), [MnDOT Standard Specifications for Construction](#), this Manual, and any specific conditions outlined in the permit. [District Traffic Engineers](#) should approve all sign installations to ensure that all applicable standards and practices are followed. Additional statutes may also be applicable.

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.

6-4.0 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 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 Manual](#).
3. Light Poles - no signs shall be placed on any light pole that is on a breakaway foundation. 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 square feet at 7 feet up from the roadway; 49-foot mounting height poles may have a sign with a maximum of 6 square feet at 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 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 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. Overhead signs shall not be mounted to railroad bridges.

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

1. General

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.

2. Internally lit street name signs

MnDOT's practice is to install sheet aluminum sign panels on traffic signal mast arms. Internally lit street name signs may be installed by a road authority. The local road authority shall be responsible for all costs of fabrication, installation, power, and maintenance. MnDOT may require that internally lit signs be removed and replaced with standard sheet aluminum if a major problem develops, e.g. driver distraction that causes crashes.

a. General criteria

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

Shop drawings of internally lit street name signs shall be submitted to OTST for review and approval.

b. Sign housing

The sign housing should be either aluminum or stainless steel. All exterior hardware on the housing (hinges, hinge plates, bolts, nuts, and washers) shall be stainless steel.

There shall be a minimum of two rows of fluorescent lamps installed in each internally lit street name sign. One row of lamps will be wired for standby operation. In the event the main row

of lamps fails, the second row of lamps can be activated either automatically or manually by a switching device. Ground access to manual switches should be provided.

The fluorescent lamps should be sized to provide no more than 1.5 to 2 watts per square foot of sign face.

c. Sign face

The sign face shall use translucent diamond-grade 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 lit street name sign may use this color. No other colors will be approved.

The sign legend may be screened or cut from translucent diamond-grade 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 lit 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 the standard size 24" x 24" unless mast arm loading becomes critical. In this case, an 18" x 18" route marker shall be installed.

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 shall 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 Manual](#).

MnDOT guideline is that all warning signs and their supplemental plaques shall be fluorescent yellow. All warning signs and their supplemental plaques associated with pedestrians, bicyclists, playgrounds, and schools shall be fluorescent yellow green. The SCHOOL plaque is also included.

Additionally, the IN-STREET and OVERHEAD PEDESTRIAN CROSSING (R1-6 series and R1-9 series) signs and the SCHOOL SPEED LIMIT (S5-1) sign shall have fluorescent yellow-green retroreflective sheeting for only the warning color parts of the sign as shown in the [MnDOT Standard Signs Manual](#).

6-4.05.03 Size

The sign dimensions are specified in the [MN MUTCD](#) and [MnDOT Standard Signs Manual](#). Increases above these standard sizes are desirable where greater legibility or emphasis is needed. Special designs or large

- 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.

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 in-place 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 desirable 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 desirable 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 it may be desirable to tilt the sign forward or back from the vertical to improve the viewing angle.

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 shall 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 shall develop a method or process for completing the visual inspection and appropriate documentation. Visual inspection shall 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 shall decide 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 shall program any work to be done by contract.

6-4.08.02 Preliminary Design

1. Work authorization
The District shall request a charge identifier.
2. Preliminary plan

The District shall prepare 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>. The plan format and sequence of details is as follows:

1. Title sheet.
2. Statement of Estimated Quantities.
3. Utility Sheet.
4. Sign tabulation sheets giving pertinent information for each sign.
5. Traffic barrier data sheets.
6. Roadway plan sheets for signing.
7. Sign panel drawings for all non-standard signs.
8. Standard details.
9. Structural details.
10. Electrical details.
11. Cross sections for Type A and Type OH signs

Links to DIV ST templates can be found on the OTST website:
www.dot.state.mn.us/trafficeng/signing/plans.html

6-4.08.04 Signing Special Provisions (DIV ST)

The District or OTST, if requested, shall be 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. Sampling, testing, and inspection of all materials shall be done in accordance with the provisions of MnDOT Specification 1603, MATERIALS: SPECIFICATIONS, SAMPLES, TESTS, AND ACCEPTANCE.

2. Technical assistance

OTST shall provide technical assistance to District project personnel as requested. Also, OTST shall inform the Project Engineer of any contacts initiated by suppliers, etc., concerning project matters.

3. Placement of signs

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

The importance of the positioning of overhead sign panels cannot be overemphasized. Project personnel shall notify the State Signing Engineer if panel placement is not 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.

6-5.0 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, the signing shall be installed either by the District or by 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, shall be installed either by the business (by permit) or by the District, in accordance with state standards. Maintenance will be performed by MnDOT.
 - 2) Signing at an entrance to a proposed new development, if warranted, shall be 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.

4. WEIGHT RESTRICTION AHEAD Sign (W14-X3)

The WEIGHT RESTRICTION AHEAD sign should be installed in advance of bridge weight limit signs.



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) shall 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 shall 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.

Bypass lanes shall be signed in accordance with the following guidelines:

1. T-intersections - the 30" x 30" BYPASS LANE sign shall be installed at the beginning of the full width portion of the bypass lane.
2. Four-legged intersections - the 30" x 30" BYPASS AND TURN LANE sign shall be installed at the beginning of the full width portion of the combined bypass/turn lane.



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.

HANDOUT

HANDOUT

HANDOUT

HANDOUT

6-5.12 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.

6-5.13 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.

6-5.13.01 Speed Limit Sign (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.

6-5.13.02 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. The speed limit shall not exceed 70 mph. A Speed Limit (R2-1) sign may be used if a traffic investigation determines that a minimum speed limit is not required.

- b. Expressways: 36" x 42" size

NOTE: There shall be adequate spacing for each sign as determined by the District Traffic Engineer.

4. The request for installation of a sign(s) shall be made through the community.
5. It is the responsibility of the local law enforcement agency to enforce the sign(s).
6. The District Traffic Engineer may require that the community pass a resolution stating that it will enforce Minn. Stat. Sec. 169.69 (MUFLER) and Minn. Stat. Sec. 169.693 (MOTOR VEHICLE NOISE LIMITS) prior to installing the sign(s).

Fabrication and Installation Guidelines

The District Traffic Engineer shall determine which of the following installation methods shall be used:

1. The requesting community may fabricate and install the sign(s) with their own forces or under contract. A permit from MnDOT shall be required for placement of signs on trunk highway right-of-way. The location of the sign shall be determined by the District Traffic Engineer.

The sign panel shall be fabricated with sheet aluminum and retroreflective sheeting in accordance with MnDOT standards.

If a sign structure is to be located within 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.

All future maintenance of signs (knockdown, replacement, etc.) shall be the responsibility of the community.

2. MnDOT forces may fabricate and install the sign(s). The requesting community shall pay all fabrication and installation costs prior to the start of the work.

All future maintenance of signs will be performed by MnDOT forces at the expense of the community.

6-6.0 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.



- 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.

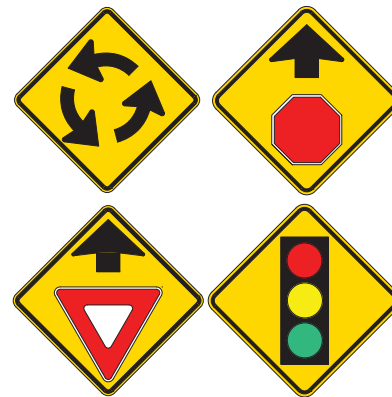
6-6.03 Advance Warning Signs on Local Road Approaches (W2-6a, W3-1, W3-2, and W3-3)

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).

- 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.
- 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 shall 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 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](#)):

- 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.

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.

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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 $D = 5729.578/\text{Radius}$.

6-6.09 Controlled Burning Signs

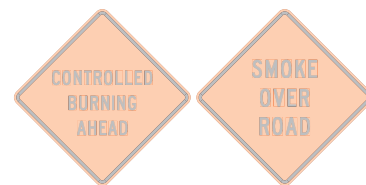
When controlled burning on trunk highway right-of-way occurs, a CONTROLLED BURNING AHEAD sign (W14-X12) should be installed prior to the burn area at a distance in conformance with the [MN MUTCD](#) Table 2C-4 or [Chart 6.4](#) of this chapter.

If the CONTROLLED BURNING AHEAD sign is installed, the SMOKE OVER ROAD sign (W14-X13) shall be installed beyond the CONTROLLED BURNING AHEAD sign to warn motorists.

Installation of a SMOKE OVER ROAD sign may require relocating the CONTROLLED BURNING AHEAD sign to allow adequate distance between the two signs.

The signs should be installed on temporary stands.

In the event that a portable changeable message sign (PCMS) is to be used in conjunction with the above signing to alert motorists, the PCMS should be located at least 1000 feet ahead of the advance sign(s).



6-6.16 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.



6-6.17 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.

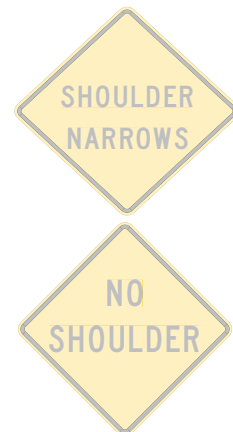
At high-speed locations where the right side shoulder width abruptly reduces by at least three feet and results in a usable width of less than six feet, a SHOULDER NARROWS sign may be installed.

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.



6-6.18 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”.



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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.

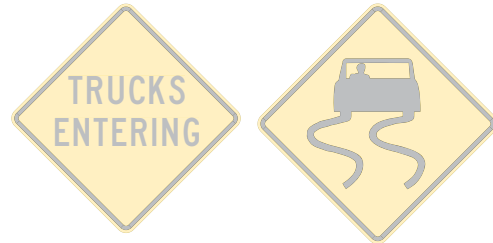
A two-line Distance (W20-100p) plaque may be installed on the left post directly below the speed reduction sign at the option of the District Traffic Engineer. Mounting height for a secondary sign mounted to one riser post is shown in Figure 6.1 of this chapter.

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

6-6.19 Truck Hauling Signs

6-6.19.01 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.

6-6.19.02 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.

6-6.20 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.

6-6.21 Truck Rollover Warning Sign (W1-13)

If used, the advisory speed posted on these signs shall 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.

6-6.22 WATCH FOR BUSES ON SHOULDER Sign (W14-X9)

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



6-6.23 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.



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6-7.0 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 as well as the exit number on freeways. Criteria for selecting destinations is shown in this section under 6-7.03 Signing Destinations.

Urban and suburban exits to local road systems shall be identified by route number, street name, and exit number. Information on the use of destination signs is shown in this section under 6-7.03 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. In no case shall signs directing motorists to secondary or supplemental destinations 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:

- ***HANDOUT***
- a. Only one destination sign is permitted from the closest state highway on each approach to an intersection.
 - b. The destination shown for each direction should ordinarily be the next county seat or the next principal city, rather than a more distant destination.
 - c. Destination cities should be used which will be most meaningful to the motorist unfamiliar with the area. Lakes and rivers shall not be used as destinations.
 - d. Normally only one destination per route or direction should be identified. Not more than three city names should be on one sign. A few exceptions have been made where multiple routes intersect at junctions. Arrangement of arrows on a sign panel shall be consistent with the [MN MUTCD](#).
 - e. Destinations shall be located on the intersected numbered highway. The destination selected for each route, in order of preference, should be:
 - 1) The county seat, if it is not too distant.
 - 2) The first city located at an important junction.
 - 3) The first large city, taking into account the size of cities in the general area.
 - 4) The next important junction.
 - 5) In rare instances, a major state or national park or other significant geographical site or traffic generator may be considered.
 - f. The following guidelines shall be met for a city to be added to an existing destination sign:
 - 1) The existing sign displays less than three cities/destinations.
 - 2) The city shall meet the selection criteria in a-e above.
2. Signing Destinations - Freeways and interchanges on expressways.

[MN MUTCD](#) Section 2E.13 provides guidance for destination signs on freeways. The following criteria also apply:

a. Rural

One or two destinations identifying the interchange may be included on primary guide signing for rural interchanges, based on the following criteria:

- 1) Where the intersecting road is a U.S. or State highway, the destinations shown shall usually be the first city in each direction which is a county seat or is located at a junction with another major highway, unless another city better identifies the interchange to the majority of travelers.
- 2) At interchanges with county or secondary roads, the destination shown shall usually be the nearest city in each direction. Cities identified on guide signs shall appear on the official Minnesota Highway Map. In the absence of such a city, a geographical area or other significant public land use may be shown.

In rural areas, one supplemental guide sign naming cities that did not qualify for display on the primary guide signing may be placed in each direction.

A city in each direction along the intersected route may be signed in accordance with the following:

- 1) The city(ies) shall be required to pay all of the signing costs (if new signs are installed or existing signs are modified or replaced) if the request is approved prior to the normal replacement of the existing signing.
- 2) The city(ies) shall not be required to pay for signing if the approved signing can be

included in conjunction with the replacement of existing signing through attrition.

In both of the above cases, the maintenance of requested signing shall be performed by MnDOT at no cost to the city(ies).

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 destination sign:

- a. The existing sign displays less than three cities/destinations.
- b. The city shall pay for all sign replacement costs if the request is made prior to the sign requiring replacement.
- c. The city shall meet the selection criteria as previously listed.

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

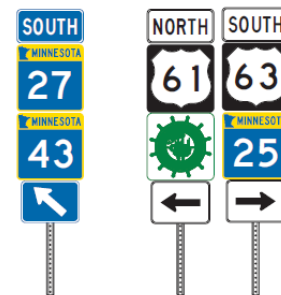
The following typical sign installations should be used as guidelines in establishing sign locations and distances between signs at junctions. The final decision shall be made by the District Traffic Engineer based on individual intersection geometrics and engineering judgment.

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

Independent route markers used on junction and directional sign assemblies shall follow the [MN MUTCD](#) Sections 2D.29 – 2D.32 for conventional roads and [MN MUTCD](#) Section 2E.27 for expressways and freeways.

In general, 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 shall be used to supplement the interstate and Minnesota route markers and black on white auxiliaries shall be used to 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, route markers should be installed 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 the following guideline should be used 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.



6-7.06 Named Road, Street, and 911 Road Name Signs

This section is based on Chapter 2D, Guide Signs - Conventional Roads (see Sections 2D.2 and 2D.43) of the [MN MUTCD](#).

Road name or street signs shall be white legend on green background and fully retroreflectored in accordance with current MnDOT requirements.

Street name signs are typically installed on a sign structure which must conform to FHWA breakaway requirements based on the current edition of the AASHTO Standard Specifications for Highway Signs, Luminaires and Traffic Signals.

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- 3) If the road authority requests new advance road name signs and cannot pay for their fabrication and installation, MnDOT will schedule the replacement based on road authority priority and the availability of MnDOT funds if the existing road name signs are removed before the end of their useful life.
- 4) If the road authority does not request new advance road name signs, new signs shall not be installed.

6-7.06.05 911 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:

1. 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.
2. Sign panel size is typically 16 inches long x 6 inches high.
3. Mounting height is a minimum of four feet from the bottom of the sign panel to the near edge of the pavement (driving lane).
4. 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.)
5. 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.
6. 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 Manual](#).

6-7.07.01 City Name Sign (I2-3)

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 shall not be abbreviated.

All city name signs shall include the population figure. The figure used shall be that of the last official Federal or State census. Population figures are changed only after an official census. If a community decides that it does not want the population included on this sign, MnDOT will cover this legend.

An exception to the above applies to unincorporated communities which warrant city name signs, but for which population counts are not available. The sign installed at these locations shall 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. 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.

- 5) If a sign panel is greater than 24 inches and less than or equal to 30 inches in height, it shall be attached to the sign post furthest from the roadway. When the existing sign structure is located on the backslope, this sign panel shall be attached to the sign post nearest to the roadway. Inplace sign panels less than 24 inches in height shall be relocated to another sign post to make room for the new, larger sign panel.
- 6) 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 shall decide which of the two sign panels shall be 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)

COUNTY NAME sign shall be installed 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.

Site viewing, explanatory signs, and trail signs as needed shall be located completely off the roadway and shoulder areas.

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

Signing for drainage divides shall be paid for by the requester.

a. Freeways

For designated routes along freeways, signs shall first be considered to be installed in rest areas. If installation of a sign in the nearest rest area or road is not practical, installation of the sign at the top of the freeway entrance ramp shall be considered. If memorial signs are installed on freeway entrance ramps, one sign in each direction of travel may be installed at the top of the nearest entrance ramp at the beginning of the designated route. If installation of a sign on the entrance ramp is not practical, then installation of the sign on the mainline may be considered. If signs are installed on the mainline, one sign in each direction of travel at or near the beginning of the designation may be installed. In all cases, memorial signs shall 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 shall 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 with the [MN MUTCD](#). One sign in each direction of travel at or near the beginning of the designation may be installed and shall 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 shall 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](#)).

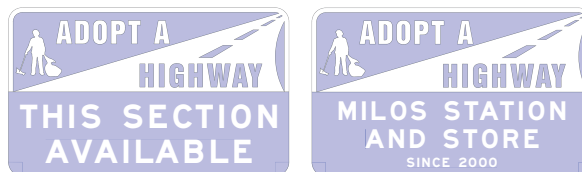
6-7.09 Supplemental Guide Signing Programs

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](#).

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 shall 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. At that time, the complete sign panel shall be replaced with the most current sign panel design.

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.

that does not detract noticeably from legibility) with a maximum number of 14 characters per line (including spaces between words). Abbreviations, if used, shall 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.
- m. Arrows shall not have encircling accents or contrasting mini-backgrounds.
- n. 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.
- o. All sign panel designs should be reviewed by the MnDOT District Traffic Office before fabrication.
- p. The sign shall not contain any animated or moving parts or flashing disks.
- q. 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 shall 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 of this 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 [6-10.03.06 Tangent](#) of this Chapter.

6-8.06 Rest Area Signing

Signing for Rest Areas is shown in the [MN MUTCD](#) Section 2I.5.

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 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

Three-cable guardrail shall be delineated 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.

6-10.03.03 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.

6-10.03.04 Intersections

Intersection delineation guidance can be found in [MN MUTCD](#) Section 3F.4.1. When used, white cylinder style delineators shall be used when placed as shown in MN MUTCD Figure 3F-2. Delineation of intersection median corners on divided-highway crossovers is shown in Figure 6.43. When used, yellow cylinder style delineators shall be used in medians to conform to the color of the edge lines.

6-10.03.05 Lane Reductions

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

6-10.03.06 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).

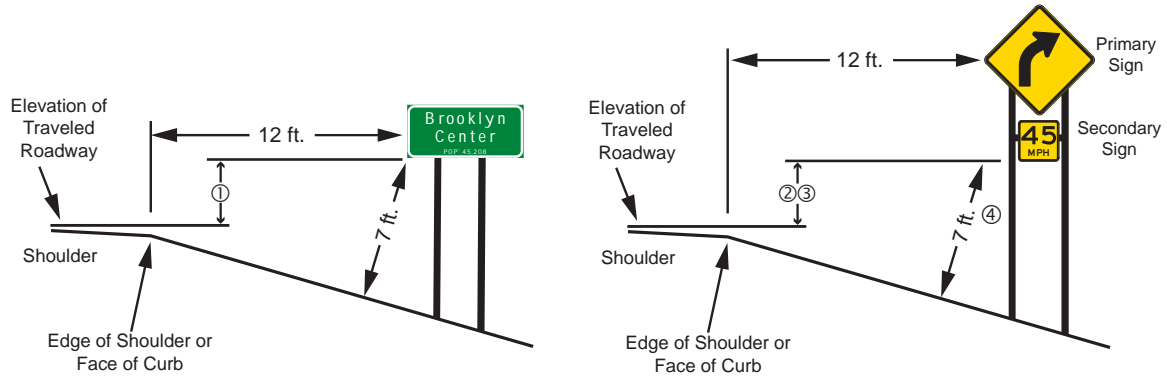
6-10.03.07 Vertical Curves

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.

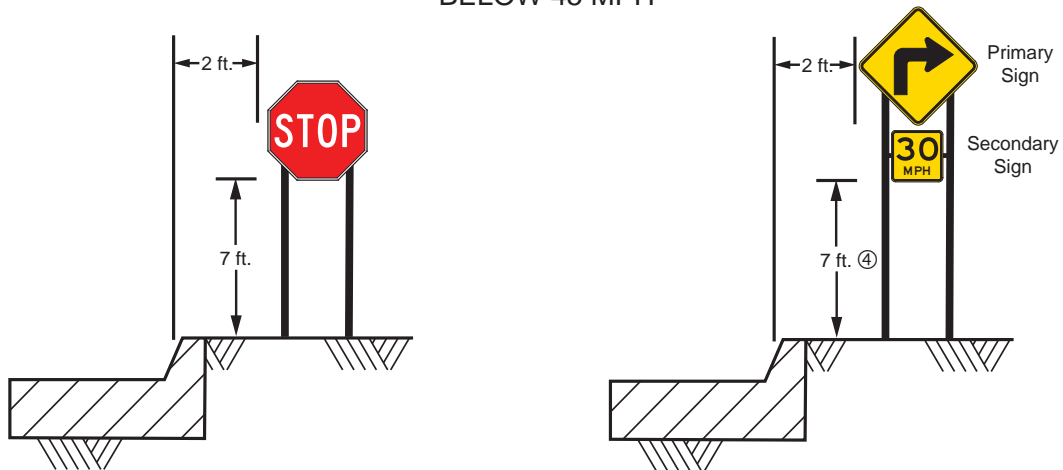
6-11.0 REFERENCES

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.
6. MnDOT Bikeway Facility Design Manual, current edition, <http://www.dot.state.mn.us/bike/design-engineering.html>

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
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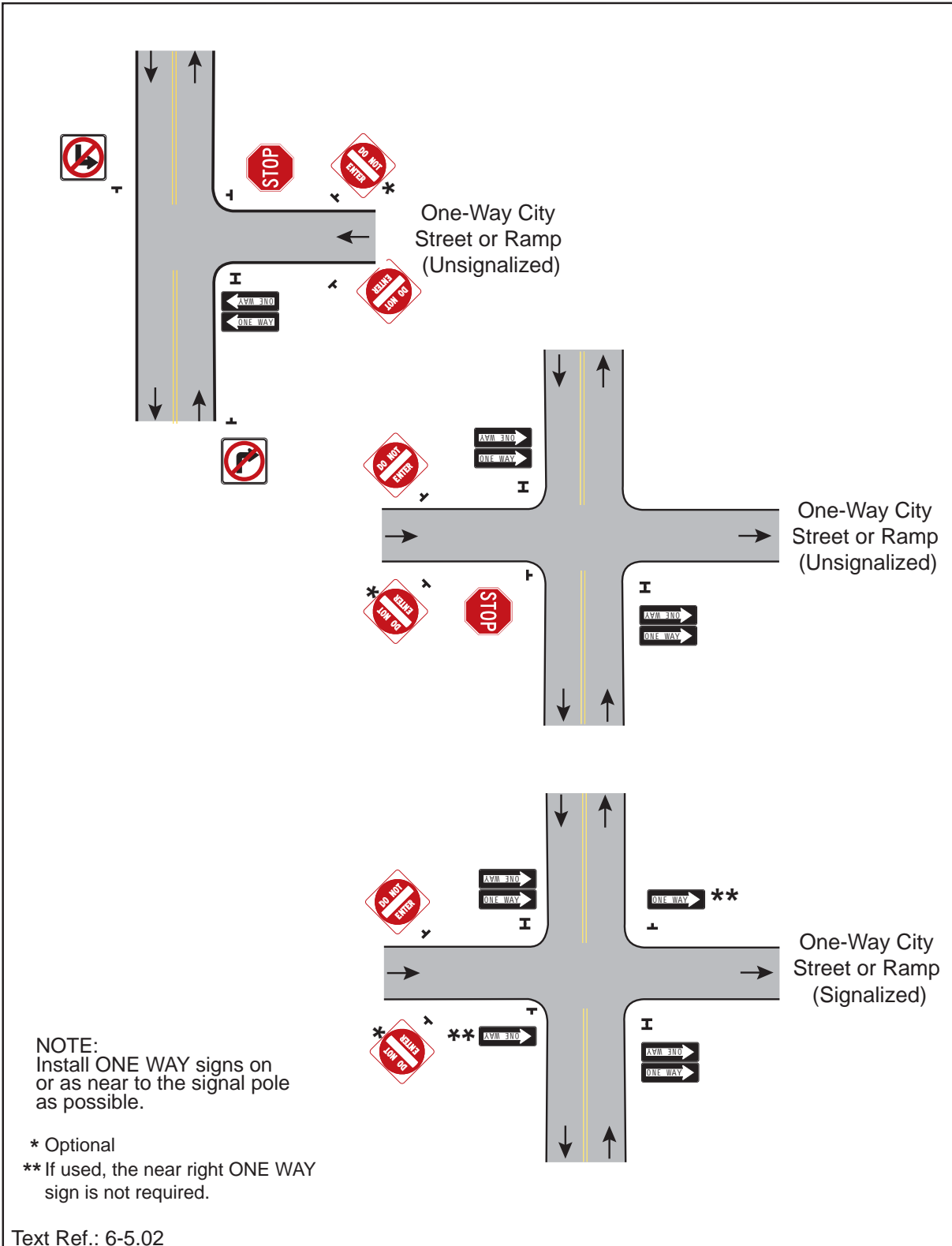
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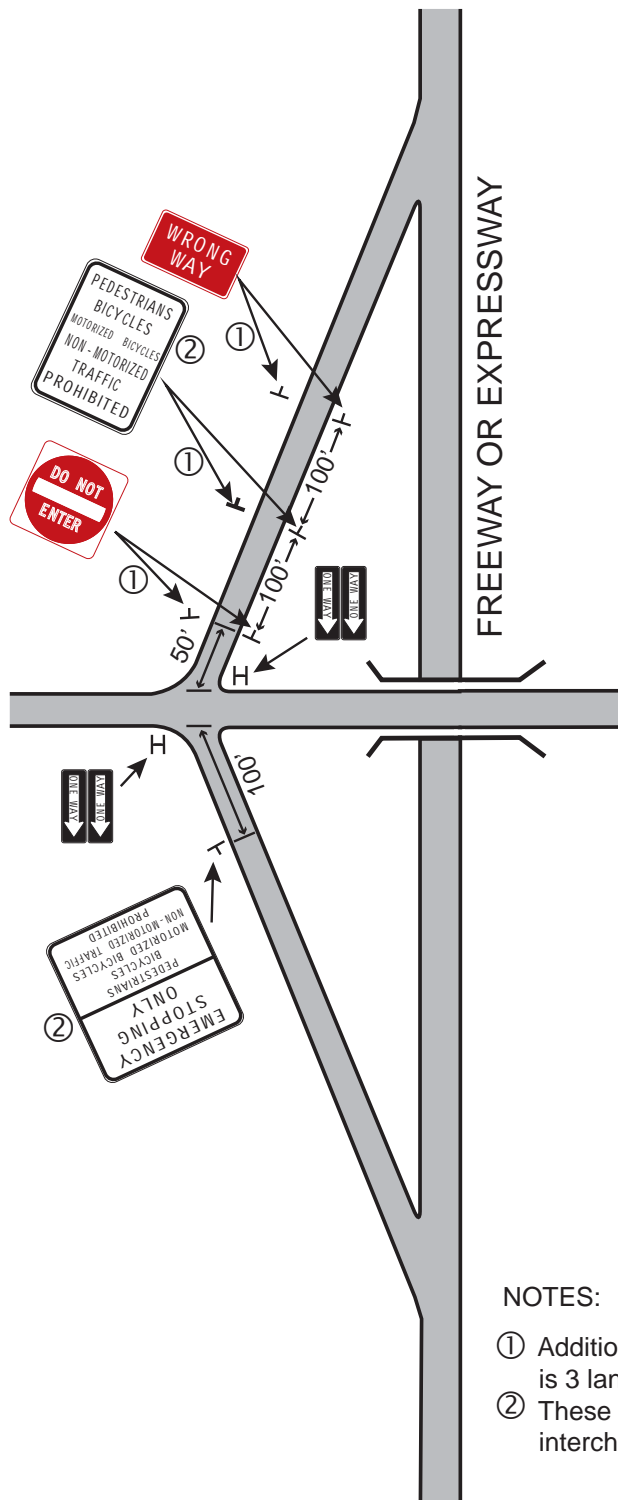
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Text Ref.: 6-5.02

<p>May 2015</p>	<p>HIGHWAY INTERSECTIONS WITH ONE-WAY STREET/RAMP</p>	<p>FIGURE 6.9</p>
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NOTES:

- ① Additional sign required on left when ramp is 3 lanes or wider.
- ② These signs are not installed on expressway interchange ramps.

Text Ref.: 6-5.02

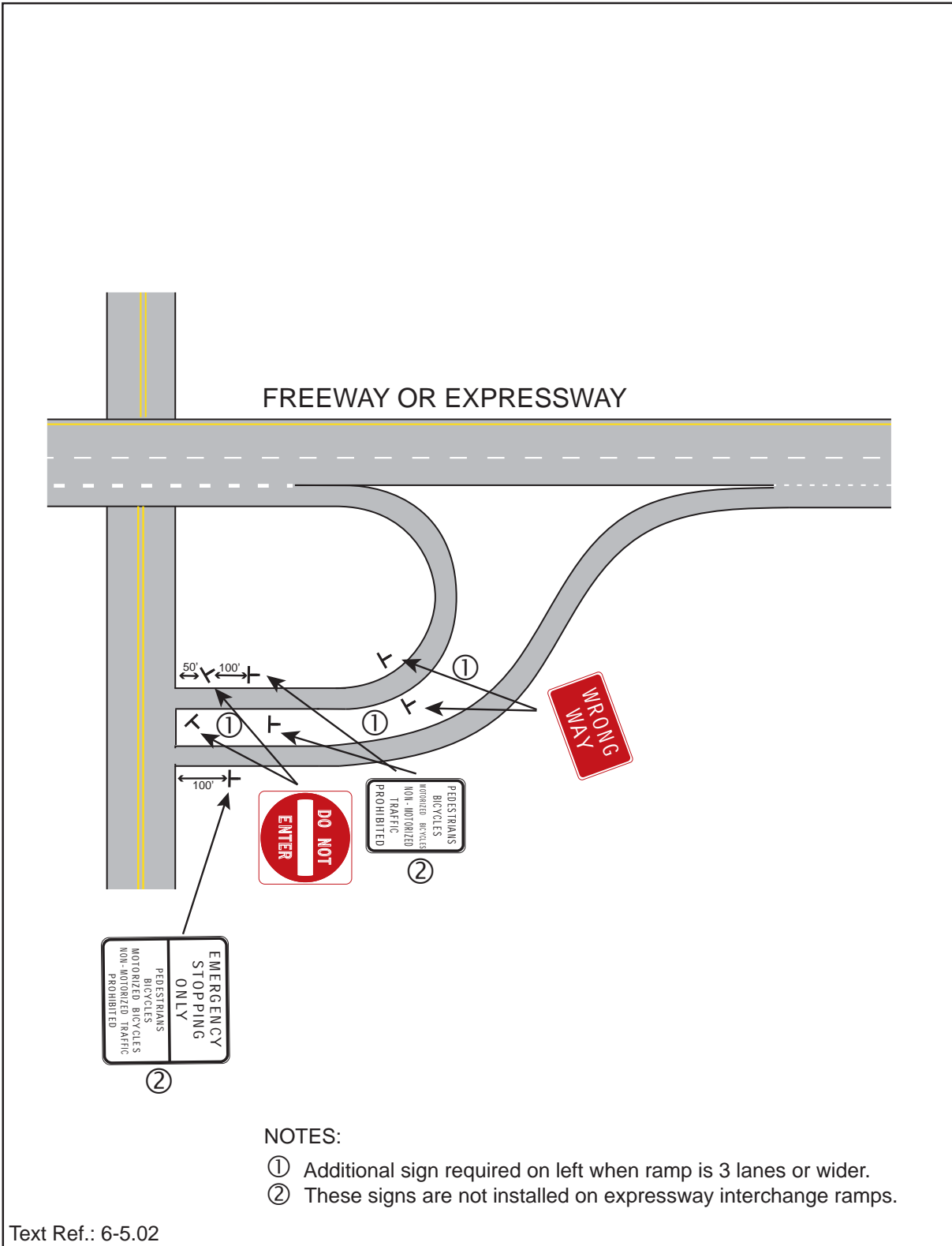
<p>May 2015</p>	<p>STANDARD SIGN PLACEMENT WRONG WAY AND EXCLUSIVE SIGNS ON INTERCHANGE RAMPS</p>	<p>FIGURE 6.12</p>
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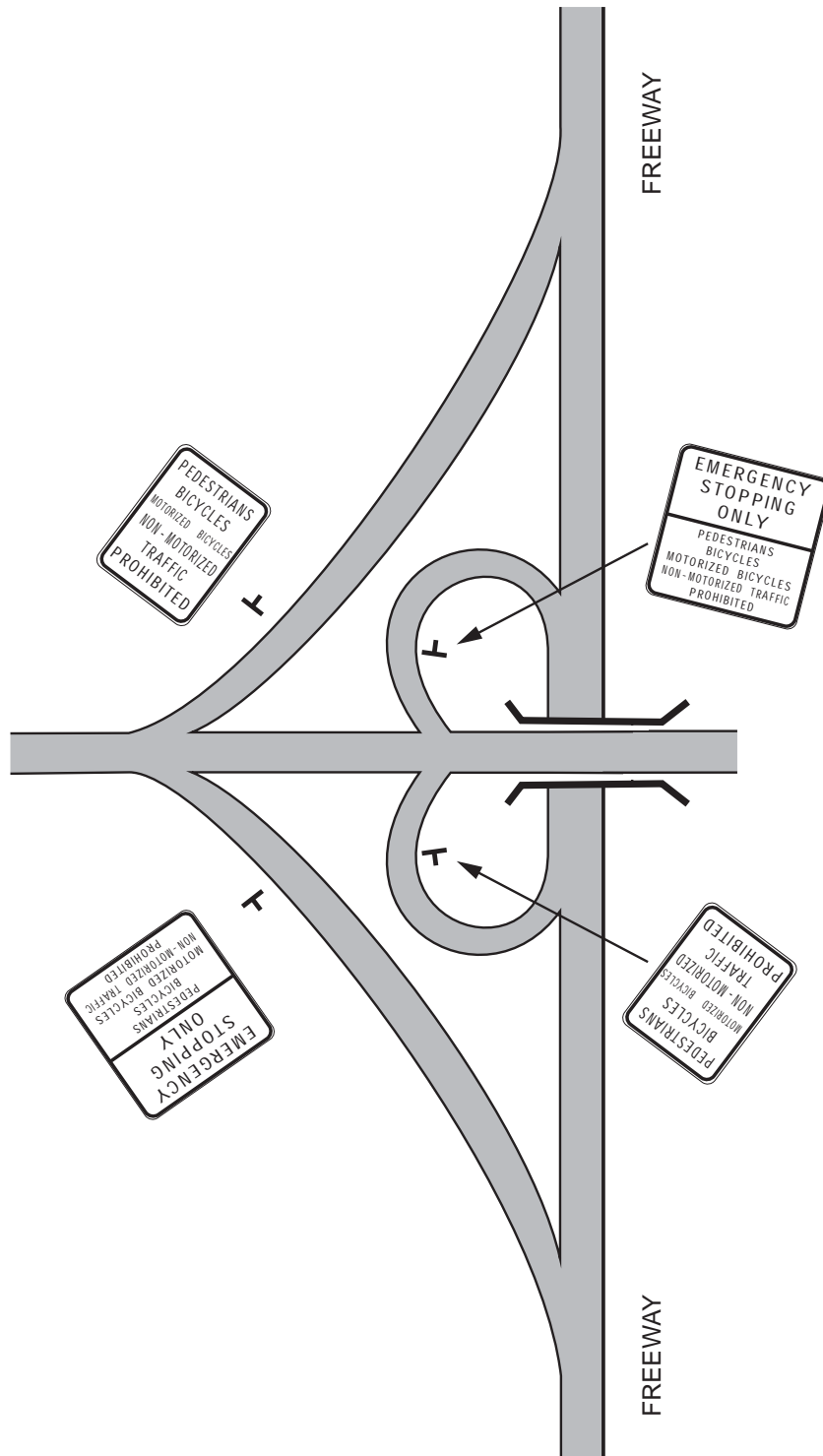
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May 2015	STANDARD SIGN PLACEMENT WRONG WAY AND EXCLUSIVE SIGNS ON INTERCHANGE RAMPS	FIGURE 6.13
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Text Ref.: 6-5.02

<p>May 2015</p>	<p>REGULATORY SIGNS ON CLOVERLEAF INTERCHANGE RAMPS</p>	<p>FIGURE 6.14</p>
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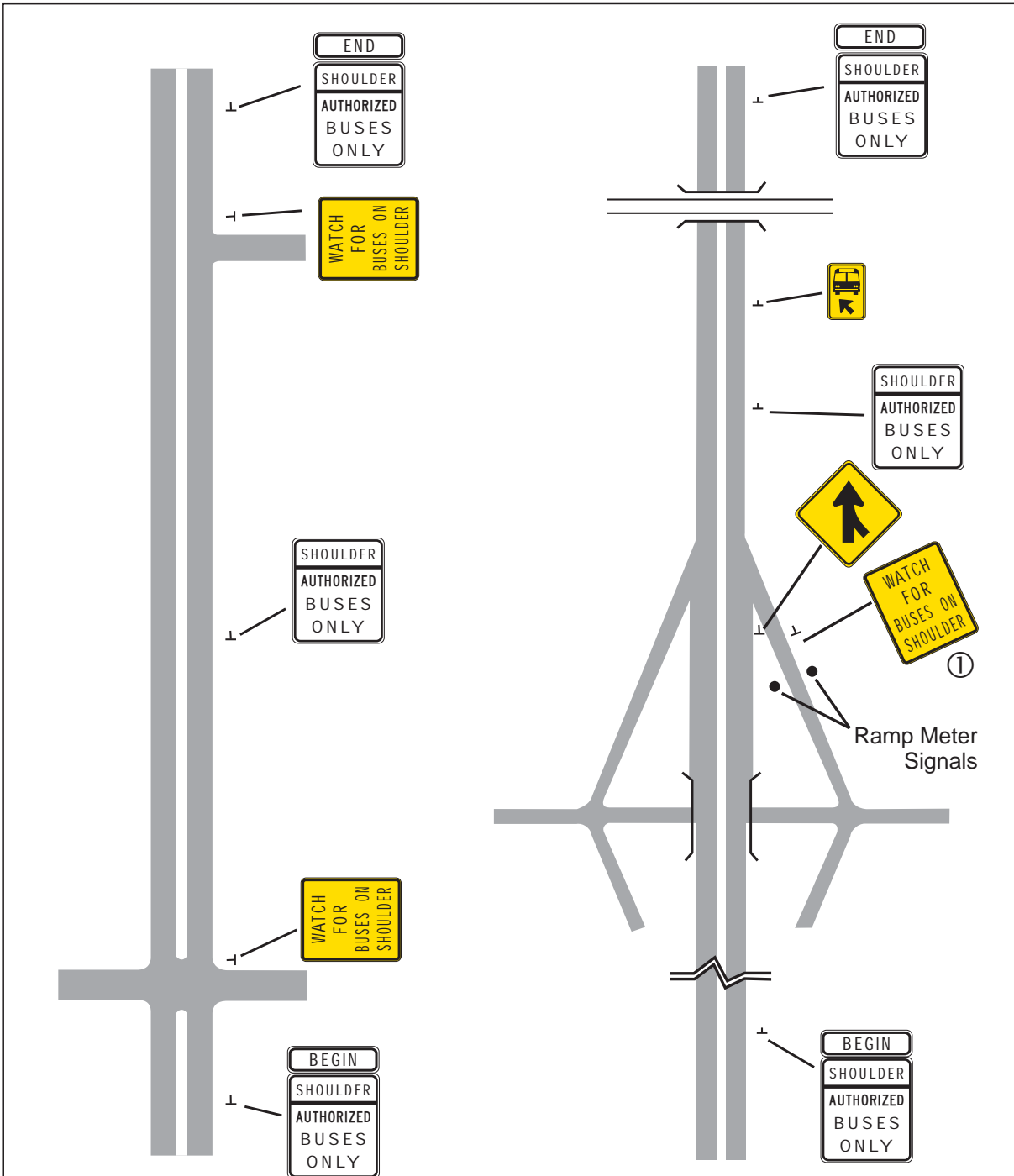
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NOTE:

- ① The WATCH FOR BUSES ON SHOULDER signs shall be located beyond the ramp meter signals.

Text Ref.: 6-5.04

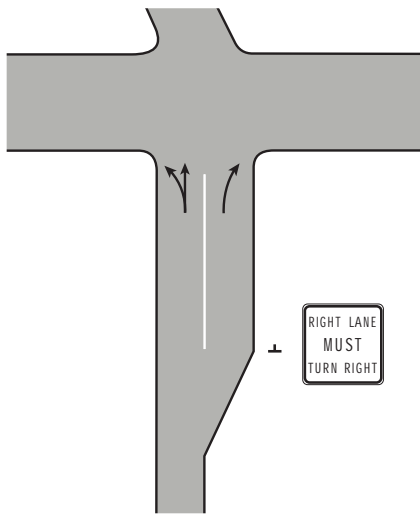
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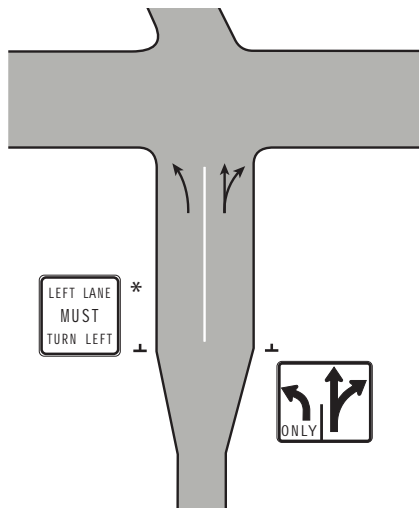
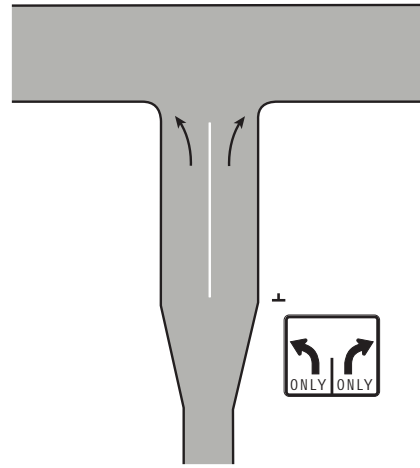
<p>May 2015</p>	<p>AUTHORIZED BUS ONLY SHOULDER SIGNING</p>	<p>FIGURE 6.15</p>
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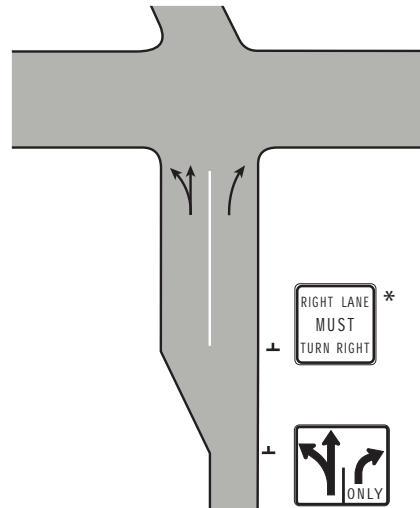
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Single right or left turn lane



Shared through/right or left turn lanes with or without through lanes



NOTE:
 Signing should be based upon geometrics such as lane development and turn lane lengths and taper lengths rather than strictly on the lane configuration.

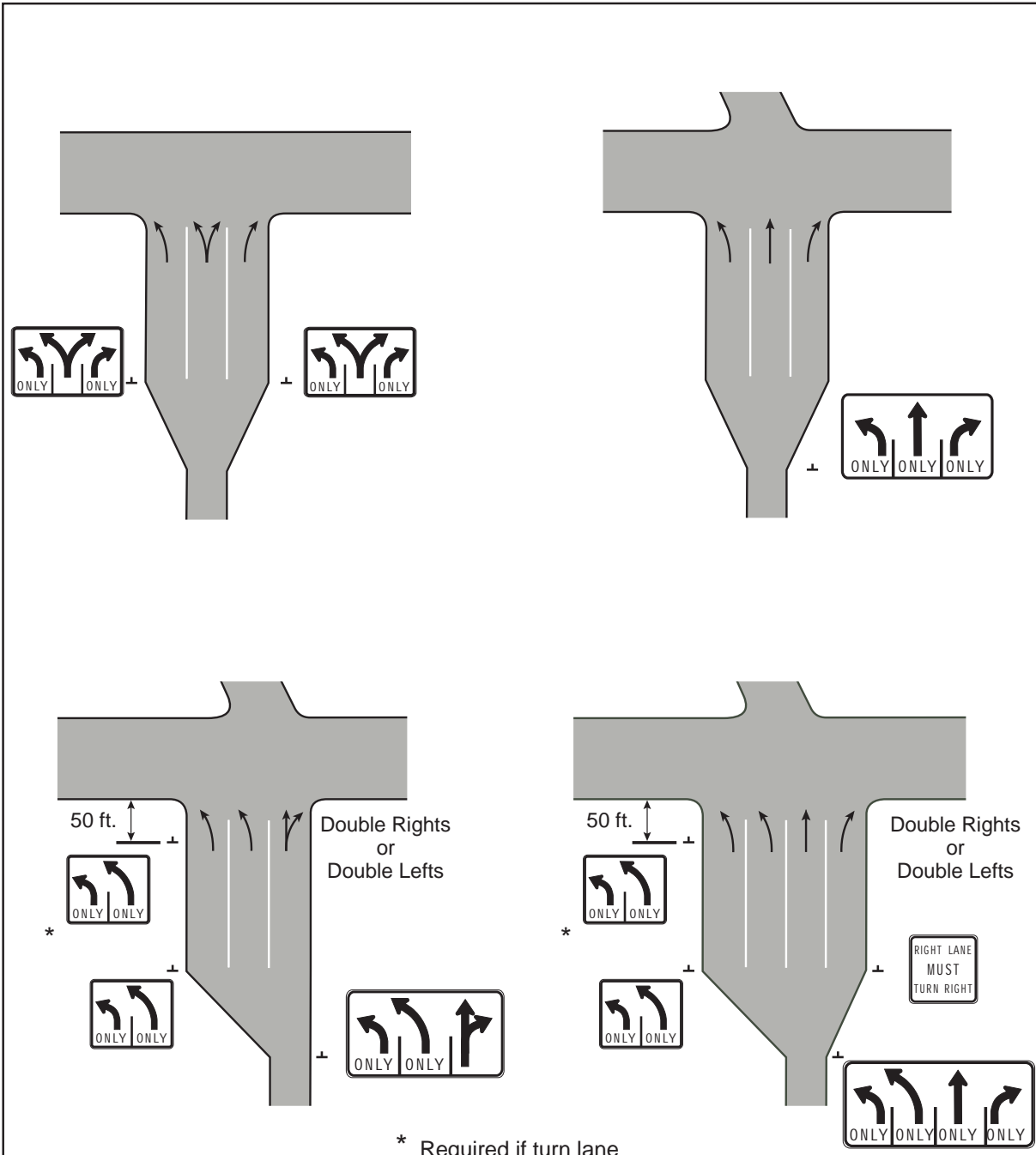
* Optional

Text Ref.: 6-5.11

<p>May 2015</p>	<p>ADVANCED INTERSECTION LANE CONTROL SIGNS (1 OF 2)</p>	<p>FIGURE 6.17A</p>
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HANDOUT

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* Required if turn lane is longer than 300 feet.

NOTES:

1. Signing should be based upon geometrics such as lane development and turn lane lengths and taper lengths rather than strictly on the lane configuration.
2. An overhead structure should be installed if there are 3 or more left turn lanes.

Text Ref.: 6-5.11

<p>May 2015</p>	<p>ADVANCED INTERSECTION LANE CONTROL SIGNS (2 OF 2)</p>	<p>FIGURE 6.17B</p>
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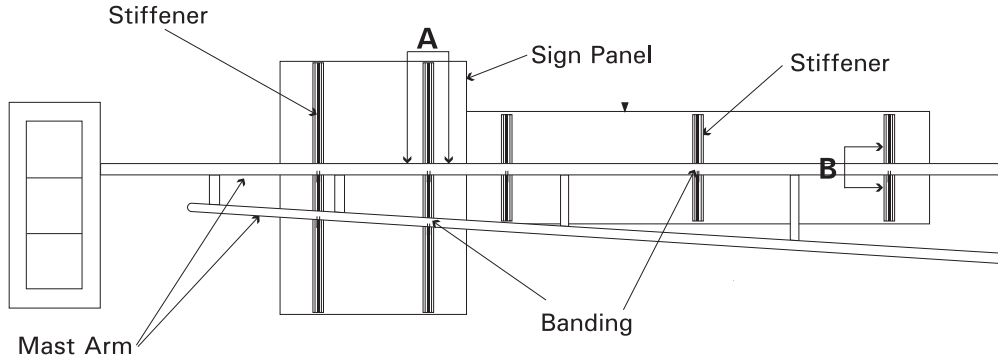
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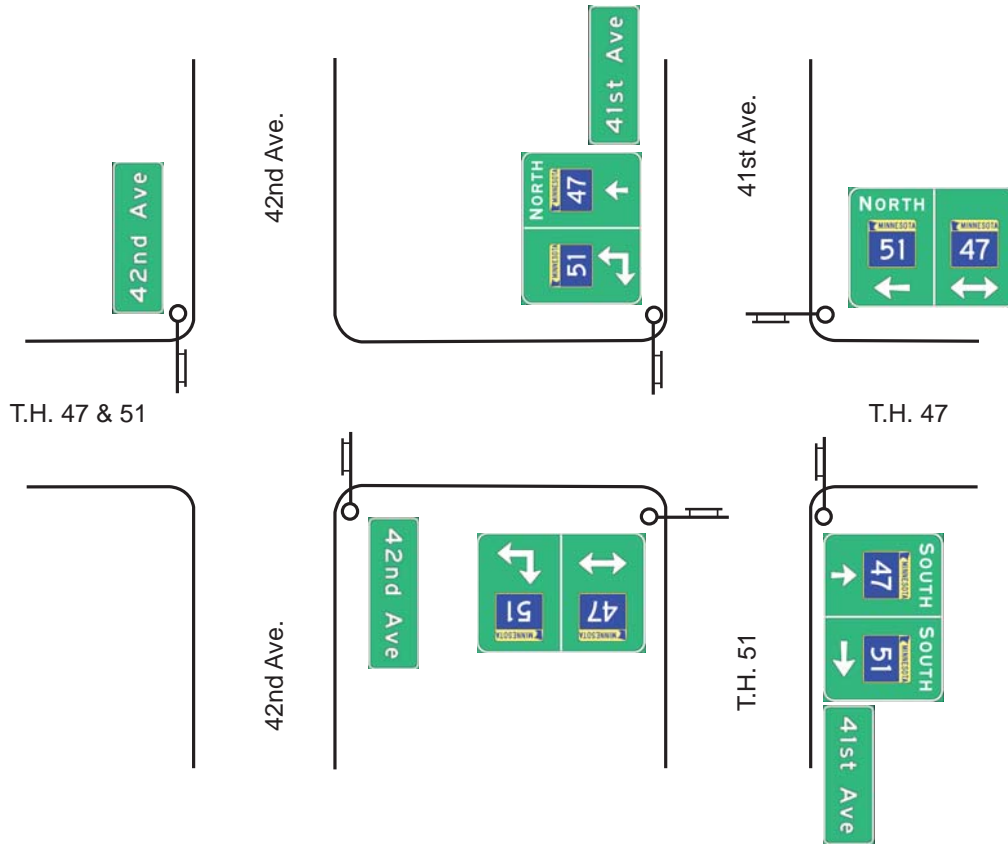
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TYPICAL MAST ARM SIGN MOUNTING



See MnDOT Standard Signs 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
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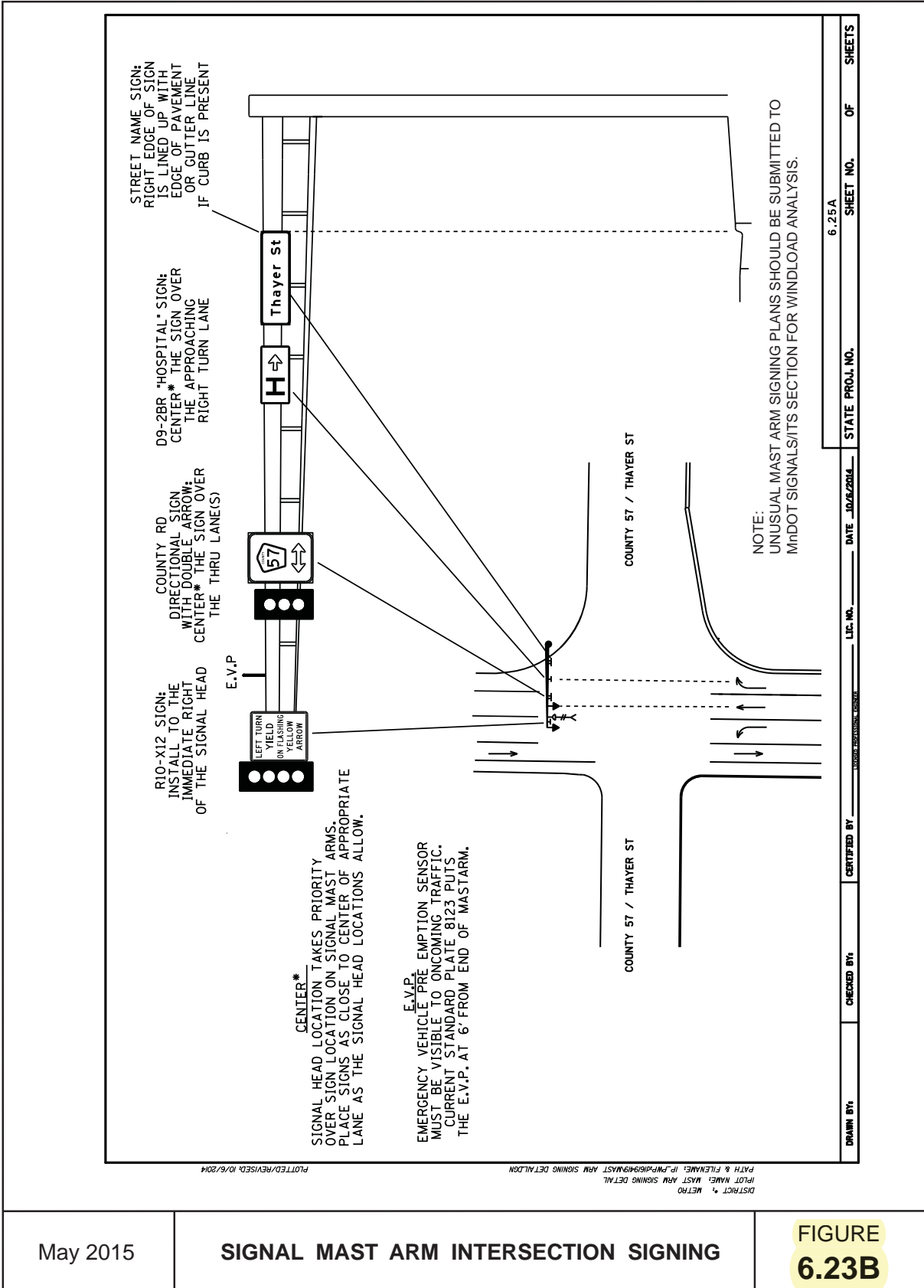
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May 2015

SIGNAL MAST ARM INTERSECTION SIGNING

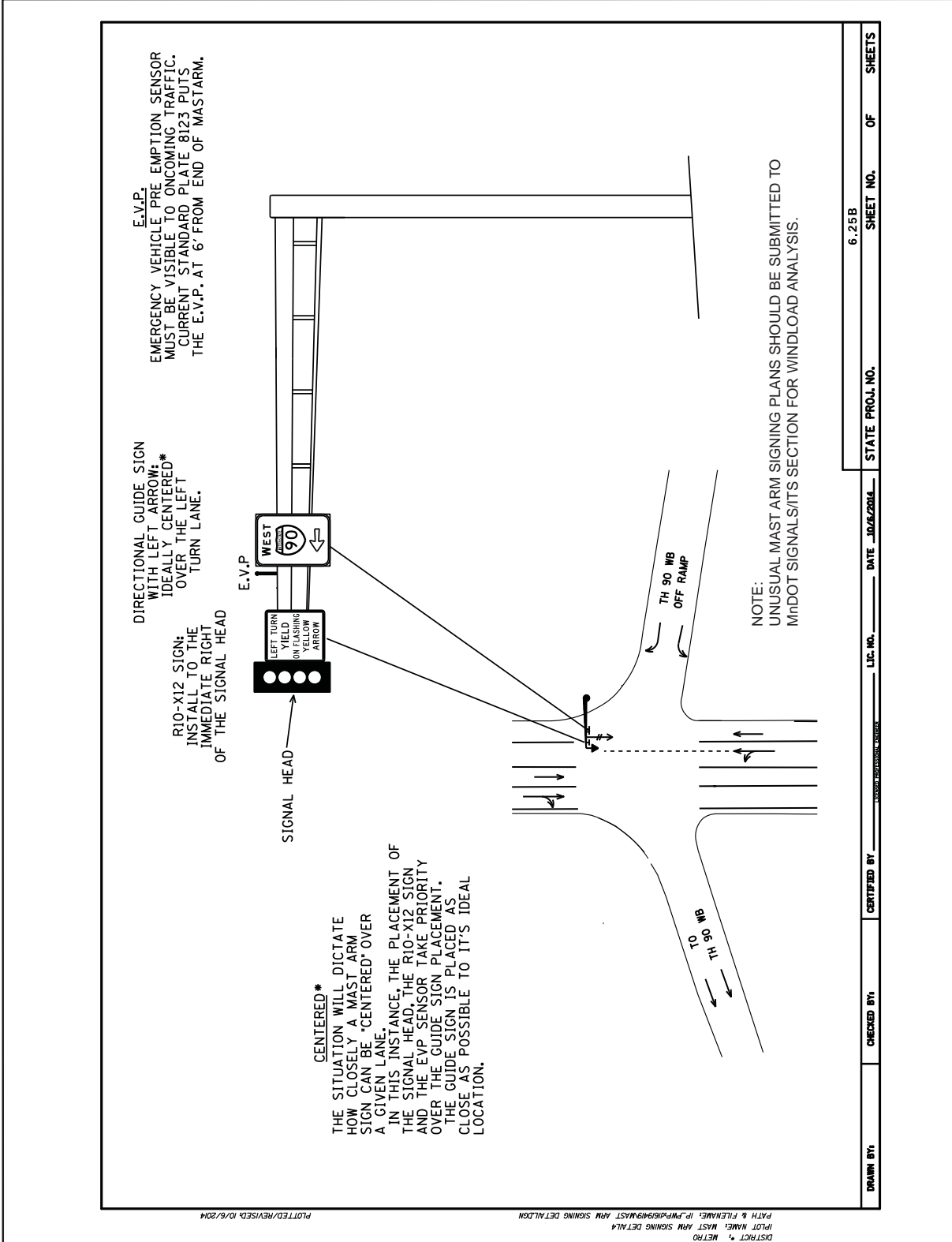
FIGURE 6.23B

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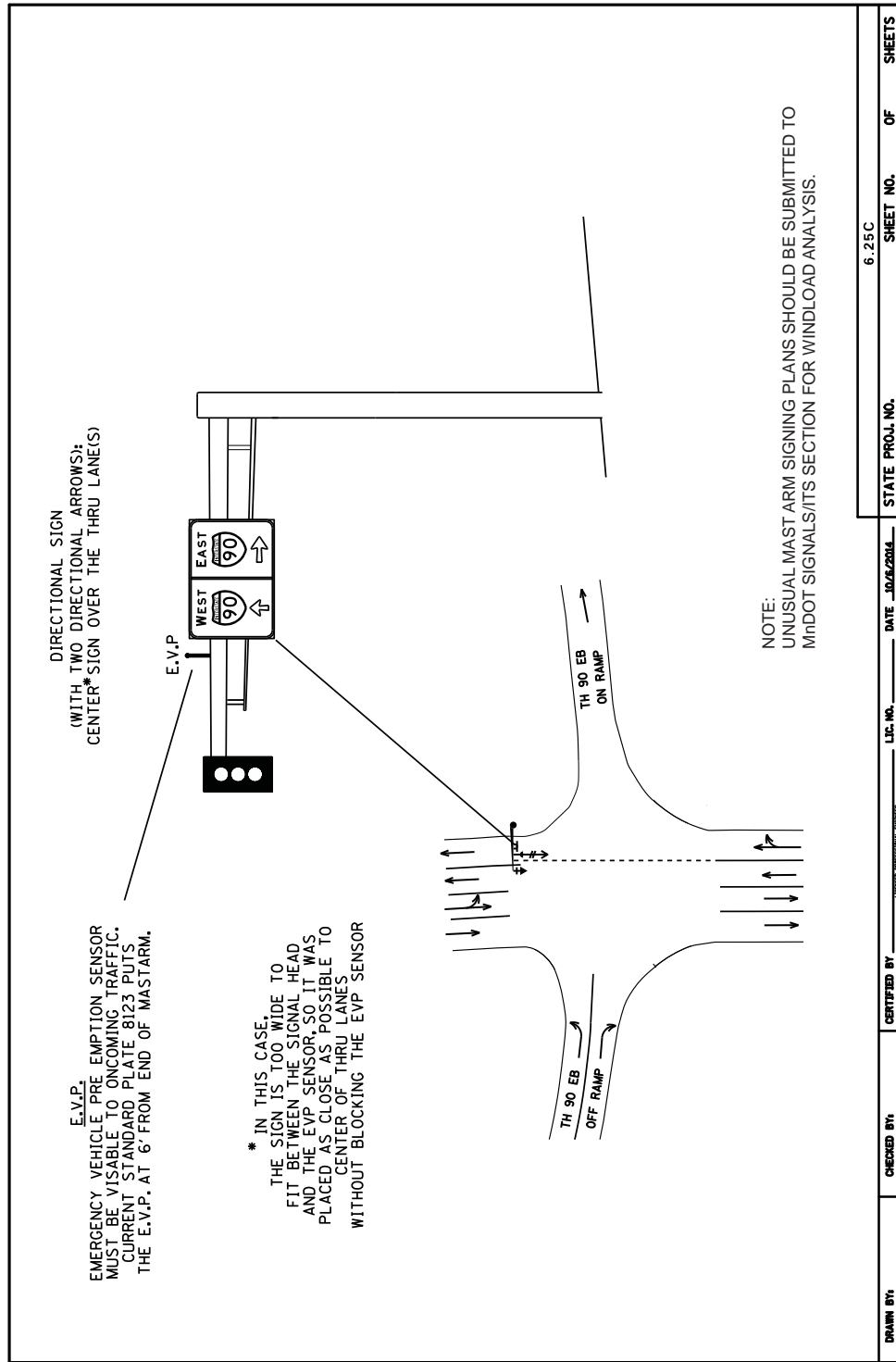
May 2015 **SIGNAL MAST ARM INTERSECTION SIGNING** **FIGURE 6.23C**

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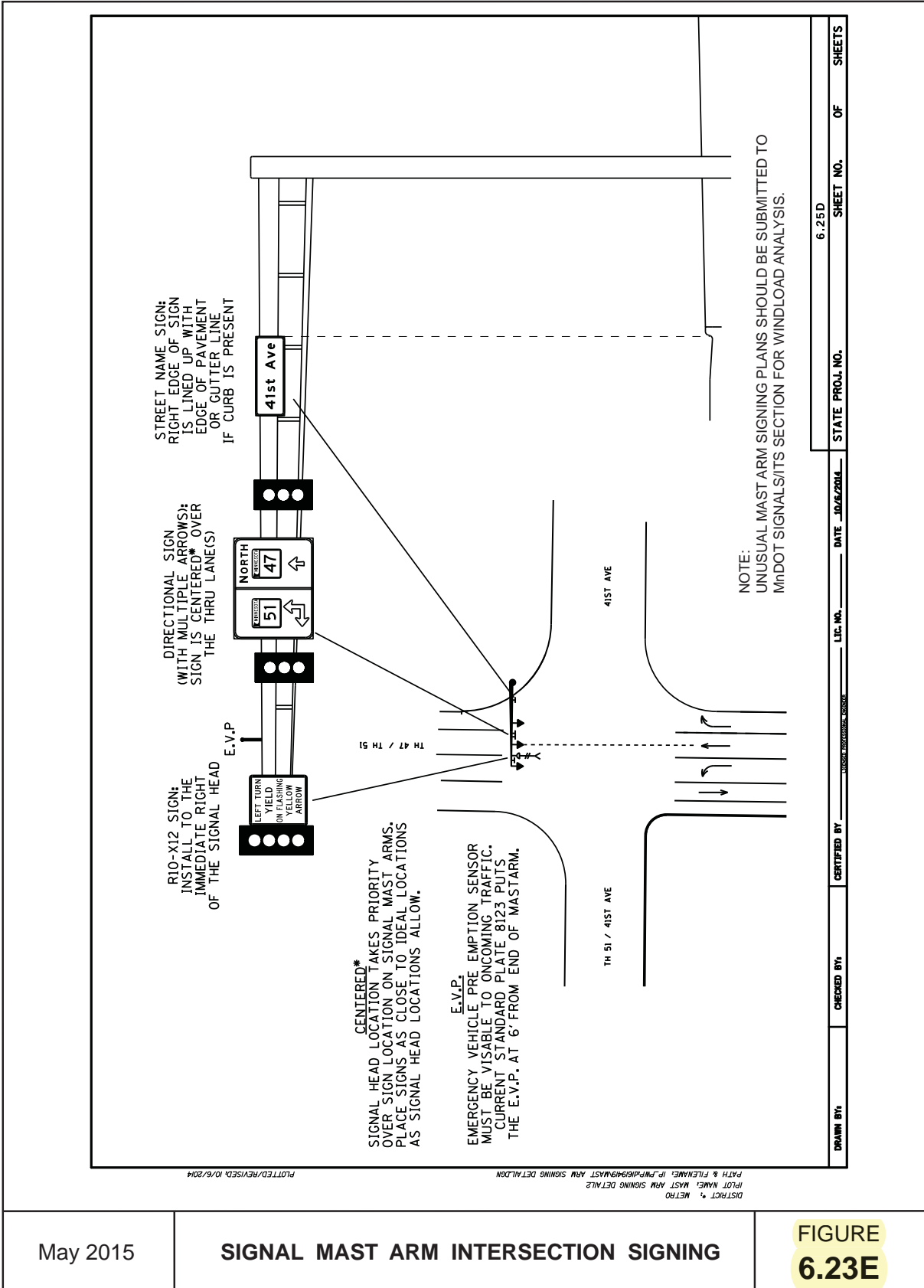
May 2015	SIGNAL MAST ARM INTERSECTION SIGNING	FIGURE 6.23D
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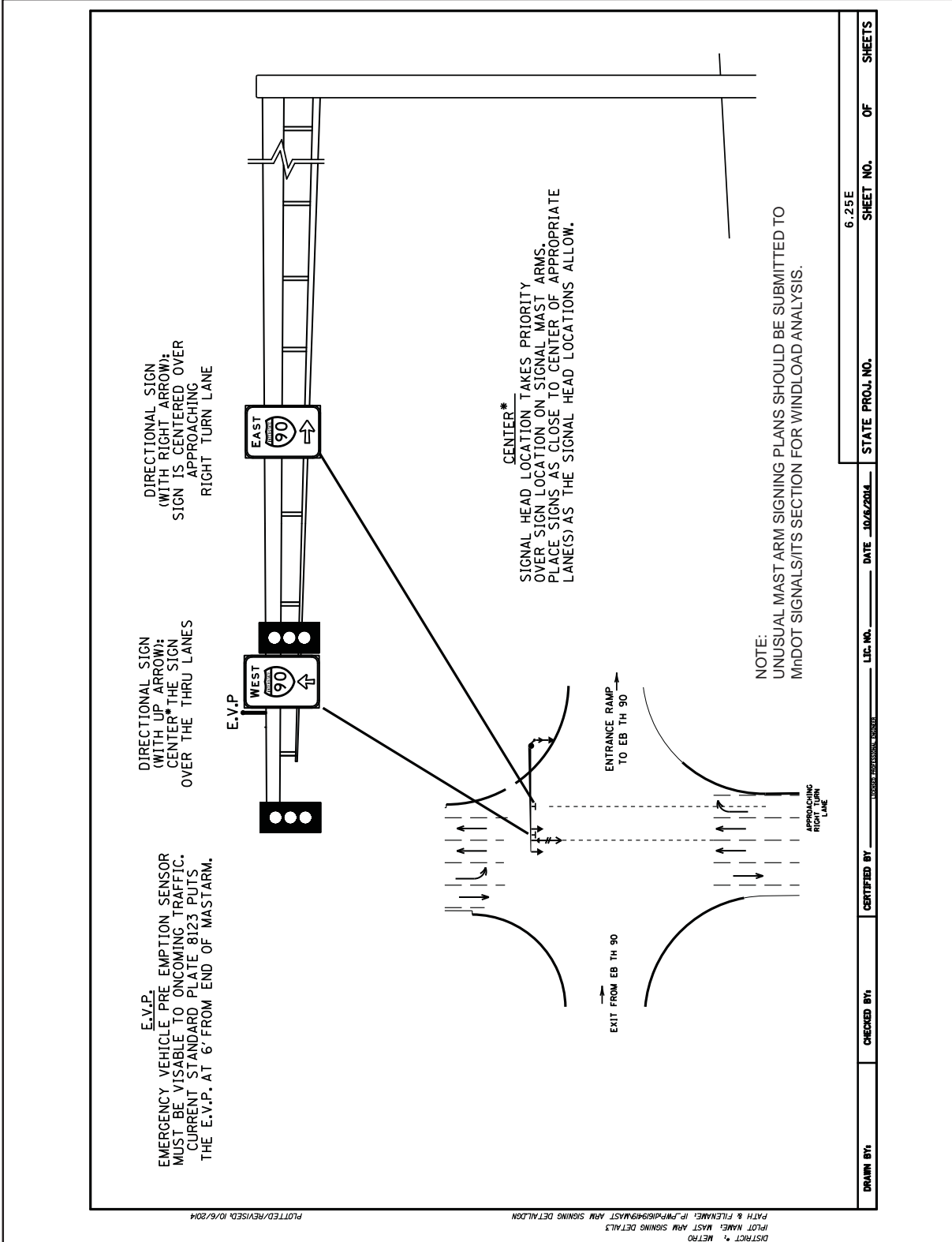
May 2015

SIGNAL MAST ARM INTERSECTION SIGNING

FIGURE 6.23E

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						6.25E

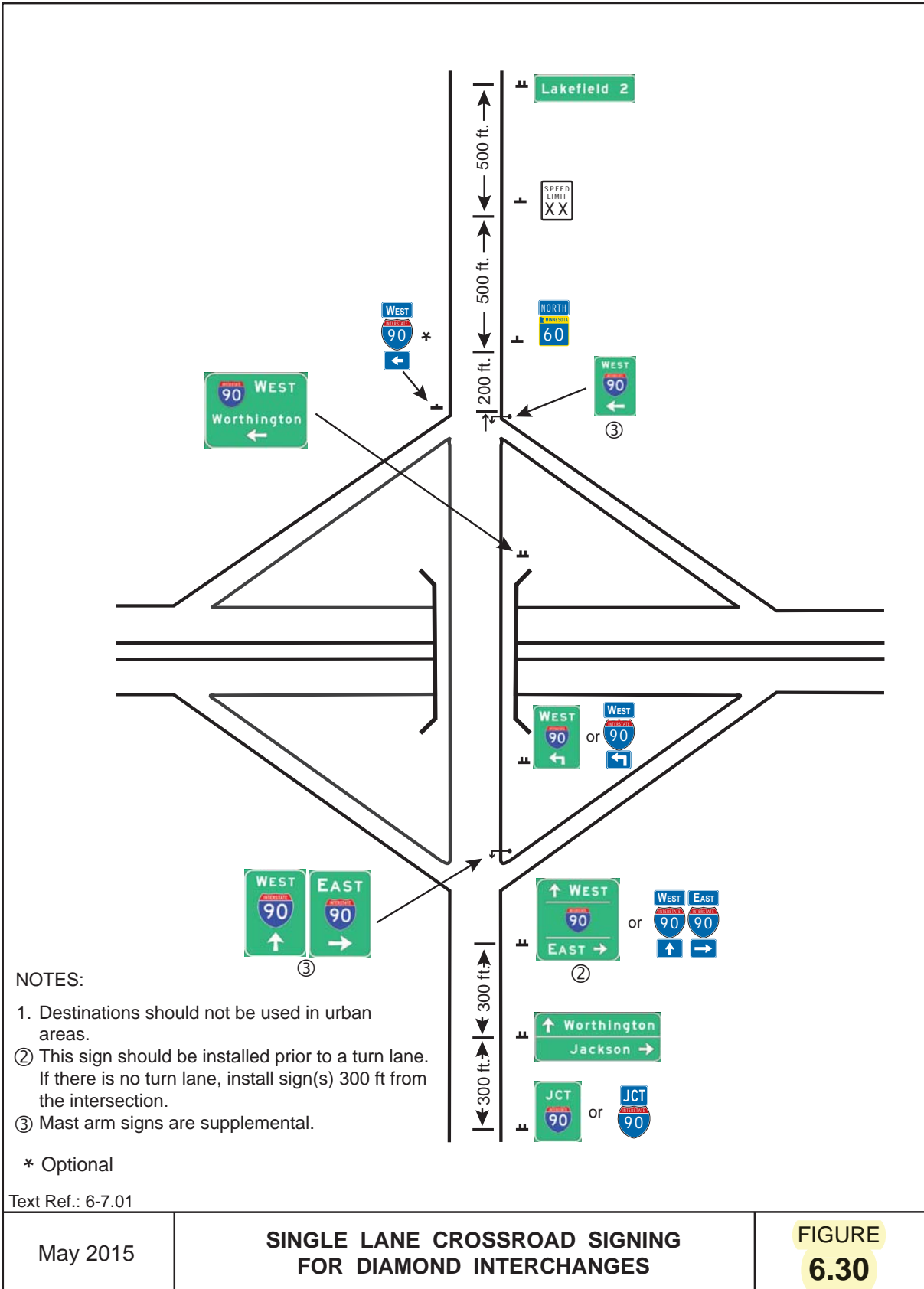
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May 2015	SIGNAL MAST ARM INTERSECTION SIGNING	FIGURE 6.23F
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HANDOUT

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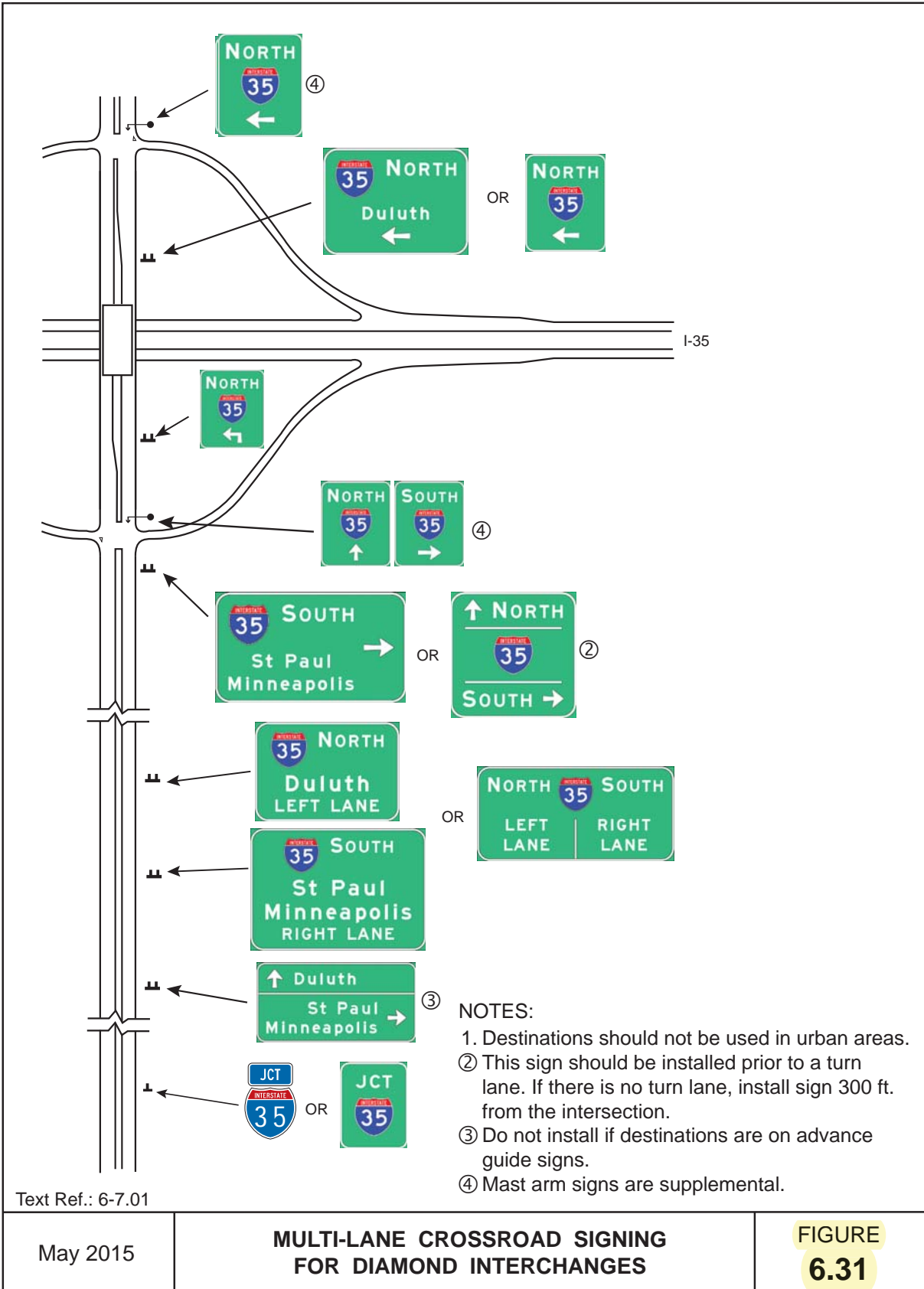
HANDOUT

HANDOUT

May 2015	SINGLE LANE CROSSROAD SIGNING FOR DIAMOND INTERCHANGES	FIGURE 6.30
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HANDOUT

HANDOUT



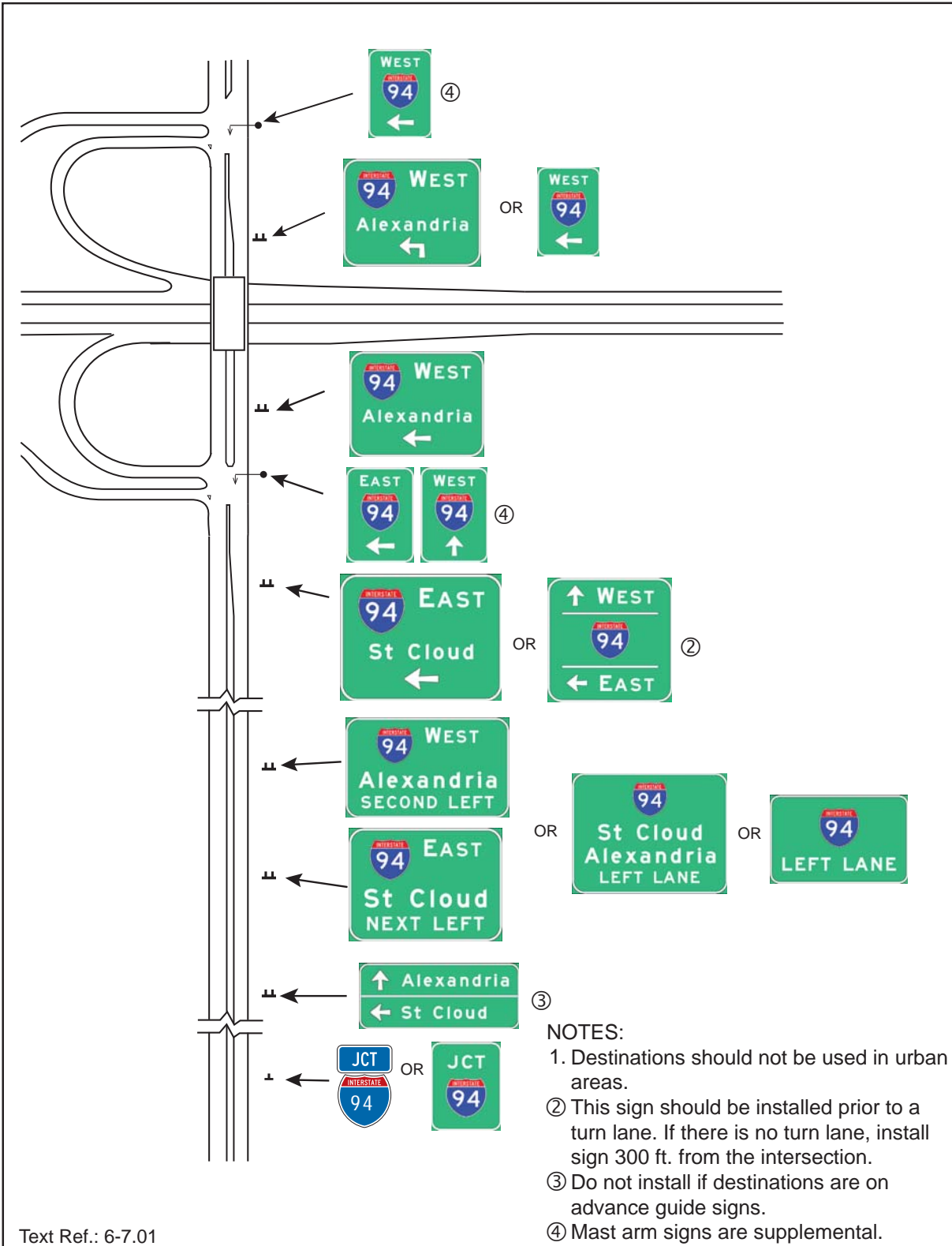
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HANDOUT

May 2015	MULTI-LANE CROSSROAD SIGNING FOR DIAMOND INTERCHANGES	FIGURE 6.31
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HANDOUT

HANDOUT



- NOTES:
1. Destinations should not be used in urban areas.
 - ② This sign should be installed prior to a turn lane. If there is no turn lane, install sign 300 ft. from the intersection.
 - ③ Do not install if destinations are on advance guide signs.
 - ④ Mast arm signs are supplemental.

Text Ref.: 6-7.01

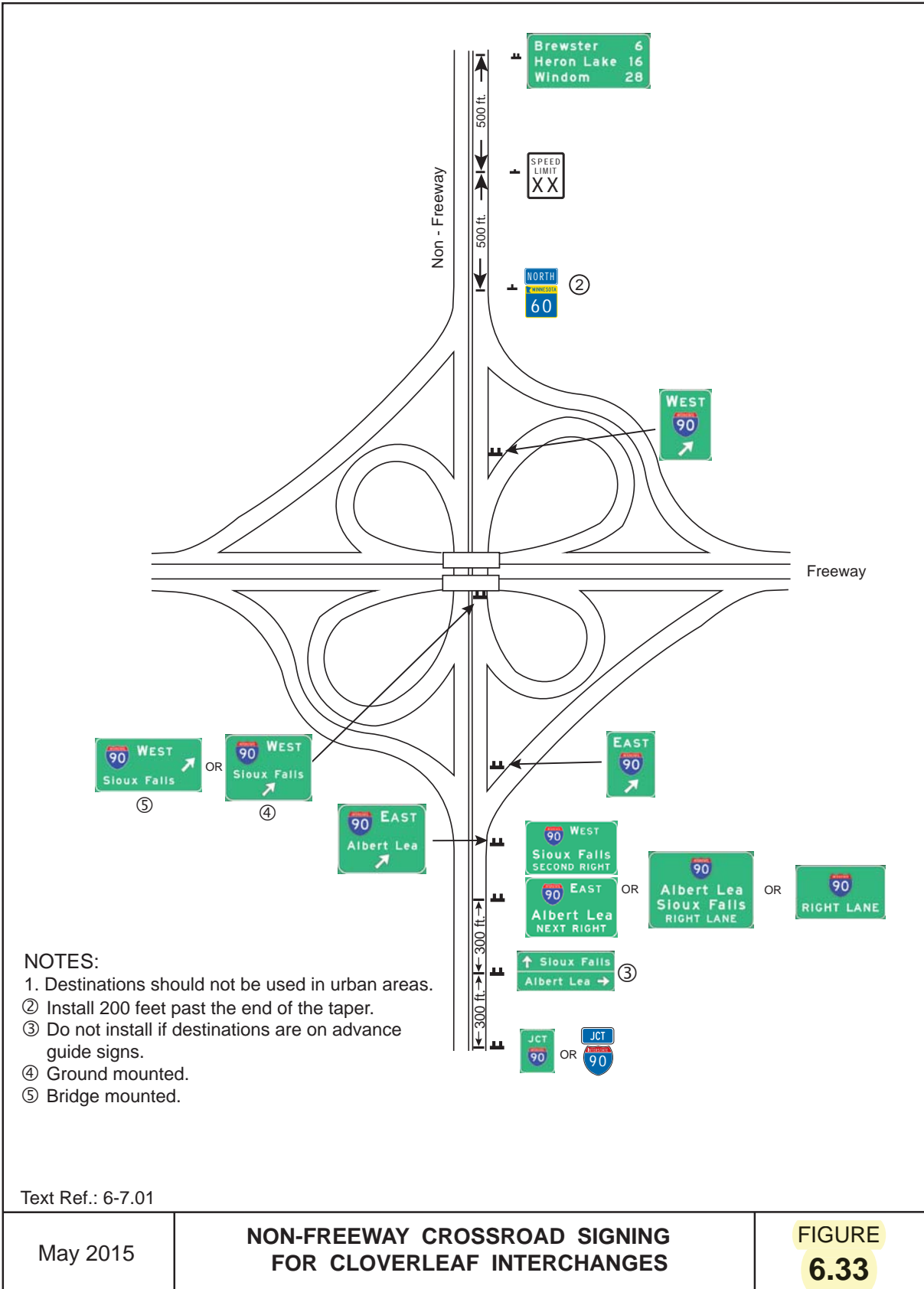
May 2015	MULTI-LANE CROSSROAD SIGNING FOR FOLDED DIAMOND INTERCHANGES	FIGURE 6.32
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HANDOUT

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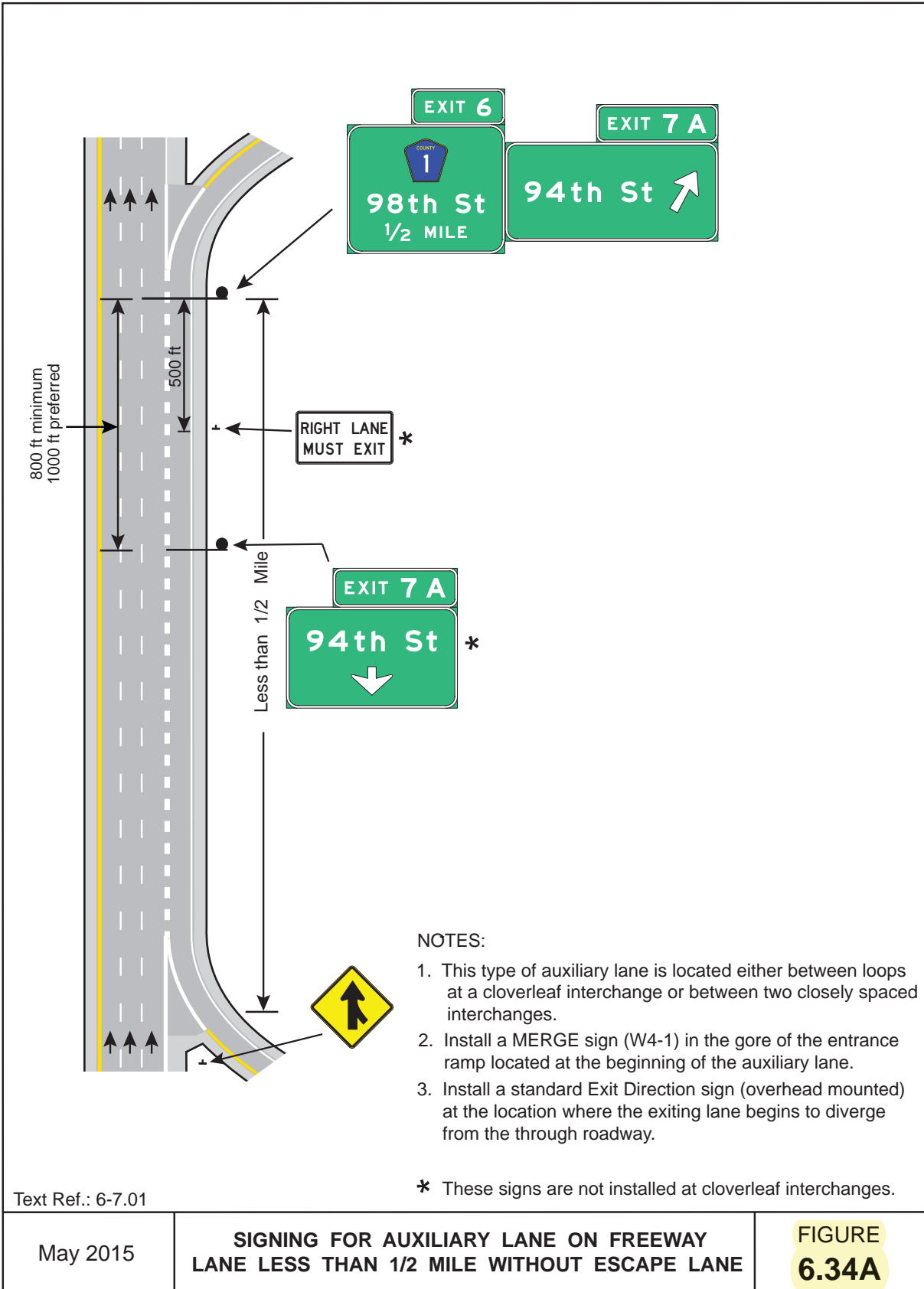


HANDOUT

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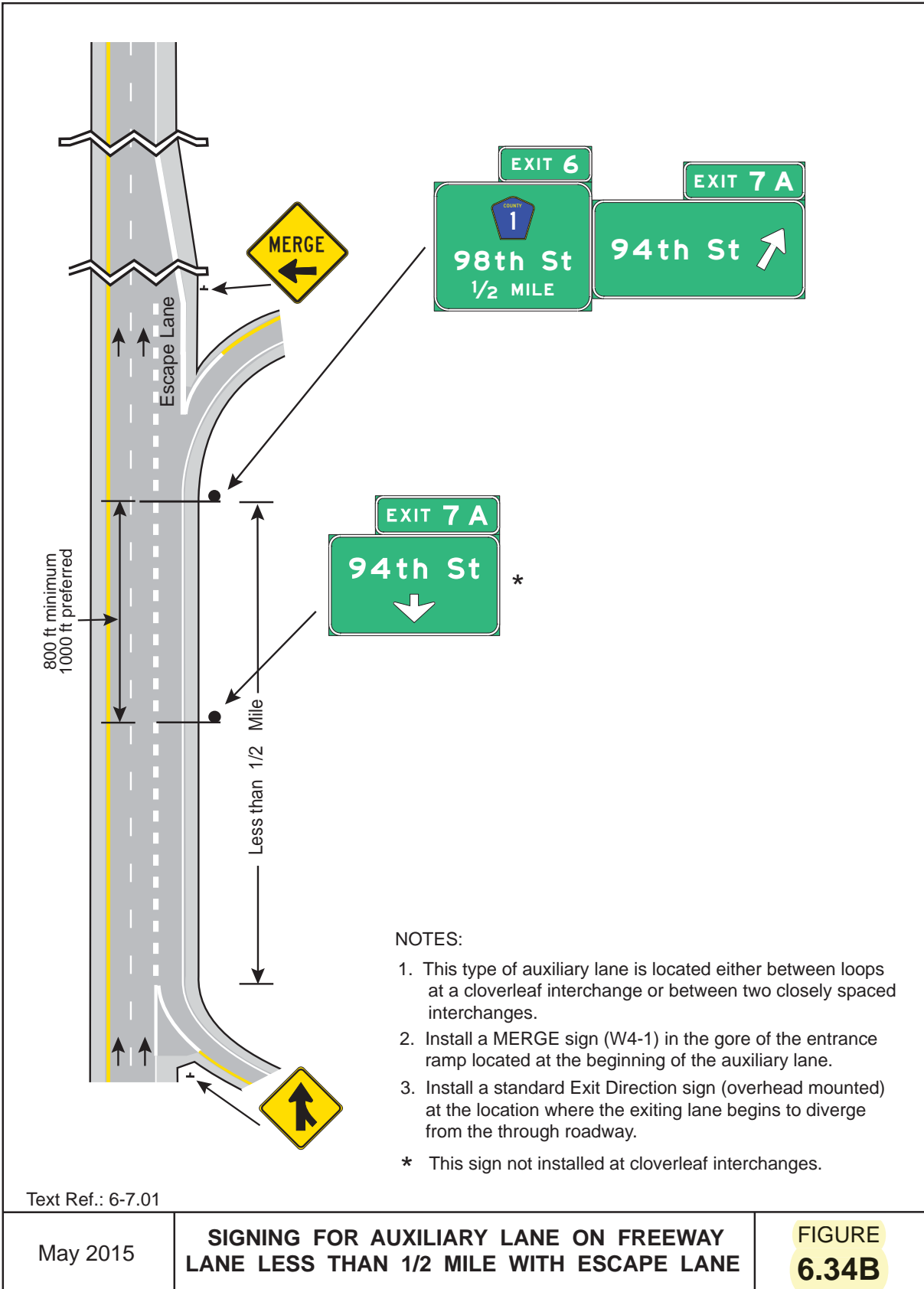


HANDOUT

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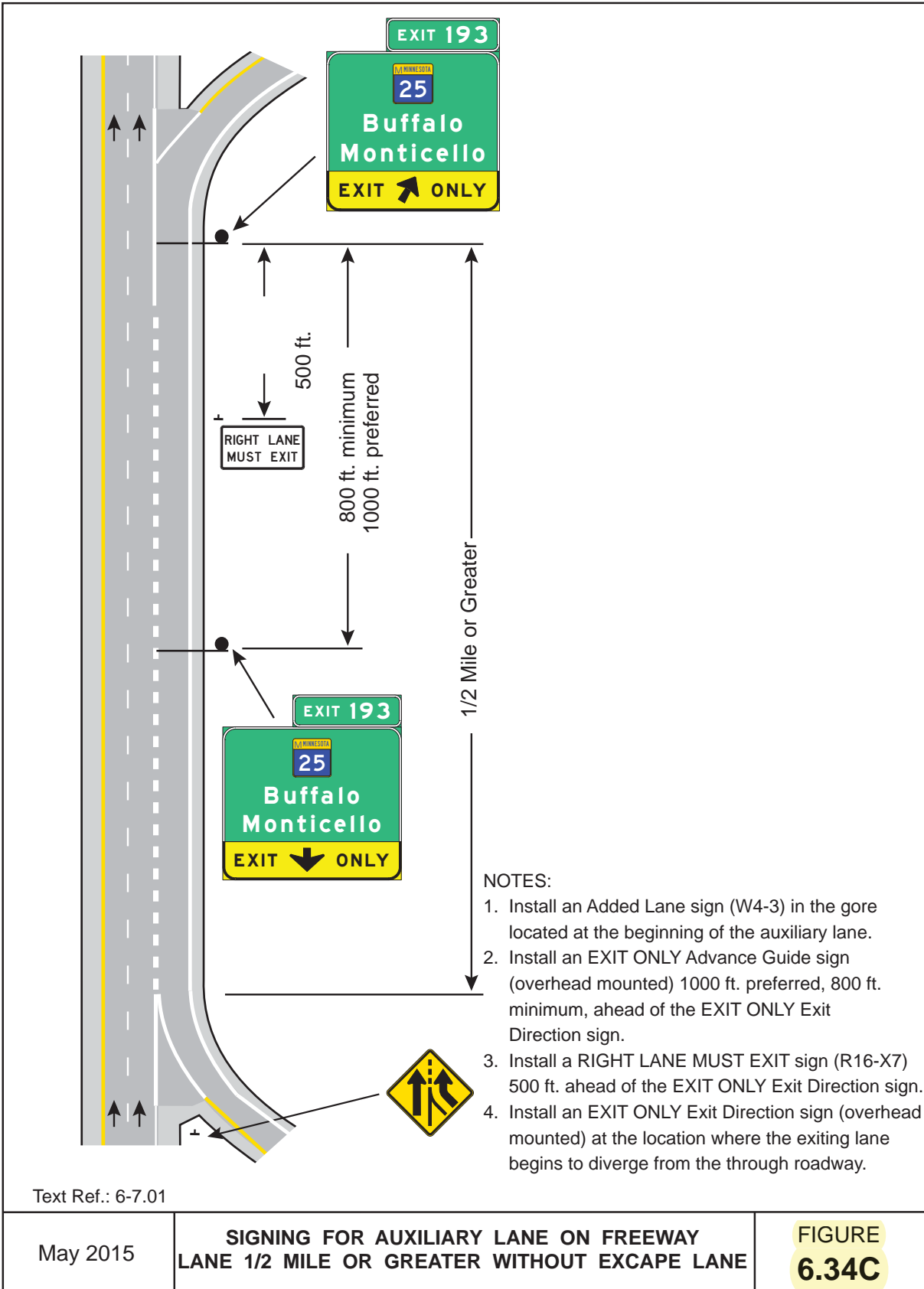
HANDOUT

HANDOUT

May 2015	SIGNING FOR AUXILIARY LANE ON FREEWAY LANE LESS THAN 1/2 MILE WITH ESCAPE LANE	FIGURE 6.34B
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HANDOUT

HANDOUT



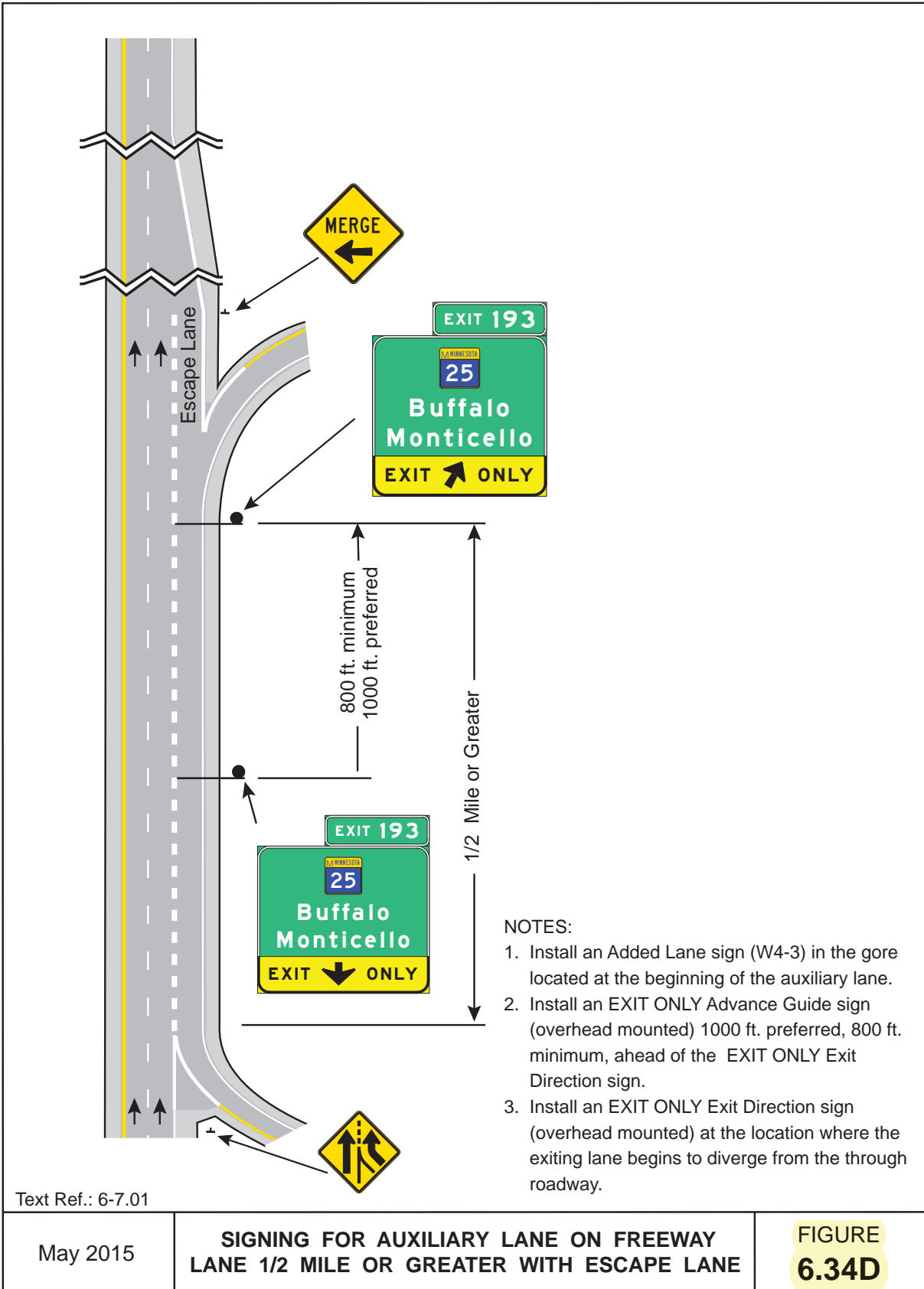
HANDOUT

HANDOUT

<p>May 2015</p>	<p>SIGNING FOR AUXILIARY LANE ON FREEWAY LANE 1/2 MILE OR GREATER WITHOUT ESCAPE LANE</p>	<p>FIGURE 6.34C</p>
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HANDOUT

HANDOUT



HANDOUT

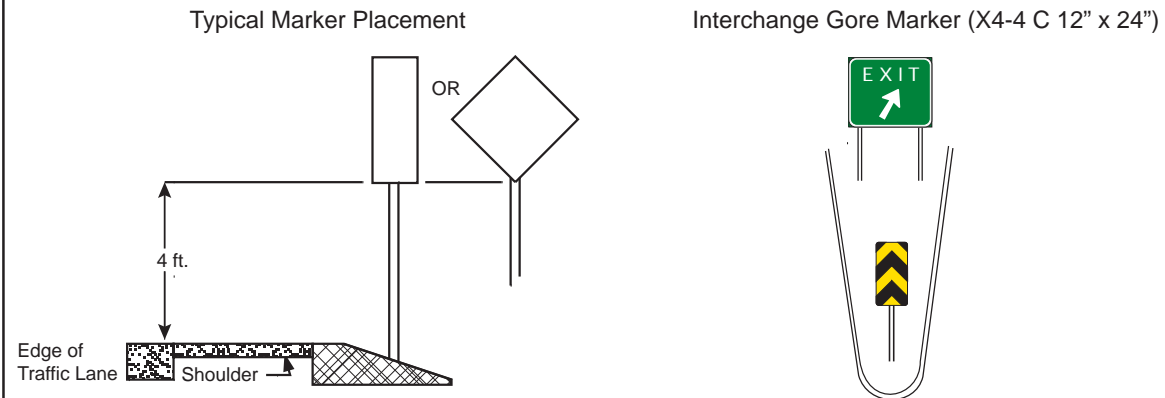
HANDOUT

- NOTES:
1. Install an Added Lane sign (W4-3) in the gore located at the beginning of the auxiliary lane.
 2. Install an EXIT ONLY Advance Guide sign (overhead mounted) 1000 ft. preferred, 800 ft. minimum, ahead of the EXIT ONLY Exit Direction sign.
 3. Install an EXIT ONLY Exit Direction sign (overhead mounted) at the location where the exiting lane begins to diverge from the through roadway.

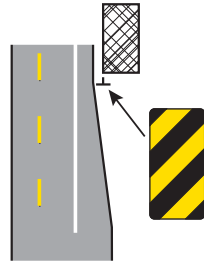
<p>May 2015</p>	<p>SIGNING FOR AUXILIARY LANE ON FREEWAY LANE 1/2 MILE OR GREATER WITH ESCAPE LANE</p>	<p>FIGURE 6.34D</p>
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HANDOUT

HANDOUT

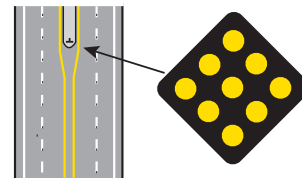


Type 3 Object Marker (X4-4)



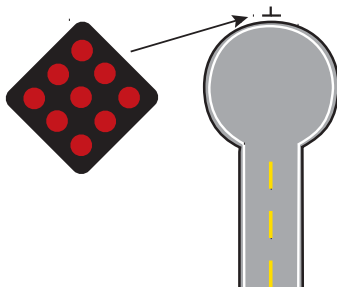
Use Type 3 Object Markers to mark hazards adjacent to the roadway such as bridge abutments, piers and rails within the width of the approaching shoulders. Right is shown.

Type 2 Object Marker (X4-2)



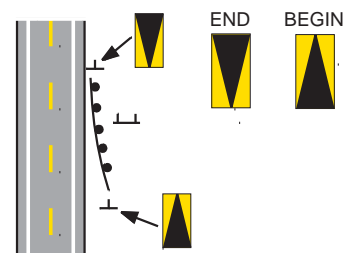
Use Type 2 Object Markers to mark hazards within the roadway.

Type 4 Object Marker (X4-11)



Use Type 4 Object Markers to mark the end of the roadway.

Snowplow Marker (X4-5)



Use snowplow marker to mark guardrail for snowplowing operations.

Text Ref.: 6-9.0

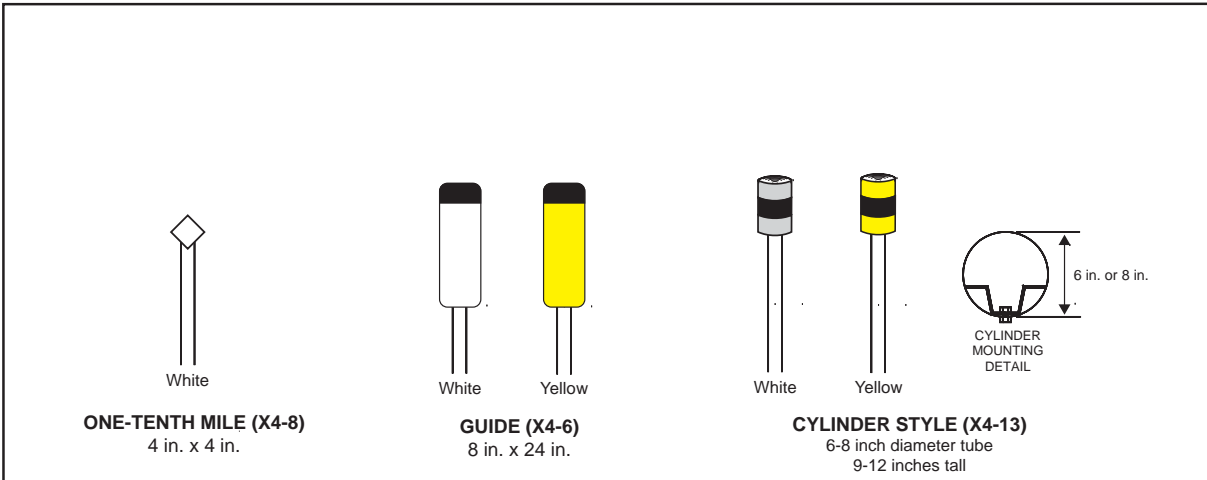
<p>May 2015</p>	<p>COMMONLY USED OBJECT MARKER TYPES AND INSTALLATION</p>	<p>FIGURE 6.38</p>
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HANDOUT

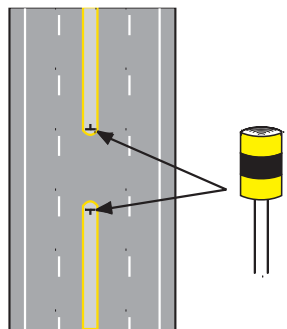
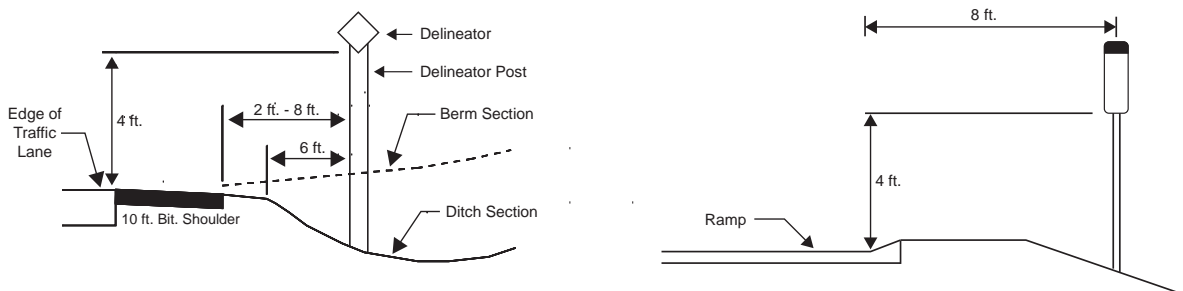
HANDOUT

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HANDOUT



TYPES OF DELINEATORS



TYPICAL DELINEATOR PLACEMENT

Text Ref.: 6-10.0

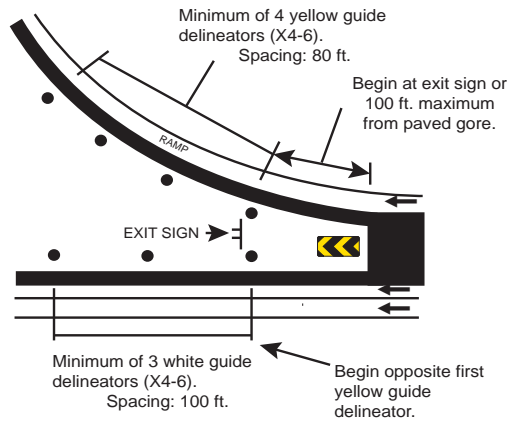
<p>May 2015</p>	<p>COMMONLY USED DELINEATOR TYPES AND INSTALLATION</p>	<p>FIGURE 6.42</p>
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HANDOUT

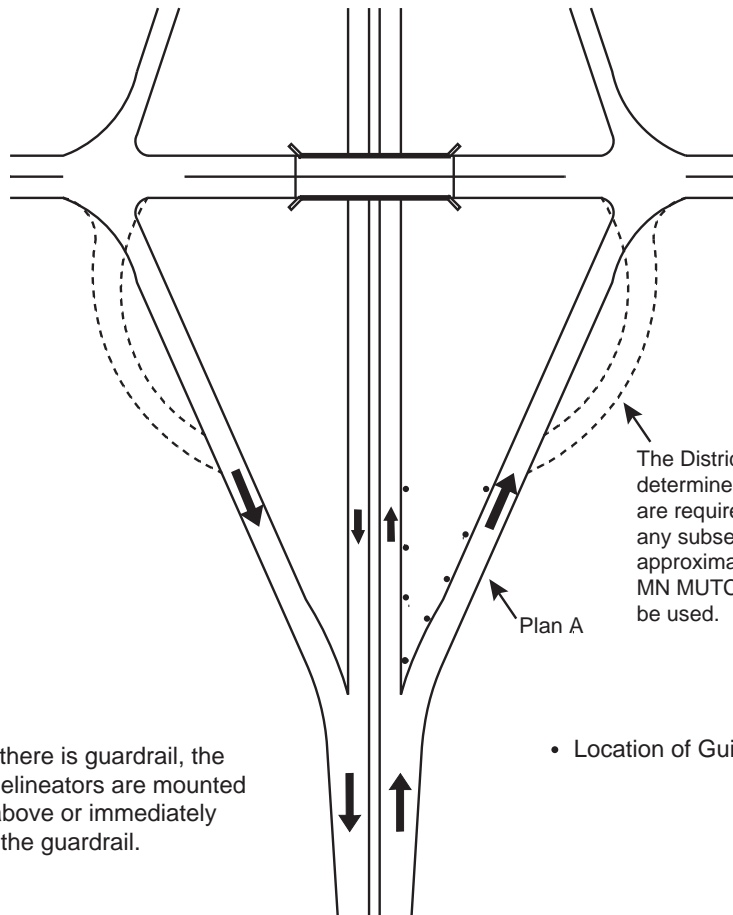
HANDOUT

HANDOUT

HANDOUT



**PLAN A
RAMP DELINEATION**



NOTE: Where there is guardrail, the guide delineators are mounted either above or immediately behind the guardrail.

Text Ref.: 6-10.04.02, 6-10.04.03

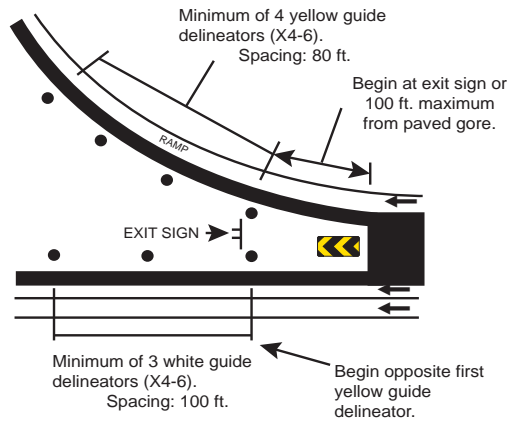
<p>May 2015</p>	<p>DIAMOND INTERCHANGE - RAMP DELINEATION PARTIAL AND FULL LIGHTING</p>	<p>FIGURE 6.44</p>
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HANDOUT

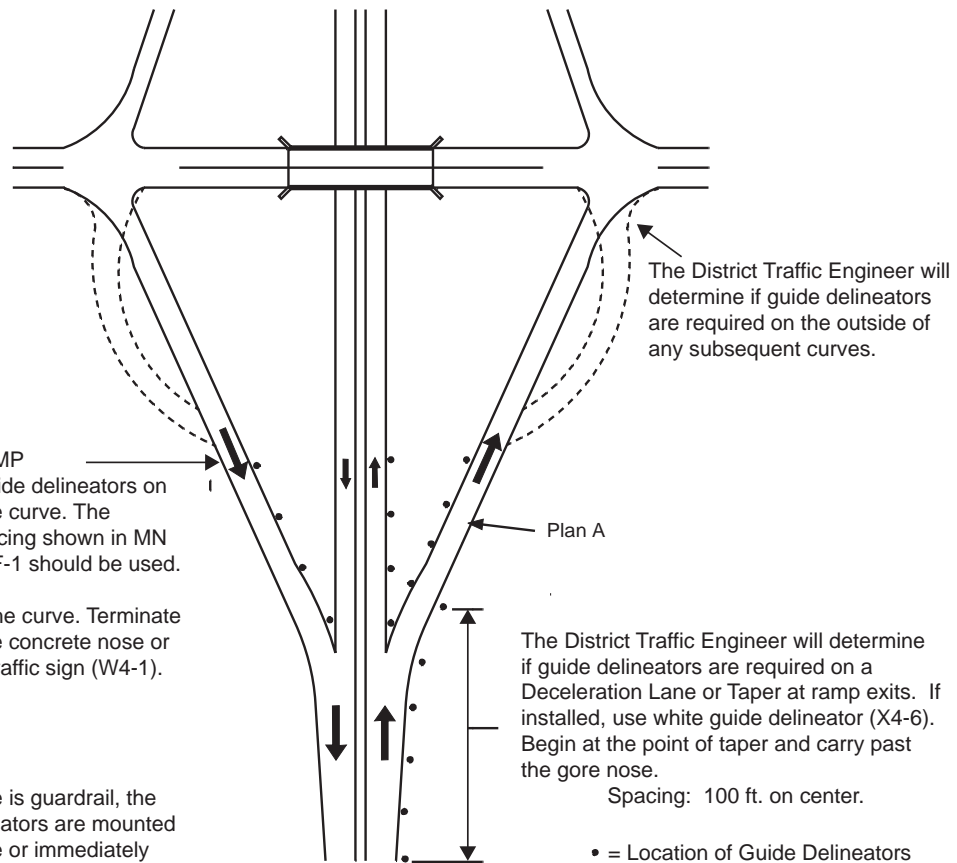
HANDOUT

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HANDOUT



**PLAN A
RAMP DELINEATION**



HANDOUT

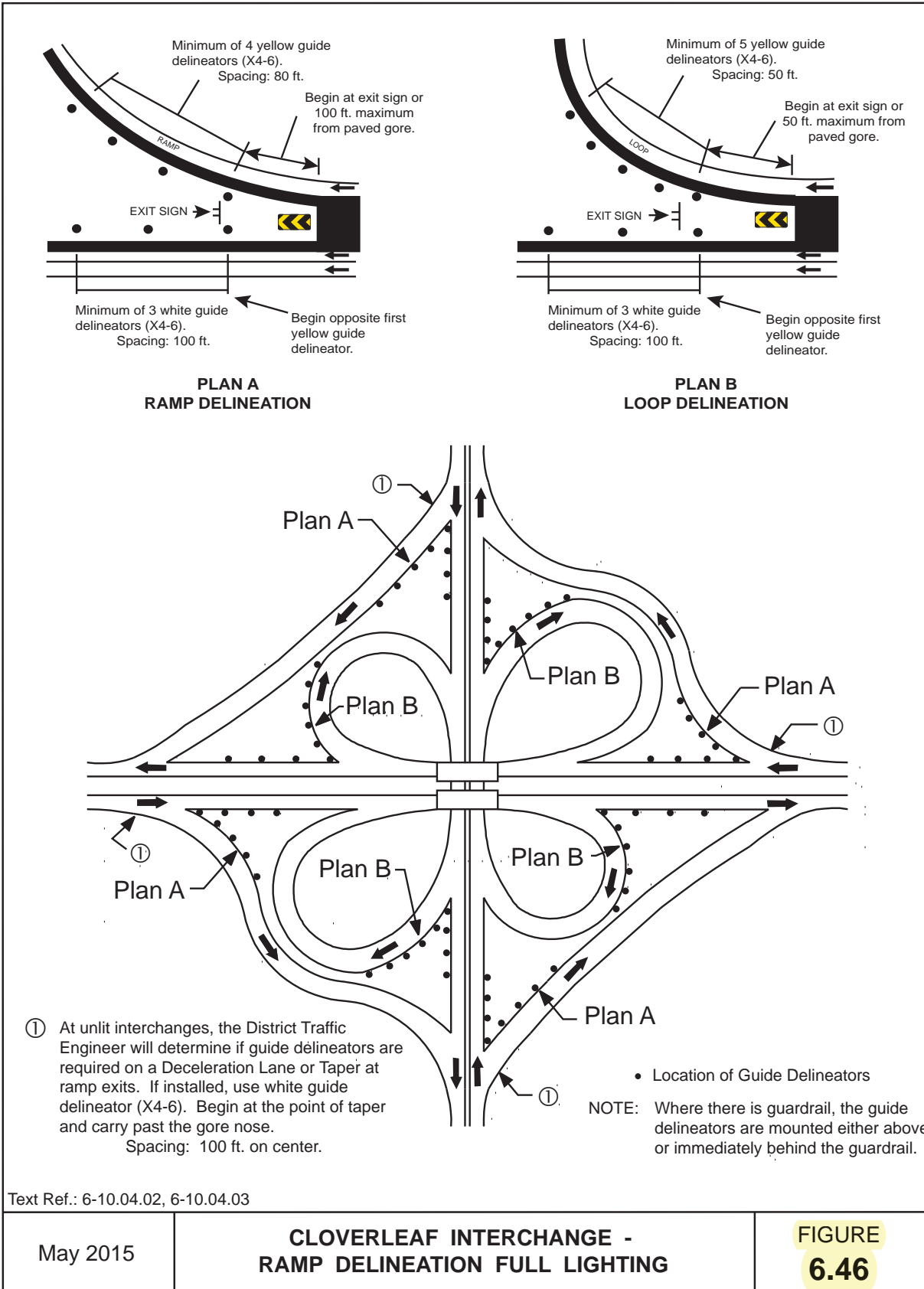
HANDOUT

Text Ref.: 6-10.04.02, 6-10.04.03

<p>May 2015</p>	<p>DIAMOND INTERCHANGE - RAMP DELINEATION UNLIT</p>	<p>FIGURE 6.45</p>
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HANDOUT

HANDOUT



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HANDOUT

May 2015	CLOVERLEAF INTERCHANGE - RAMP DELINEATION FULL LIGHTING	FIGURE 6.46
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Ball Banking Form

<u>Driving Speed</u>	<u>Safe Ball Bank Reading</u>	* See Note 4
35 MPH and Higher	12 Degrees or under	
25-30 MPH	14 Degrees or under	
20 MPH or Less	16 Degrees or Under	

Roadway_____ Control Section_____ REF PT of Curve_____

Posted Speed Limit_____ Work Order No._____ Location Description_____

Posted SPEED Advisory_____ SP_____ STA_____ Curve Radius _____
IF AVAILABLE IF AVAILABLE IF AVAILABLE

Date_____ Driver _____ Rider _____
FULL NAME FULL NAME

Driving Speed	Travel Direction			
	Circle One NORTH EAST			
	Ball Bank Reading			
65 MPH				
60 MPH				
55 MPH				
50 MPH				
45 MPH				
40 MPH				
35 MPH				
30 MPH				
25 MPH				
20 MPH				
15 MPH				

May 2015

Ball Banking Form

FORM 6.2

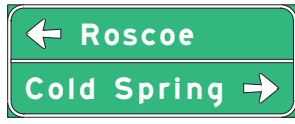
HANDOUT

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Destination Signs



D1-2



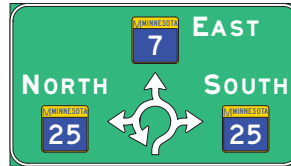
D1-2



D1-2d



D1-3

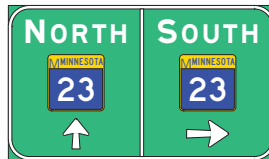


D1-2a



D1-1a

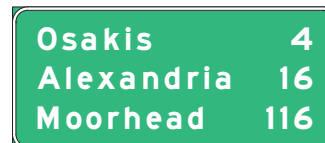
Directional Signs



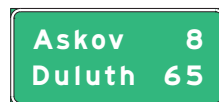
Distance Signs



Interchange Sequence Sign



Post Interchange Distance Sign



D2-2



Text Ref.: 6-4.05.04

May 2015	TYPES OF GUIDE SIGNS	CHART 6.1C
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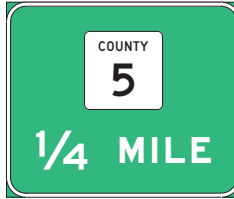
HANDOUT

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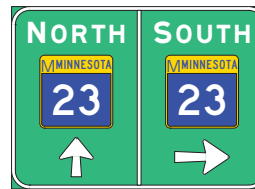
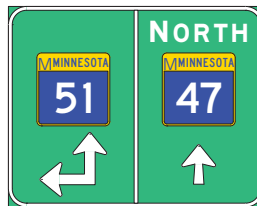
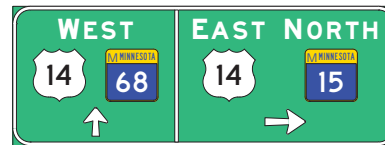
Junction Signs



Signal Mast Arm Mounted Signs



D3-X1



Supplemental Signs



Text Ref.: 6-4.05.04

May 2015	TYPES OF GUIDE SIGNS	CHART 6.1D
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Interchange Advance and Exit Guide Signs



Interchange Advance Guide Sign Type A



Interchange Exit Direction Sign Type A



Interchange Advance Guide Sign Type OH



Interchange Exit Direction Sign Type OH



Interchange Advance Lane Drop Guide Sign Type OH



Interchange Exit Direction Lane Drop Guide Sign Type OH

Text Ref.: 6-4.05.04

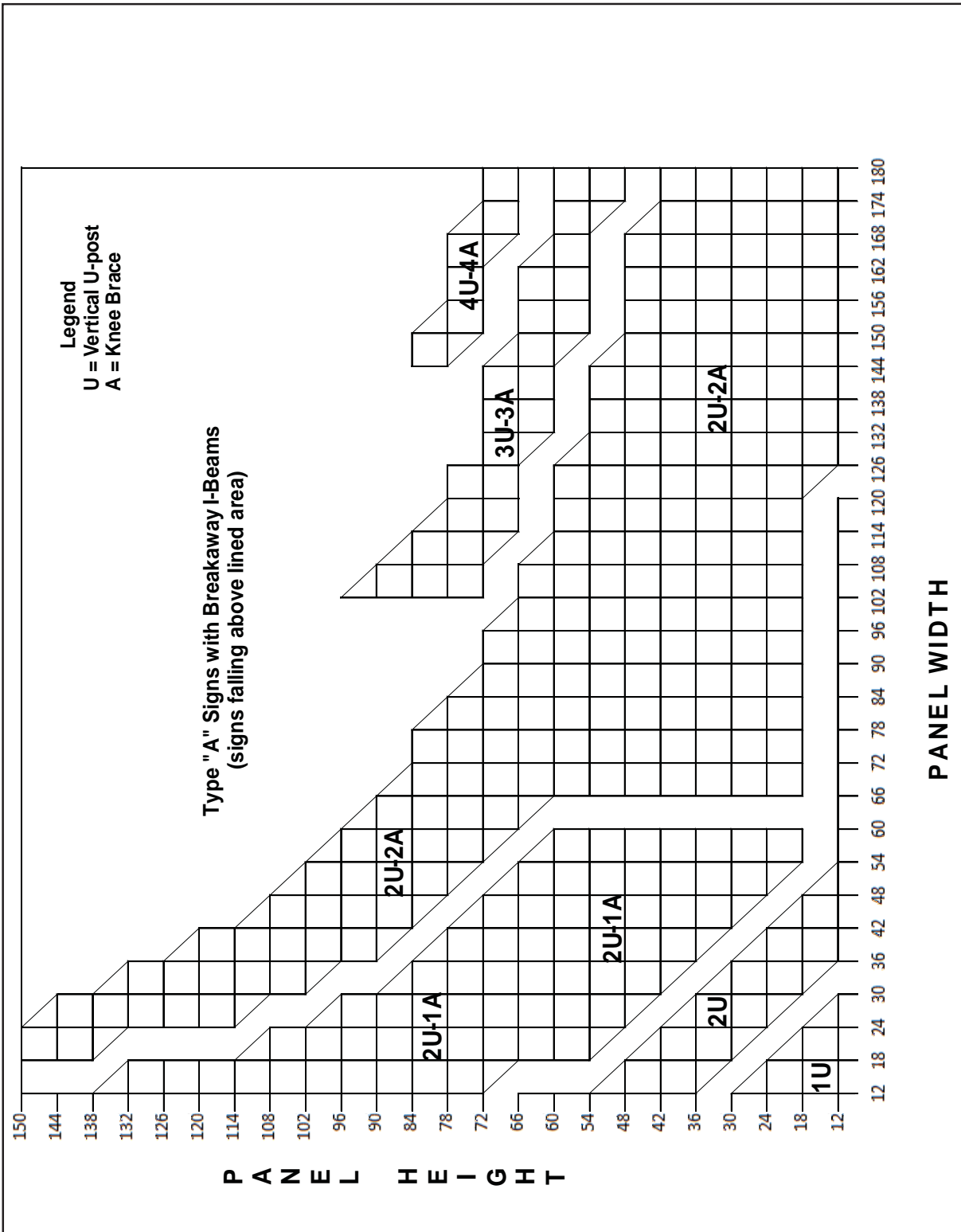
May 2015	TYPES OF GUIDE SIGNS	CHART 6.1E
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<p>May 2015</p>	<p>U-POST STRUCTURE CHART FOR GROUND MOUNTED SIGNS</p>	<p>CHART 6.2</p>
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PANEL WIDTH (inches)	POST SPACING		
	2 POSTS (inches)	3 POSTS (inches)	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.

Text Ref.: 6-4.08.01

May 2015	TYPE D SIGN POST SPACING CHART	CHART 6.3
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Posted or 85th Percentile Speed (mph)	Advance Placement Distance ¹								
	Condition A: Speed reduction and lane changing in heavy traffic ² feet	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0 ³ feet	10 ⁴ feet	20 ⁴ feet	30 ⁴ feet	40 ⁴ feet	50 ⁴ feet	60 ⁴ feet	70 ⁴ 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/second², 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/second², minus the sign legibility distance of 250 ft.
- ⁵ No suggested distances are provided for these speeds, as placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other sign.
- ⁶ The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

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May 2015	WARNING SIGNS ADVANCE PLACEMENT CHART	CHART 6.4
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7. MN MUTCD PART 2

7.1 MN MUTCD Part 2A Handout - General

The information on the following pages are a handout from the 2011 MN MUTCD, Chapter 2A regarding General information on signs. The entire section is not included, but only pages of interest for this manual. For full details on the MUTCD, refer to the OTST publications website found at, www.dot.state.mn.us/trafficeng/publ/index.html.

PART 2. SIGNS
Chapter 2A. General
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2A.3	Standardization of Application	2A-1
2A.4	Excessive Use of Signs	2A-1
2A.5	Classification of Signs	2A-2
2A.6	Design of Signs	2A-2
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2A.14	Sign Borders	2A-11
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FIGURES

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Table 2A-5	Common Uses of Sign Colors	2A-9

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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 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.

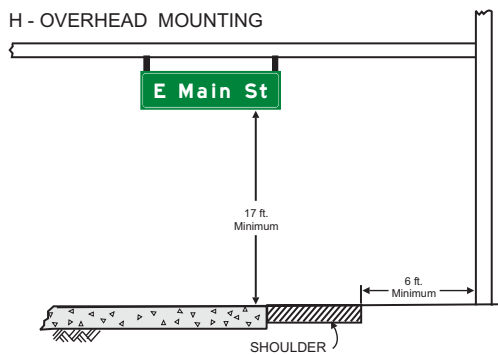
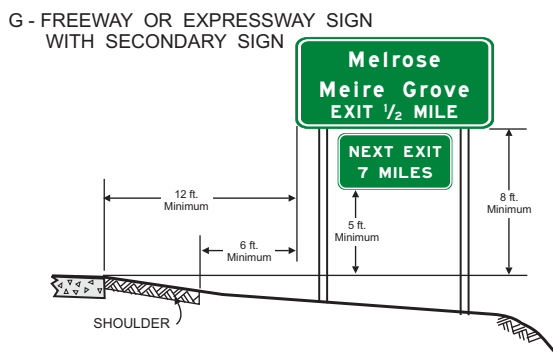
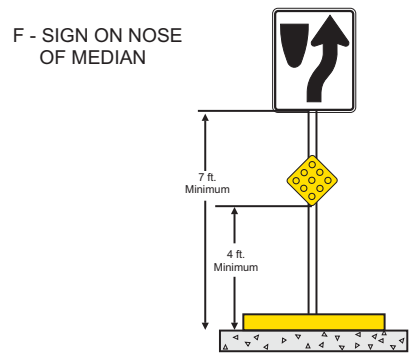
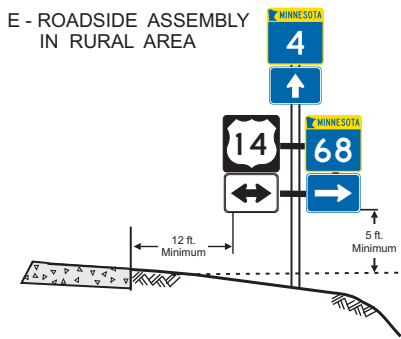
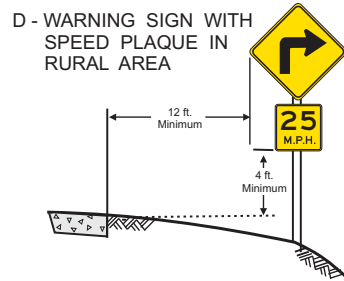
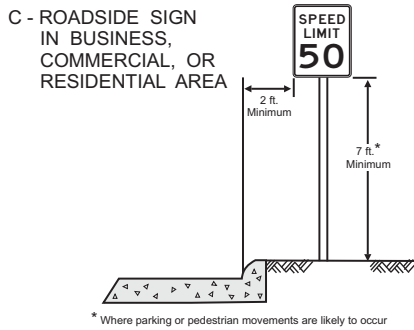
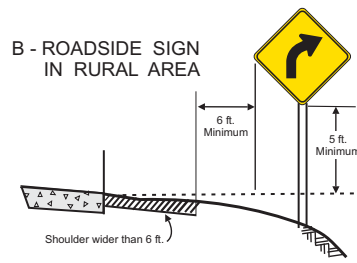
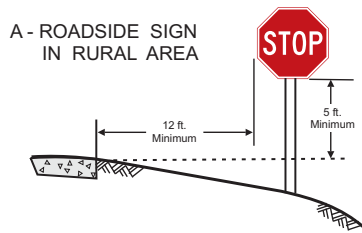
2A.15 Enhanced Conspicuity for Standard Signs**OPTION:**

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.

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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

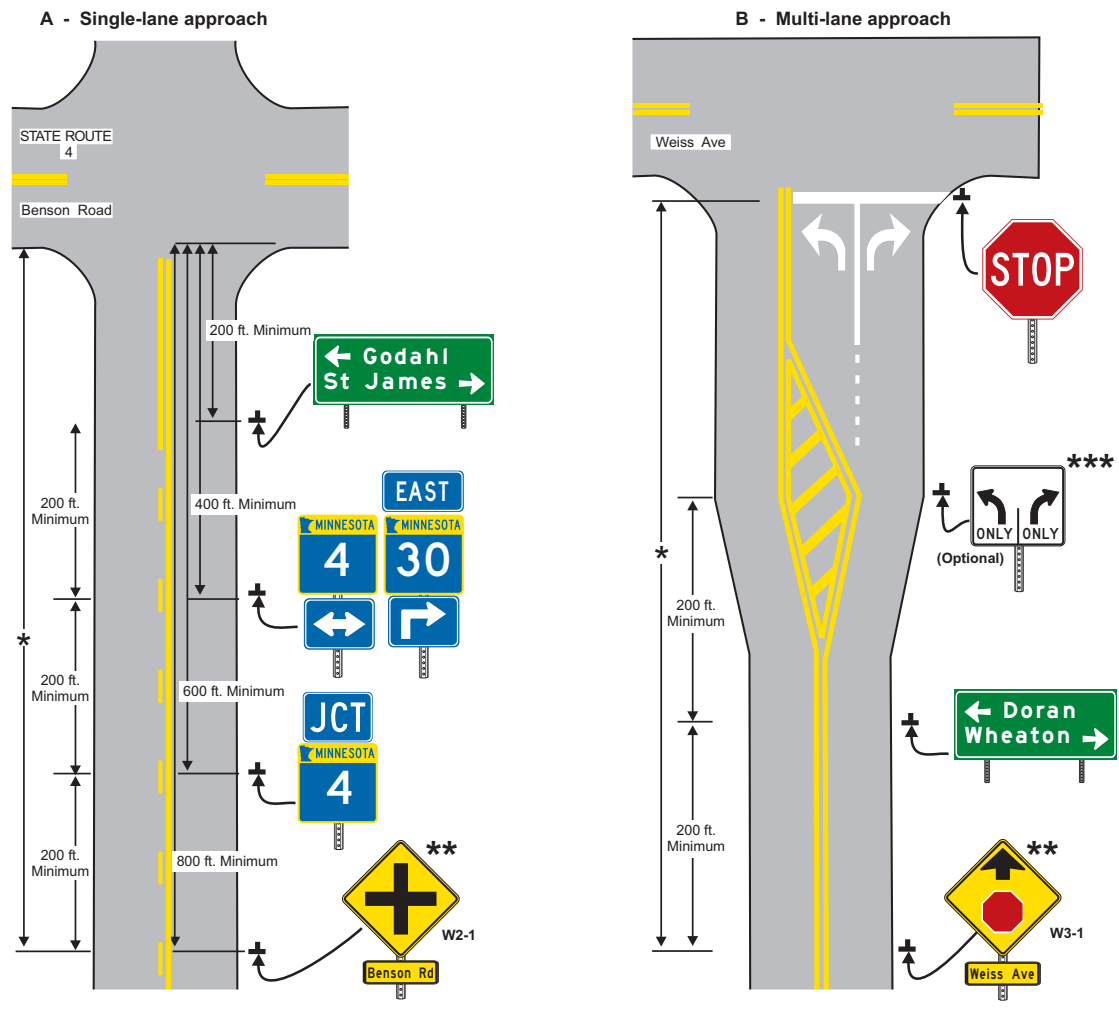
Also see Figure 6.1 in the TEM

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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.

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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.

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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.

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.

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.

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.

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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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7.2 MN MUTCD Part 2B Handout – Regulatory Signs

The information on the following pages are a handout from the 2011 MN MUTCD, Chapter 2 on Regulatory Signs. The entire section is not included, but only pages of interest for this manual. For full details on the MUTCD, refer to the OTST publications website found at, www.dot.state.mn.us/trafficeng/publ/index.html.

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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.

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.

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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 (plaque)	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	---	---	---	---

Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 1 of 5)

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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
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
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
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
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	---	---	---	---
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	---	---	---	---
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)

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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/Restricted Parking (combined sign)	R7-200	2B.46	24 x 18	24 x 18	---	---	---	---
No Parking/Restricted 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)

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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	---	---	---	---

Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 4 of 5)

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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)

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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.

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

STANDARD:

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

OPTION:

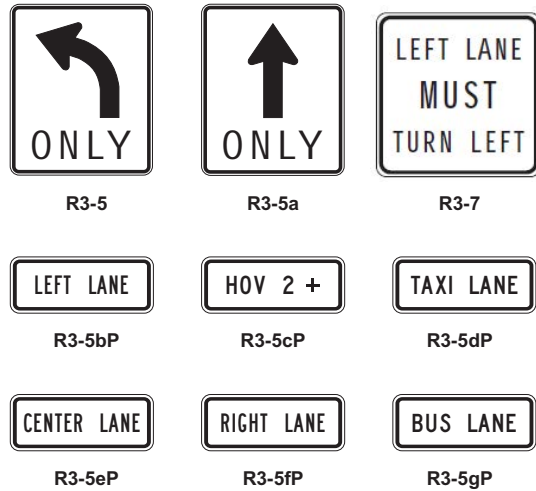
Where the number of through lanes on an approach is two or less, the Intersection Lane Control signs (R3-5, R3-6, or R3-8) may be overhead or post-mounted.

Intersection Lane Control signs may be omitted where:

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

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

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



STANDARD:

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

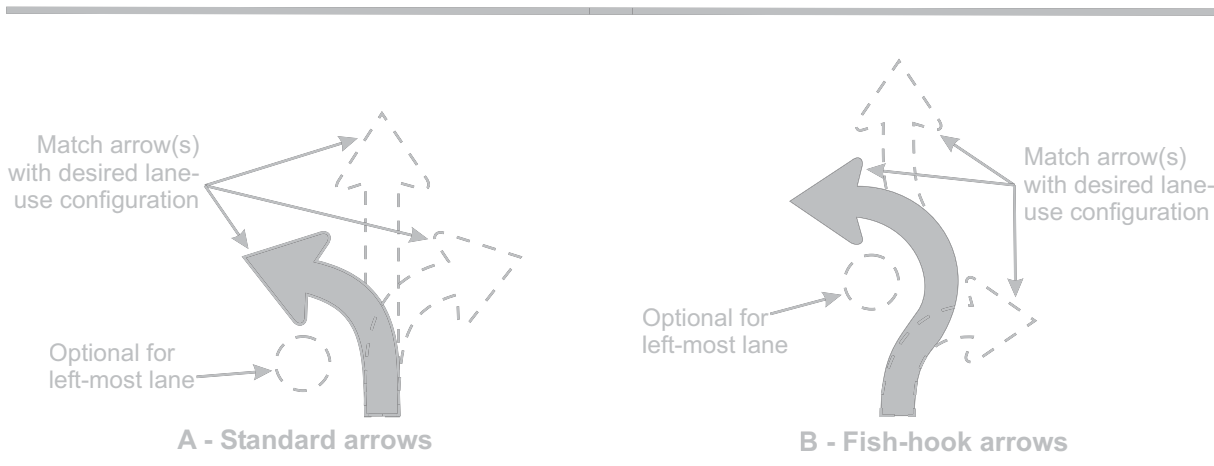


Figure 2B-5. Intersection Lane Control Sign Arrow Options for Roundabouts

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

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

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

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

GUIDANCE:

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

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

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

OPTION:

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

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

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

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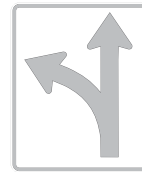


R16-X7

OPTION:

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

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



R3-6

STANDARD:

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

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

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

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

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

GUIDANCE:

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

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OPTION:

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

STANDARD:

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

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



R3-30AE



R3-30AELA



R3-30ACA

OPTION:

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

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

GUIDANCE:

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

OPTION:

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

STANDARD:

Where three or more approach lanes are available to traffic, Advance Intersection Lane Control (R3-30 series)

signs, if used, shall be post-mounted in advance of the intersection and shall not be mounted overhead (see Section 2B.19).

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



R3-33

OPTION:

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

SUPPORT:

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

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



R3-9a



R3-9b

GUIDANCE:

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

OPTION:

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

SUPPORT:

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

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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.

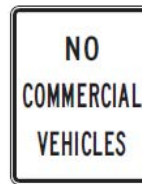
2B.39 Selective Exclusion Signs



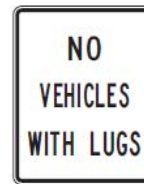
R5-2



R5-3



R5-4



R5-5



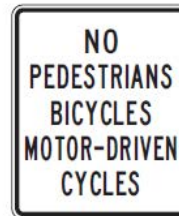
R5-6



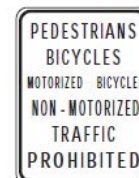
R5-7



R5-8



R5-10a



R5-10d



R5-10b



R5-10c

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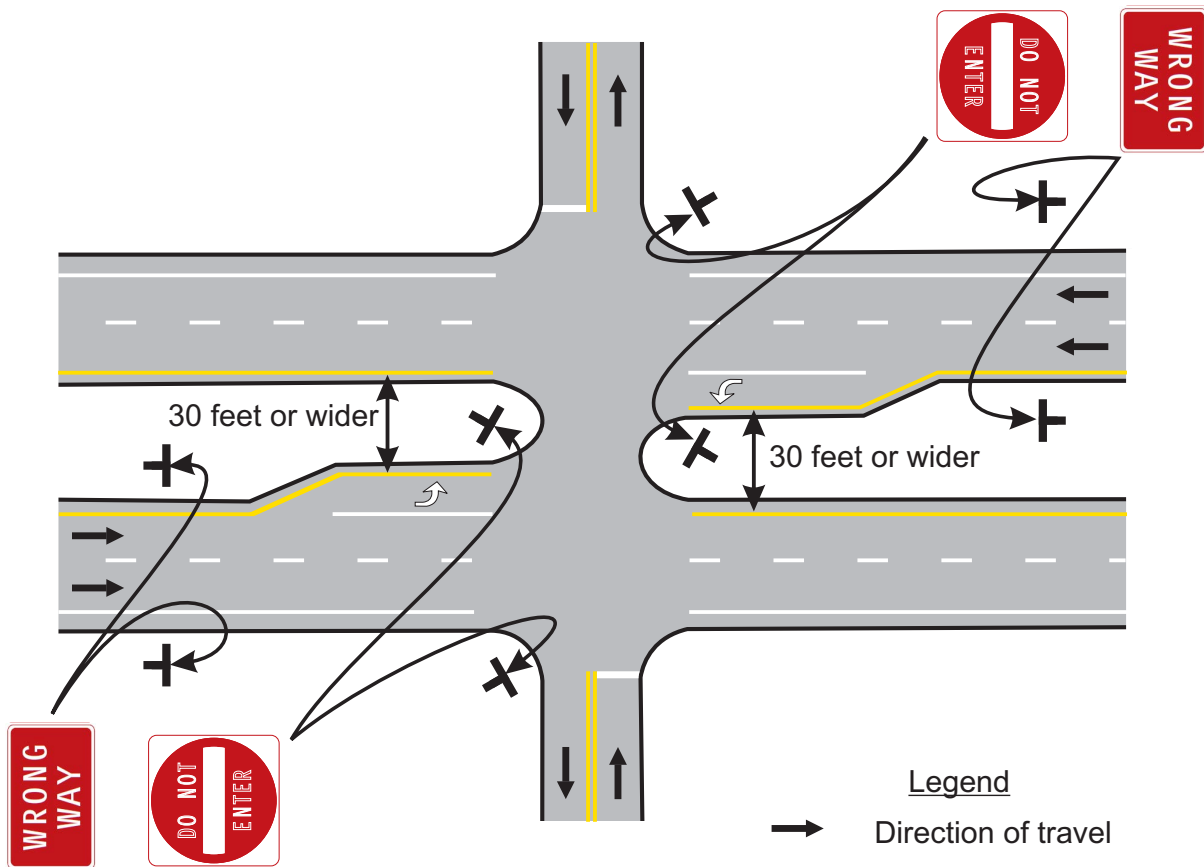


Figure 2B-12. Locations of Wrong-Way Signing for Divided Highways with Medians of 30 Feet or Wider



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).

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



R5-X1

GUIDANCE:

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

GUIDANCE:

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

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



R6-1



R6-2

STANDARD:

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

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

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

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

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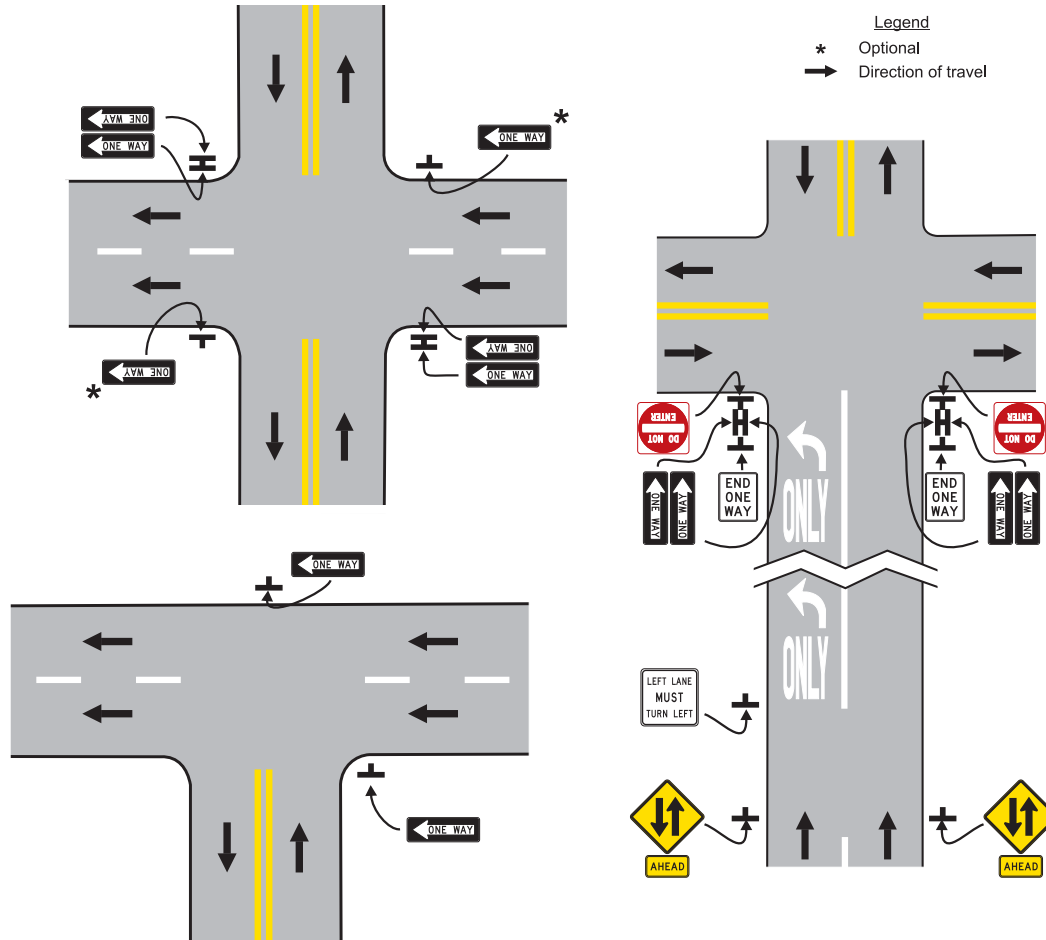


Figure 2B-14. Locations of ONE WAY Signs

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.

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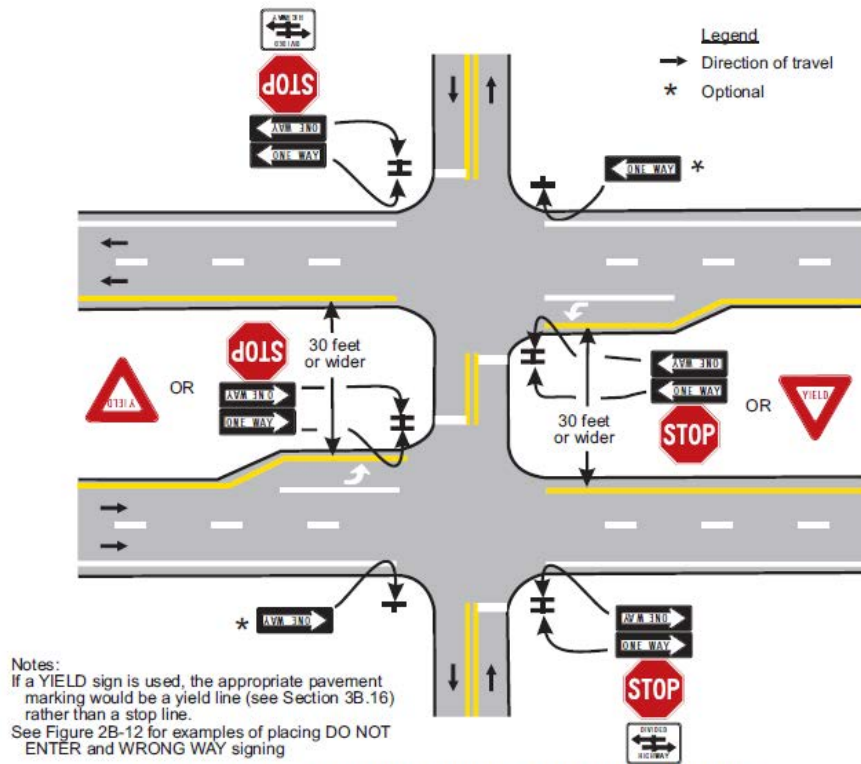


Figure 2B-15. ONE WAY Signing for Divided Highways with Median Widths of 30 Feet or Wider

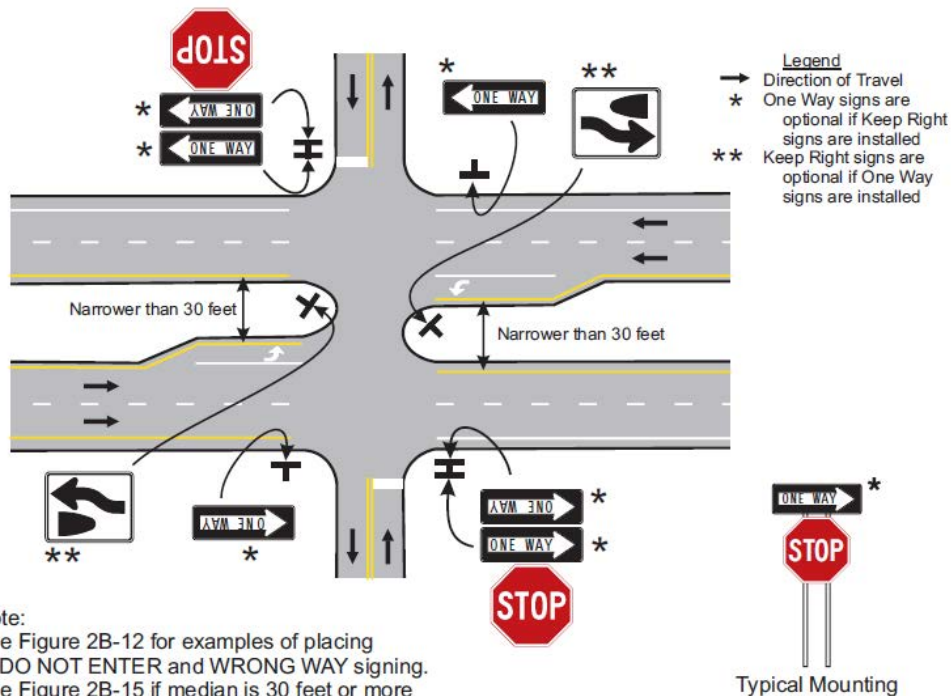


Figure 2B-16. ONE WAY Signing for Divided Highways with Median Widths Narrower Than 30 Feet

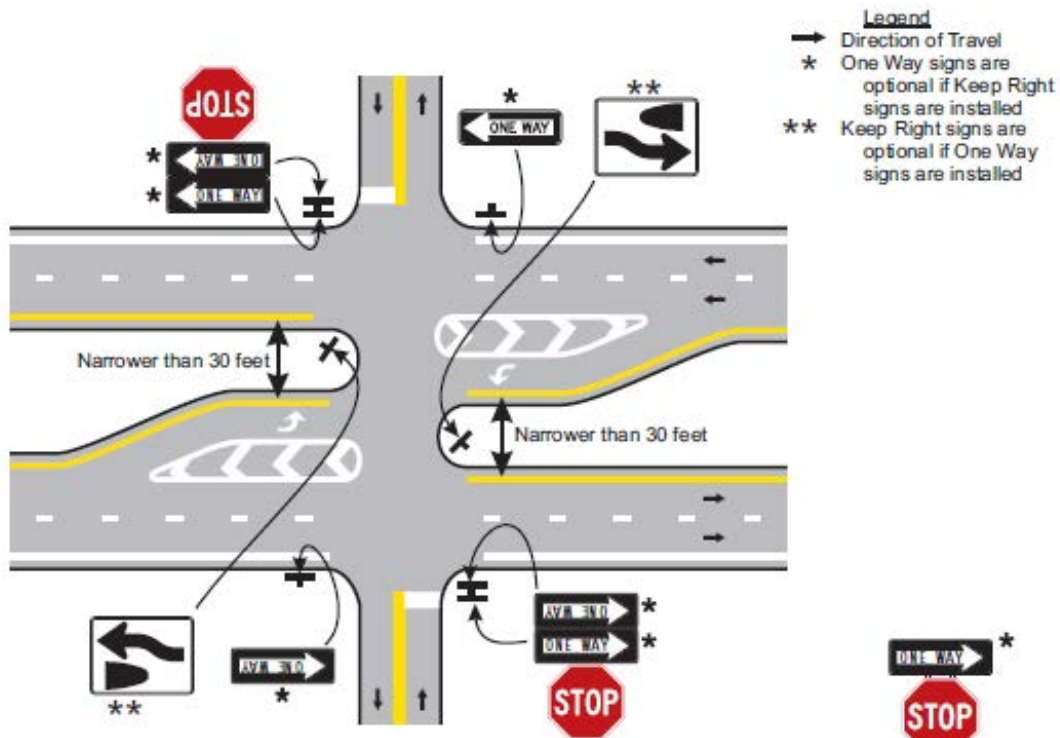
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Notes:
See Figure 2B-12 for examples of placing DO NOT ENTER and WRONG WAY signing.
See Figure 2B-15 if median is 30 feet or more in width.



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.

Compliance Date: December 31, 2019

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.

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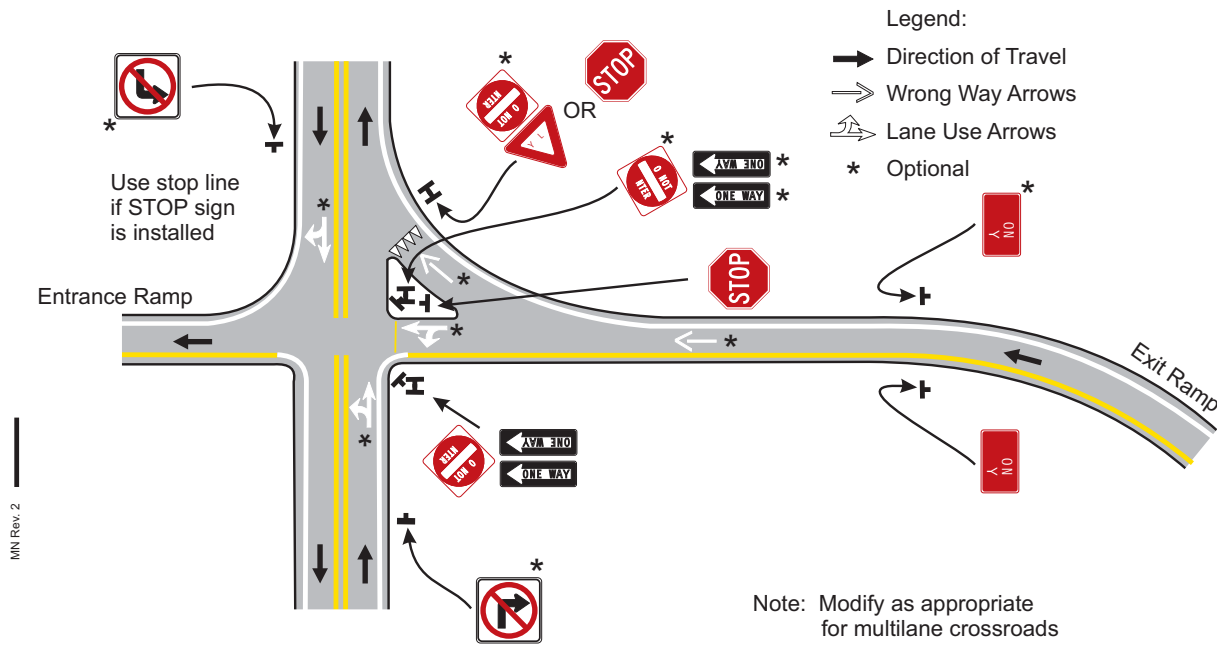


Figure 2B-18. Example of Application of Regulatory Signing and Pavement Markings at an Exit Ramp Termination to Deter Wrong-Way Entry

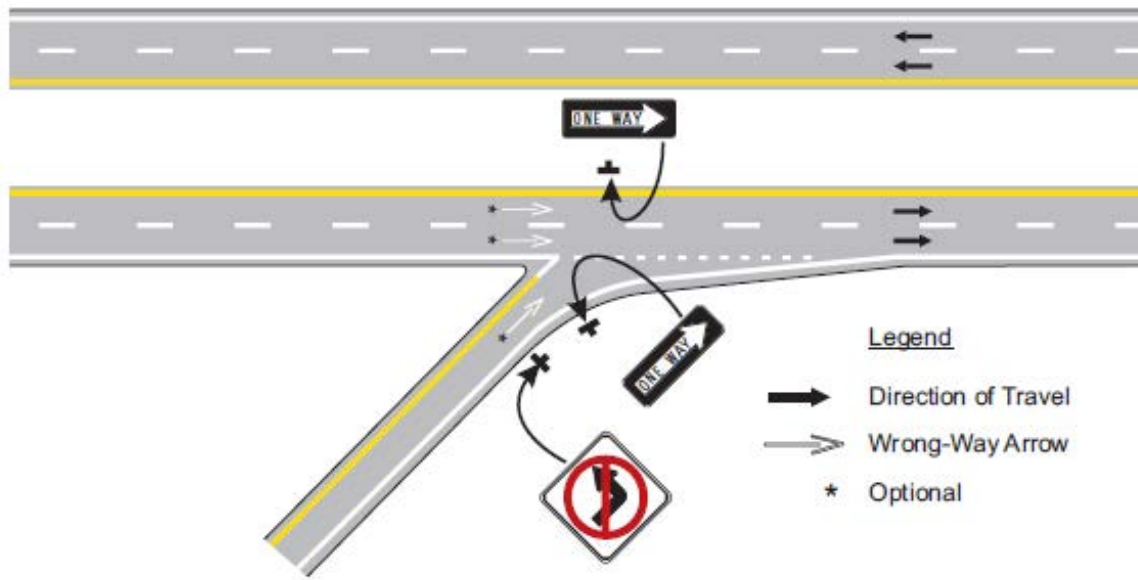


Figure 2B-19. Example of Application of Regulatory Signing and Pavement Markings at an Exit Ramp Termination Where the Design Does Not Clearly Indicate the Direction of Flow

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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.

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.

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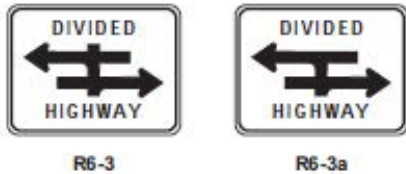
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SUPPORT:

Section 2B.42 contains further information on signing to avoid wrong-way movements at at-grade intersections on expressways.

2B.42 Divided Highway Crossing Signs (R6-3, R6-3a)



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STANDARD:

On unsignalized minor-street approaches from which both left turns and right turns are permitted onto a divided highway that has a median width at the intersection itself of 30 feet or more, except as provided in the following Option, a Divided Highway Crossing (R6-3 or R6-3a) sign shall be used to advise road users that they are approaching an intersection with a divided highway (see Figure 2B-15).

OPTION:

If a divided highway that has a median width at the intersection itself of 30 feet or more has a traffic volume of less than 400 AADT and a speed limit of 25 mph or less, the Divided Highway Crossing signs facing the unsignalized minor-street approaches may be omitted.

A Divided Highway Crossing sign may be used on signalized minor-street approaches from which both left turns and right turns are permitted onto a divided highway to advise road users that they are approaching an intersection with a divided highway.

If a Divided Highway Crossing sign is used at a four-legged intersection, the R6-3 sign shall be used. If used at a T-intersection, the R6-3a sign shall be used.

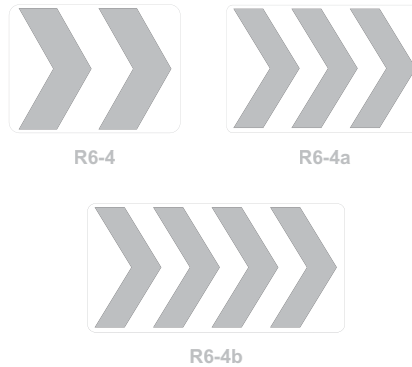
The Divided Highway Crossing sign shall be located on the near right corner of the intersection, mounted beneath a STOP or YIELD sign or on a separate support.

OPTION:

An additional Divided Highway Crossing sign may be installed on the left-hand side of the approach to supplement the Divided Highway Crossing sign on the near right corner of the intersection.

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2B.43 Roundabout Directional Arrow Signs (R6-4, R6-4a, and R6-4b)



GUIDANCE:

Where the central island of a roundabout allows for the installation of signs, Roundabout Directional Arrow (R6-4 series) signs should be used in the central island to direct traffic counter-clockwise around the central island, except as provided in the second Option in Section 2B.40.

STANDARD:

The R6-4 sign shall be a horizontal rectangle with two black chevron symbols pointing to the right on a white background. The R6-4a sign shall be a horizontal rectangle with three black chevron symbols pointing to the right on a white background. The R6-4b sign shall be a horizontal rectangle with four black chevron symbols pointing to the right on a white background. No border shall be used on the Roundabout Directional Arrow signs.

Roundabout Directional Arrow signs shall be used only at roundabouts and other circular intersections.

GUIDANCE:

When used on the central island of a roundabout, the mounting height of a Roundabout Directional Arrow 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.

OPTION:

More than one Roundabout Directional Arrow sign and/or R6-4a or R6-4b signs may be used facing high-speed approaches, facing approaches with limited visibility, or in other circumstances as determined by engineering judgment where increased sign visibility would be appropriate.

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Where parking spaces are designated to accommodate wheelchair vans, the Van Accessible plaque (R7-8bP) shall be installed below the Disabled Parking sign (R-8m). Both signs as well as any additional supplemental plaques shall have a white legend and border on a blue background.

GUIDANCE:

Where a guide sign is needed to direct motorists to van-accessible parking facilities, an appropriate arrow should be installed below the Disabled Parking assembly.

2B.49 Emergency Restriction Signs (R8-4, R8-7, R8-8, R16-X4)



OPTION:

The EMERGENCY PARKING ONLY (R8-4) sign or the EMERGENCY STOPPING ONLY (R8-7) sign may be used to discourage or prohibit shoulder parking, particularly where scenic or other attractions create a tendency for road users to stop temporarily.

The DO NOT STOP ON TRACKS (R8-8) sign (see Figure 8B-1) may be used to discourage or prohibit parking or stopping on railroad or light rail transit tracks (see Section 8B.09).

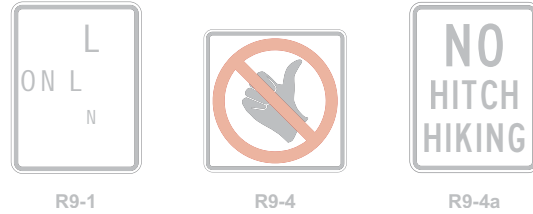
The Freeway Entrance Ramp Information sign (R16-X4) may be used as an alternate for or to supplement the EMERGENCY STOPPING ONLY sign.

STANDARD:

Emergency Restriction signs shall be rectangular and shall have a red or black legend and border on a white background.

The Freeway Entrance Ramp Information sign (R16-X4) shall be installed on all freeway entrance ramps near the beginning of the ramp facing traffic entering the freeway.

2B.50 WALK ON LEFT FACING TRAFFIC and No Hitchhiking Signs (R9-1, R9-4, R9-4a)



OPTION:

The WALK ON LEFT FACING TRAFFIC (R9-1) sign may be used on highways where no sidewalks are provided.

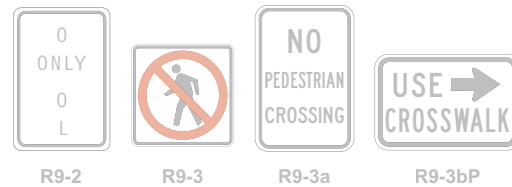
STANDARD:

If used, the WALK ON LEFT FACING TRAFFIC sign shall be installed on the right-hand side of the road where pedestrians walk on the pavement or shoulder in the absence of pedestrian pathways or sidewalks.

OPTION:

The No Hitchhiking (R9-4) sign may be used to prohibit standing in or adjacent to the roadway for the purpose of soliciting a ride. The R9-4a word message sign may be used as an alternate to the R9-4 symbol sign.

2B.51 Pedestrian Crossing Signs (R9-2, R9-3)



OPTION:

Pedestrian Crossing signs may be used to limit pedestrian crossing to specific locations.

STANDARD:

If used, Pedestrian Crossing signs shall be installed to face pedestrian approaches.

OPTION:

Where crosswalks are clearly defined, the CROSS ONLY AT CROSSWALKS (R9-2) sign may be used to prohibit pedestrians from crossing at locations away from crosswalks.

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7.3 MUTCD Chapter 2C Handout – Warning Signs

The information on the following pages are a handout from the 2011 MN MUTCD, Chapter 2C on Warning Signs. The entire section is not included, but only pages of interest for this manual. For full details on the MUTCD, refer to the OTST publications website found at, www.dot.state.mn.us/trafficeng/publ/index.html.

In addition, the entire Standard Signs Summary is included in the Appendix.

PART 2. SIGNS

Chapter 2C. Warning Signs and Object Markers

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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).

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.

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

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.

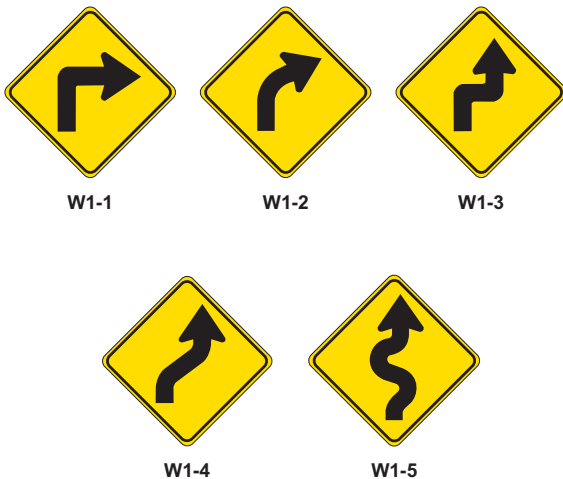
STANDARD:

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)



STANDARD:

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

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

GUIDANCE:

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

OPTION:

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

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

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

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

GUIDANCE:

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

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

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

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

Table 2C-5. Horizontal Alignment Sign Selection

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



W13-1P

OPTION:

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

STANDARD:

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

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

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

engineering study.

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

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

SUPPORT:

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

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

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

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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.

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.

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

STANDARD:

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

GUIDANCE:

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

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



W1-10



W1-10a



W1-10b



W1-10c



W1-10d



W1-10e

OPTION:

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

GUIDANCE:

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

STANDARD:

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

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



W1-6

OPTION:

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

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

STANDARD:

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

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

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

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

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

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GUIDANCE:

If used, the One-Direction Large Arrow sign should be visible for a sufficient distance to provide the road user with adequate time to react to the change in alignment.

2C.13 Truck Rollover Warning Sign (W1-13)



W1-13

OPTION:

A Truck Rollover Warning (W1-13) sign may be used to warn drivers of vehicles with a high center of gravity, such as trucks, tankers, and recreational vehicles, of a curve or turn where geometric conditions might contribute to a loss of control and a rollover as determined by an engineering study.

SUPPORT:

Among the established engineering practices that are appropriate for the determination of the truck rollover potential of 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 10 degrees of ball-bank

STANDARD:

If a Truck Rollover Warning (W1-13) sign is used, it shall be accompanied by an Advisory Speed (W13-1P) plaque indicating the recommended speed for vehicles with a higher center of gravity.

OPTION:

The Truck Rollover Warning sign may be displayed as a static sign, as a static sign supplemented by a flashing warning beacon, or as a changeable message sign activated by the detection of an approaching vehicle with a high center of gravity that is traveling in excess of the recommended speed for the condition.

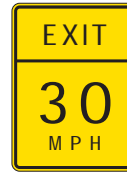
SUPPORT:

The curved arrow on the Truck Rollover Warning sign shows the direction of roadway curvature. The truck tips in the opposite direction.

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2C.14 Advisory Exit and Ramp Speed Signs (W13-2, W13-3)



W13-2



W13-3

STANDARD:

Advisory Exit Speed (W13-2) and Advisory Ramp Speed (W13-3) signs shall be vertical rectangles. The use of Advisory Exit Speed and Advisory Ramp Speed signs on freeway and expressway ramps shall be in accordance with the information shown in Table 2C-5.

GUIDANCE:

If used, the Advisory Exit Speed sign should be installed along the deceleration lane and the advisory speed displayed should be based on an engineering study. When a Truck Rollover (W1-13) sign (see Section 2C.13) is also installed for the ramp, the advisory exit speed should be based on the truck advisory speed for the horizontal alignment using recommended engineering practices.

If used, the Advisory Exit Speed sign should be visible in time for the road user to decelerate and make an exiting maneuver.

SUPPORT:

Table 2C-4 lists recommended advance sign placement distances for deceleration to various advisory speeds.

GUIDANCE:

If used, the Advisory Ramp Speed sign should be installed on the ramp to confirm the ramp advisory speed.

If used, Chevron Alignment (W1-8) signs and/or One-Direction Large Arrow (W1-6) signs should be installed on the outside of the exit curve as described in Sections 2C.9 and 2C.12.

OPTION:

Where there is a need to remind road users of the recommended advisory speed, a horizontal alignment warning sign with an advisory speed plaque may be installed at or beyond the beginning of the exit curve or on the outside of the curve, provided that it is apparent that the sign applies only to exiting traffic. These signs may also be used at intermediate points along the ramp, especially if the ramp curvature changes and the subsequent curves on the ramp have a different advisory speed than the initial ramp curve.

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SUPPORT:

Figure 2C-3 shows an example of advisory speed signing for an exit ramp. Engineering judgment should be used for actual sign selection and placement at specific locations.

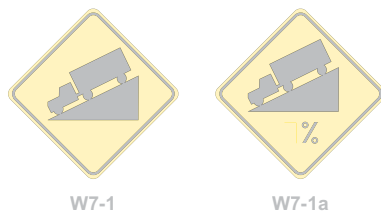
2C.15 Combination Horizontal Alignment/Advisory Exit and Ramp Speed Signs (W13-6, W13-7)



OPTION:

A horizontal alignment sign (see Section 2C.7) may be combined with an Advisory Exit Speed or Advisory Ramp Speed sign to create a combination Horizontal Alignment/Advisory Exit Speed (W13-6) sign or a combination Horizontal Alignment/Advisory Ramp Speed (W13-7) sign. These combination signs may be used where the severity of the exit ramp curvature might not be apparent to road users in the deceleration lane or where the curvature needs to be specifically identified as being on the exit ramp rather than on the mainline.

2C.16 Hill Signs (W7-1, W7-1a)



GUIDANCE:

The Hill (W7-1) sign should be used in advance of a downgrade where the length, percent of grade, horizontal curvature, and/or other physical features require special precautions on the part of road users.

The Hill sign and supplemental grade (W7-3P) plaque (see Section 2C.57) used in combination, or the W7-1a sign used alone, should be installed in advance of downgrades for the following conditions:

- A. 5% grade that is more than 3,000 feet in length;
- B. 6% grade that is more than 2,000 feet in length;
- C. 7% grade that is more than 1,000 feet in length;
- D. 8% grade that is more than 750 feet in length; or
- E. 9% grade that is more than 500 feet in length.

These signs should also be installed for steeper grades or where crash experience and field observations indicate a need.

Supplemental plaques (see Section 2C.57) and larger signs should be used for emphasis or where special hill characteristics exist. On longer grades, the use of the Hill sign with a distance (W7-3aP) plaque or the combination distance/grade (W7-3bP) plaque at periodic intervals of approximately 1-mile spacing should be considered.

STANDARD:

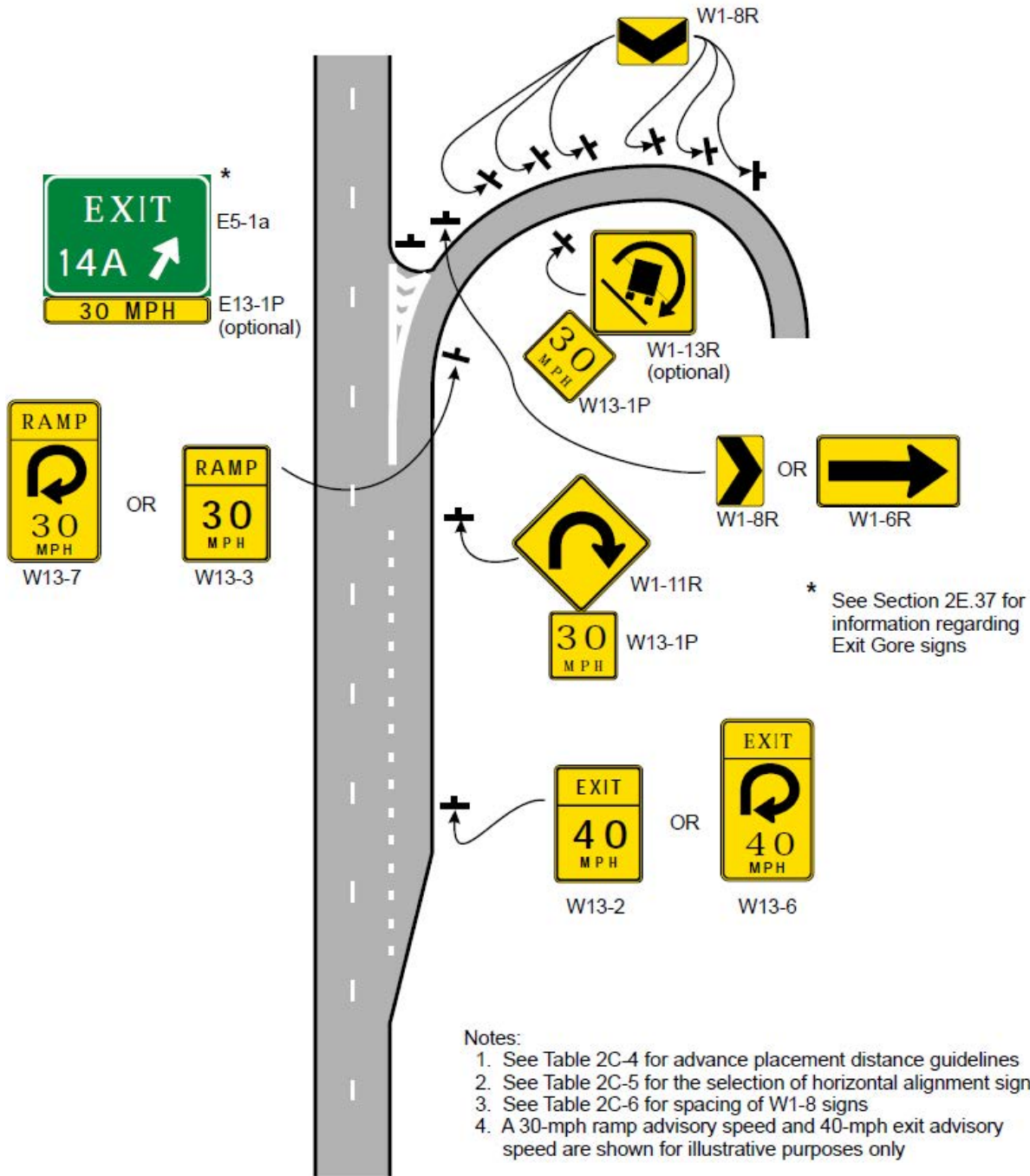
If the percent grade is displayed on a supplemental plaque, the plaque shall be placed below the Hill (W7-1) sign.

OPTION:

A USE LOW GEAR (W7-2P) or TRUCKS USE LOWER GEAR (W7-2bP) supplemental plaque may be used to indicate a situation where downshifting as well as braking might be advisable.

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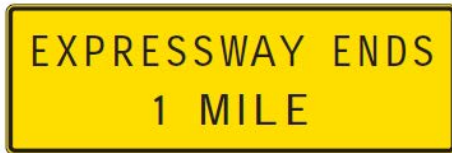
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Figure 2C-3. Example of Advisory Speed Signing for an Exit Ramp

2C.24 Freeway or Expressway Ends Signs (W19 Series)



W19-1



W19-2



W19-3



W19-4



W19-5

OPTION:

A FREEWAY ENDS XX MILES (W19-1) sign or a FREEWAY ENDS (W19-3) sign may be used in advance of the end of a freeway.

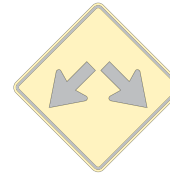
An EXPRESSWAY ENDS XX MILES (W19-2) sign or an EXPRESSWAY ENDS (W19-4) sign may be used in advance of the end of an expressway.

The rectangular W19-1 and W19-2 signs may be post-mounted or may be mounted overhead for increased emphasis.

GUIDANCE:

If the reason that the freeway is ending is that the next portion of the freeway is not yet constructed and as a result all traffic must use an exit ramp to leave the freeway, an ALL TRAFFIC MUST EXIT (W19-5) sign should be used in addition to the Freeway Ends signs in advance of the downstream end of the freeway.

2C.25 Double Arrow Sign (W12-1)



W12-1

OPTION:

The Double Arrow (W12-1) sign may be used to advise road users that traffic is permitted to pass on either side of an island, obstruction, or gore in the roadway. Traffic separated by this sign may either rejoin or change directions.

GUIDANCE:

If used on a raised island, the Double Arrow sign should be mounted near the approach end.

If used in front of a pier or obstruction, the Double Arrow sign should be mounted on the face of, or just in front of, the obstruction. Where stripe markings are used on the obstruction, they should be discontinued to leave a 75 mm (3 in) space around the outside of the sign.

2C.26 DEAD END/NO OUTLET Signs (W14-1, W14-1a, W14-2, W14-2a)



W14-1



W14-2



W14-1a



W14-2a

OPTION:

The DEAD END (W14-1) sign may be used at the entrance of a single road or street that terminates in a dead end or cul-de-sac. The NO OUTLET (W14-2) sign may be used at the entrance to a road or road network from which there is no other exit.

DEAD END (W14-1a) or NO OUTLET (W14-2a) signs may be used in combination with Street Name (D3-1) signs (see Section 2D.38) to warn turning traffic that the cross street ends in the direction indicated by the arrow.

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STANDARD:

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

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



W3-5

W3-5a

GUIDANCE:

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

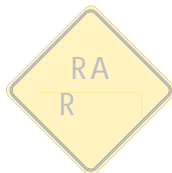
STANDARD:

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

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

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

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W3-6

STANDARD:

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

2C.40 Merge Signs (W4-1)



W4-1

OPTION:

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

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

GUIDANCE:

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

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

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

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

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

OPTION:

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

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

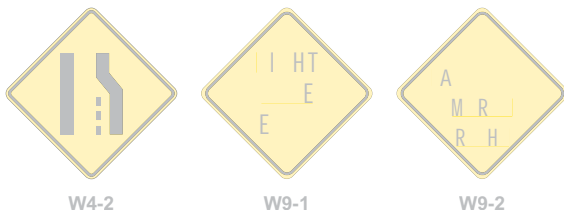


GUIDANCE:

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

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

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



GUIDANCE:

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

OPTION:

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

GUIDANCE:

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

OPTION:

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

SUPPORT:

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

GUIDANCE:

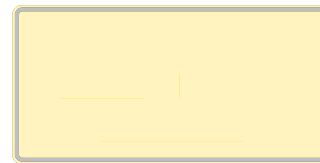
Where an extra lane has been provided for slower moving traffic (see Section 2B.31), a Lane Ends word sign or a Lane Ends (W4-2) symbol sign should be installed in advance of the downstream end of the extra lane.

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

STANDARD:

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

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



W9-7

OPTION:

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

STANDARD:

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

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7.4 MUTCD Chapter 2D through 2E - Guide Signing

The information on the following pages is a handout from the 2011 MN MUTCD, Chapter 2D on Guide Signs for Conventional Roads. The entire section is not included, but only pages of interest for this manual. For full details on the MUTCD, refer to the OTST publications website found at, www.dot.state.mn.us/trafficeng/publ/index.html.

In addition, the entire Standard Signs Summary is included in the Appendix.

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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

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

Use the figures in the TEM instead of those in the MN MUTCD

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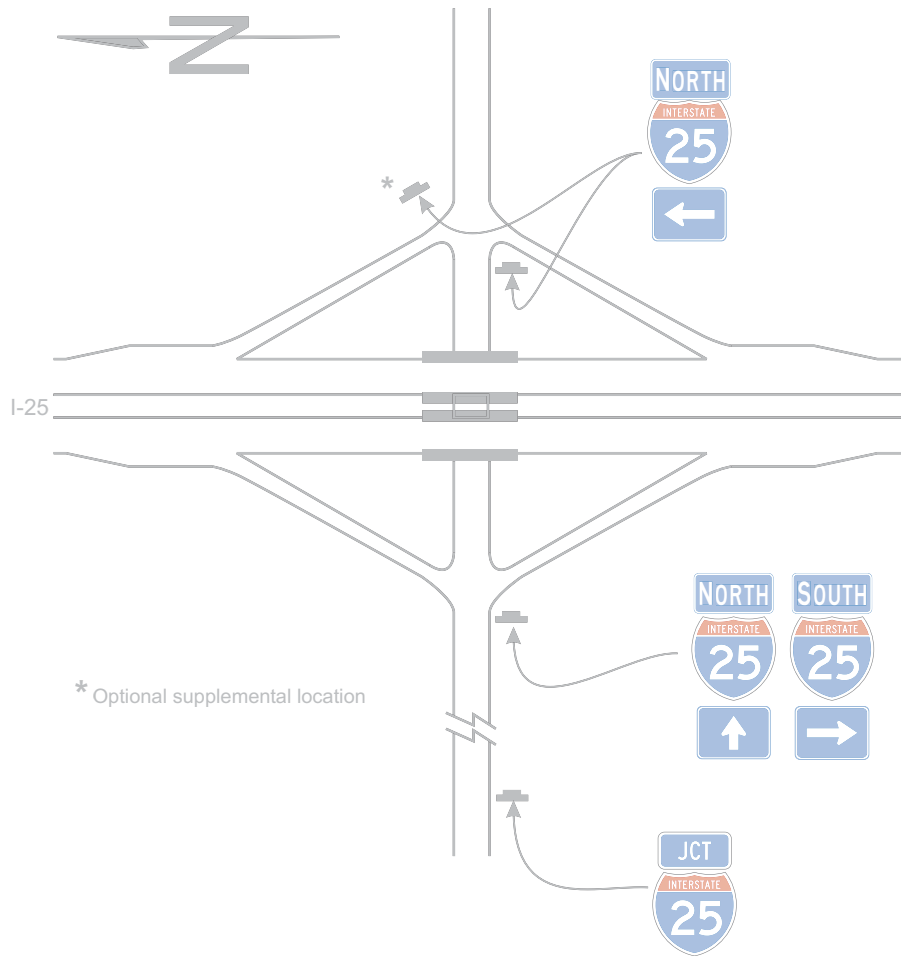


Figure 2D-12. Example of Minor Interchange Crossroad Signing

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).

Use the figures in the TEM instead of those in the MN MUTCD

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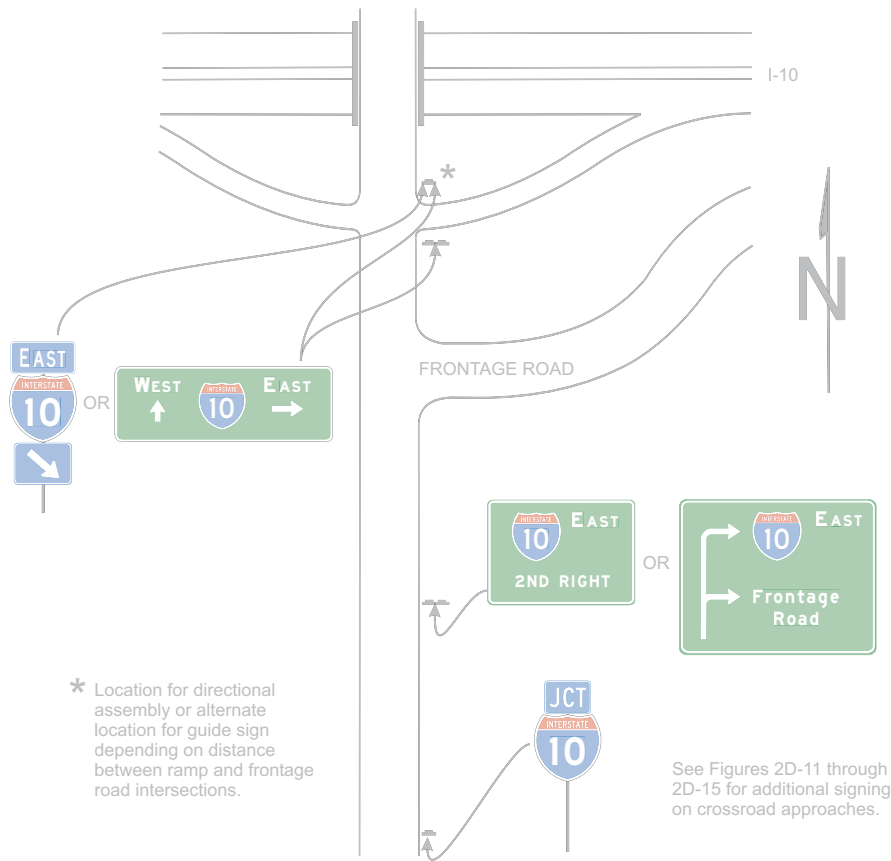


Figure 2D-16 Example of Crossroad Signing for an Entrance Ramp with a Nearby Frontage Road

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.

Use the figures in the TEM instead of those in the MN MUTCD

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PART 2. SIGNS

Chapter 2E. Guide Signs - Freeways and Expressways

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PART 2. SIGNS

Chapter 2E. Guide Signs - Freeways and Expressways

2E.1 Scope of Freeway and Expressway Guide Sign Standards

SUPPORT:

The provisions of this Chapter provide a uniform and effective system of signing for high-volume, high-speed motor vehicle traffic on freeways and expressways. The requirements and specifications for expressway signing exceed those for conventional roads (see Chapter 2D), but are less than those for freeway signing. Since there are many geometric design variables to be found in existing roads, a signing concept commensurate with prevailing conditions is the primary consideration. Section 1A.13 includes definitions of freeway and expressway.

Guide signs for freeways and expressways are primarily identified by the name of the sign rather than by an assigned sign designation. Guidelines for the design of guide signs for freeways and expressways are provided in the "Standard Highway Signs and Markings" book (see Section 1A.11).

STANDARD:

The provisions of this Chapter shall apply to any highway that meets the definition of freeway or expressway facilities.

2E.2 Freeway and Expressway Signing Principles

SUPPORT:

The development of a signing system for freeways and expressways is approached on the premise that the signing is primarily for the benefit and direction of road users who are not familiar with the route or area. The signing furnishes road users with clear instructions for orderly progress to their destinations. Sign installations are an integral part of the facility and, as such, are best planned concurrently with the development of highway location and geometric design. For optimal results, plans for signing are analyzed during the earliest stages of preliminary design, and details are correlated as final design is developed. The excessive signing found on many major highways usually is the result of using a multitude of signs that are too small and that are poorly designed and placed to accomplish the intended purpose.

Freeway and expressway signing is to be considered and developed as a planned system of installations. An engineering study is sometimes necessary for proper

solution of the problems of many individual locations, but, in addition, consideration of an entire route is necessary.

GUIDANCE:

Road users should be guided with consistent signing on the approaches to interchanges, when they drive from one State to another, and when driving through rural or urban areas. Because geographical, geometric, and operating factors regularly create significant differences between urban and rural conditions, the signing should take these conditions into account.

Guide signs on freeways and expressways should serve distinct functions as follows:

- A. Give directions to destinations, or to streets or highway routes, at intersections or interchanges;
- B. Furnish advance notice of the approach to intersections or interchanges;
- C. Direct road users into appropriate lanes in advance of diverging or merging movements;
- D. Identify routes and directions on those routes;
- E. Show distances to destinations;
- F. Indicate access to general motorist services, rest, scenic, and recreational areas; and
- G. Provide other information of value to the road user.

2E.3 Guide Sign Classification

SUPPORT:

Freeway and expressway guide signs are classified and treated in the following categories:

- A. Route signs and Trailblazer Assemblies (see Section 2E.27),
- B. At-Grade Intersection signs (see Section 2E.29),
- C. Interchange signs (see Sections 2E.30 through 2E.39),
- D. Interchange Sequence signs (see Section 2E.40),
- E. Community Interchanges Identification signs (see Section 2E.41),
- F. NEXT XX EXITS signs (see Section 2E.42),
- G. Weigh Station signing (see Section 2E.54),
- H. Miscellaneous information signs (see Section 2H.04),
- I. Reference Location signs (see Section 2H.05),
- J. General Service signs (see Chapter 2I),
- K. Rest and Scenic Area signs (see Section 2I.05),
- L. Tourist Information and Welcome Center signs (see Section 2I.08),
- M. Radio Information signing (see Section 2I.09),
- N. Carpool and Ridesharing signing (see Section 2I.11),
- O. Specific Service signs (see Chapter 2J), and
- P. Recreational and Cultural Interest Area signs (see Chapter 2M).

MnDOT further clarifies these definitions in the glossary of Chapter 6 of the TEM

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2E.4 General

SUPPORT:

Signs are designed so that they are legible to road users approaching them and readable in time to permit proper responses. Desired design characteristics include: (a) long visibility distances, (b) large lettering, symbols, and arrows, and (c) short legends for quick comprehension.

STANDARD:

Standard shapes and colors shall be used so that traffic signs can be promptly recognized by road users.

2E.5 Color of Guide Signs

STANDARD:

Guide signs on freeways and expressways, except as otherwise provided in this Manual, shall have white letters and numerals, symbols, arrows, and borders on a green background.

SUPPORT:

Color requirements for route signs and trailblazers, signs with blank-out or changeable messages, signs for services, rest areas, park and recreational areas, and for certain miscellaneous signs are provided in the individual Sections dealing with the particular sign or sign group.

2E.6 Retroreflection or Illumination

STANDARD:

Letters, numerals, symbols, arrows, and borders of all guide signs shall be retroreflectorized. The background of all guide signs that are not independently illuminated shall be retroreflective.

SUPPORT:

Where there is no serious interference from extraneous light sources, retroreflectorized post-mounted signs usually provide adequate nighttime visibility.

On freeways and expressways where much driving at night is done with low-beam headlights, the amount of headlight illumination incident to an overhead sign display is relatively small.

GUIDANCE:

Overhead sign installations should be illuminated unless an engineering study shows that retroreflectorization alone will perform effectively. The type of illumination chosen should provide effective and reasonably uniform illumination of the sign face and message.

2E.7 Characteristics of Urban Signing

SUPPORT:

Urban conditions are characterized not so much by city limits or other arbitrary boundaries, as by the following features:

- A. Mainline roadways with more than two lanes in each direction;
- B. High traffic volumes on the through roadways;
- C. High volumes of traffic entering and leaving interchanges;
- D. Interchanges closely spaced;
- E. Roadway and interchange lighting;
- F. Three or more interchanges serving the major city;
- G. A loop, circumferential, or spur serving a sizable portion of the urban population; and
- H. Visual clutter from roadside development.

Operating conditions and road geometrics on urban freeways and expressways usually make special sign treatments desirable, including:

- A. Use of Interchange Sequence signs (see Section 2E.40);
 - B. Use of sign spreading to the maximum extent possible (see Section 2E.11);
 - C. Elimination of General or Specific Service signing (see Chapters 2I and 2J);
 - D. Reduction to a minimum of post-interchange signs (see Section 2E.38);
 - E. Display of advance signs at distances closer to the interchange, with appropriate adjustments in the legend (see Section 2E.33);
 - F. Use of overhead signs on roadway structures and independent sign supports (see Section 2E.25);
 - G. Use of Overhead Arrow-per-Lane or Diagrammatic guide signs in advance of intersections and interchanges (see Sections 2E.21 and 2E.22); and
 - H. Frequent use of street names as the principal message in guide signs.
- Lower speeds which are often characteristic of urban operations do not justify lower signing standards. Typical traffic patterns are more complex for the road user to negotiate, and large, easy-to-read legends are, therefore, just as necessary as on rural highways.

2E.8 Characteristics of Rural Signing

SUPPORT:

Rural areas ordinarily have greater distances between interchanges, which permits adequate spacing for the sequences of signs on the approach to and departure from each interchange. However, the absence of traffic in adjoining lanes and on entering or exiting ramps often adds monotony or inattention to rural driving. This increases the importance of signs that call for decisions or actions.

GUIDANCE:

Where there are long distances between interchanges and the alignment is relatively unchanging, signs should be positioned for their best effect on road users. The tendency to group all signing in the immediate vicinity of rural interchanges should be avoided by considering the entire route in the development of sign plans. Extra effort should be given to the placement of signs at natural target locations to command the attention of the road user, particularly when the message requires an action by the road user.

2E.9 Signing of Named Highways**SUPPORT:**

Section 2D.53 contains information, which is also applicable to freeways and expressways, regarding the use of highway names on the signing for unnumbered highways to enhance route guidance and facilitate travel.

Section 2M.10 contains information regarding memorial signing of routes, bridges, or highway components.

2E.10 Amount of Legend on Guide Signs**GUIDANCE:**

No more than two destination names or street names should be displayed on any Advance Guide sign or Exit Direction sign. A city name and street name on the same sign should be avoided. Where two or three signs are placed on the same supports, destinations or names should be limited to one per sign, or to a total of three in the display. Sign legends should not exceed three lines of copy, exclusive of the exit number and action or distance information.

2E.11 Number of Signs at an Overhead Installation and Sign Spreading**GUIDANCE:**

If overhead signs are warranted, as set forth in Section 2A.17, the number of signs at these locations should be limited to only those essential in communicating pertinent destination information to the road user. Exit Direction signs for a single exit and the Advance Guide signs should have only one sign with one or two destinations. Regulatory signs, such as speed limits, should not be used in conjunction with overhead guide sign installations. Because road users have limited time to read and comprehend sign messages, there should not be more than three guide signs displayed at any one location either on the overhead structure or its support.

OPTION:

At overhead locations, more than one sign may be installed to advise of a multiple exit condition at an

interchange. If the roadway ramp or crossing roadway has complex or unusual geometrics, additional signs with confirming messages may be provided to properly guide the road user.

SUPPORT:

Sign spreading is a concept where major overhead signs are spaced so that road users are not overloaded with a group of signs at a single location. Figure 2E-1 illustrates an example of sign spreading.

GUIDANCE:

Where overhead signing is used, sign spreading should be used at all single exit interchanges and to the extent possible at multi-exit interchanges. Sign spreading should be accomplished by use of the following:

- A. The Exit Direction sign should be the only sign used in the vicinity of the gore (other than the Exit Gore sign). It should be located overhead near the theoretical gore and generally on an overhead sign support structure.
- B. The Advance Guide sign to indicate the next interchange exit should be placed near the crossroad location. If the crossroad goes over the mainline, the Advance Guide sign should be placed on the overcrossing structure or on a separate structure immediately in front of the overcrossing structure.

2E.12 Pull-Through Signs**SUPPORT:**

Pull-Through (E6-2, E6-2a) signs (see Figure 2E-2) are overhead guide signs intended for through traffic.

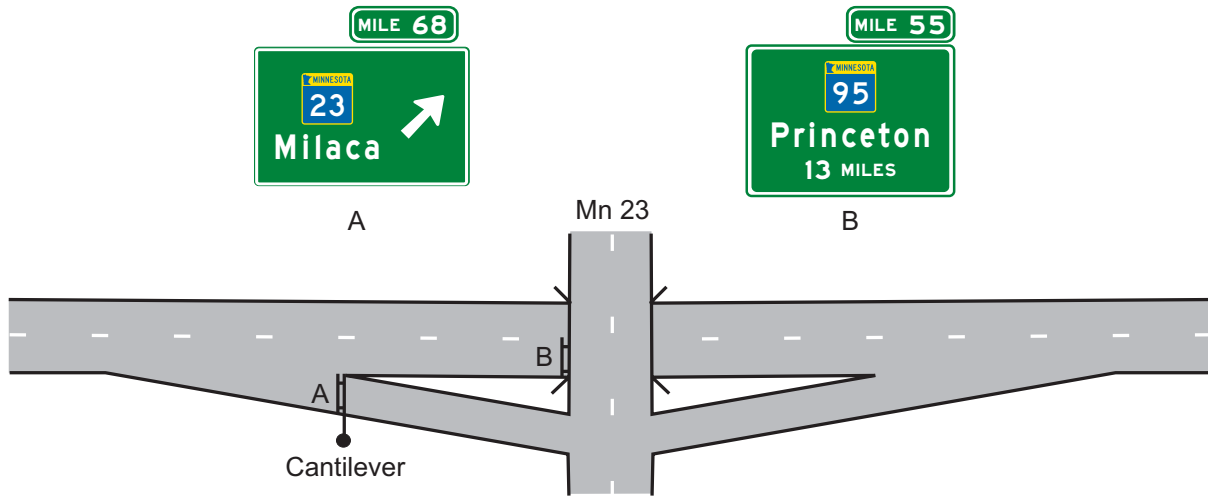
GUIDANCE:

Pull-Through signs should be used where the geometrics of a given interchange are such that it is not clear to the road user as to which is the through roadway, or where additional route guidance is desired. Pull-Through signs with down arrows should be used where the alignment of the through lanes is curved and the exit direction is straight ahead, where the number of through lanes is not readily evident, and at multi-lane exits where there is a reduction in the number of through lanes.

SUPPORT:

Sections 2E.20 through 2E.24 contain information regarding the use of Overhead Arrow-per-Lane or Diagrammatic guide signs at multi-lane exits where there is a reduction in the number of through lanes and a through lane becomes an interior option lane for through or exiting traffic.

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Figure 2E-1 Example of Guide Sign Spreading



E6-2



E6-2a

Figure 2E-2 Pull-Through Signs

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2E.13 Designation of Destinations

STANDARD:

The direction of a freeway and the major destinations or control cities along it shall be clearly identified through the use of appropriate destination legends (see Section 2D.37). Successive freeway guide signs shall provide continuity in destination names and consistency with available map information. At any decision point, a given destination shall be indicated by way of only one route.

GUIDANCE:

Control city legends should be used in the following situations along a freeway:

- A. At interchanges between freeways;
- B. At separation points of overlapping freeway routes;
- C. On directional signs on intersecting routes, to guide traffic entering the freeway;
- D. On Pull-Through signs; and
- E. On the bottom line of post-interchange distance signs.

SUPPORT:

Continuity of destination names is also useful on expressways serving long-distance or intrastate travel.

The determination of major destinations or control cities is important to the quality of service provided by the freeway. Control cities on freeway guide signs are selected by the States and are contained in the "Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to Freeways, 4th Edition/Guide Signs, Part II: Guidelines for Airport Guide Signing/Guide Signs, Part III: List of Control Cities for Use in Guide Signs on Interstate Highways," published by and available from the American Association of State and Highway Transportation Officials (see Section 1A.11).

2E.14 Size and Style of Letters and Signs

STANDARD:

Except as provided in Section 2A.11, the sizes of freeway and expressway guide signs that have standardized designs shall be as shown in Table 2E-1.

SUPPORT:

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

OPTION:

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

STANDARD:

For all freeway and expressway signs that do not have a standardized design, the message dimensions shall be determined first, and the outside sign dimensions secondarily. Word messages in the legend of expressway guide signs shall be in letters at least 8 inches high. Larger lettering shall be used for major guide signs at or in advance of interchanges and for all overhead signs. Minimum numeral and letter sizes for expressway guide signs according to interchange classification, type of sign, and component of sign legend shall be as shown in Tables 2E-2 and 2E-3. Minimum numeral and letter sizes for freeway guide signs according to interchange classification, type of sign, and component of sign legend shall be as shown in Tables 2E-4 and 2E-5. All names of places, streets, and highways on freeway and expressway guide signs shall be composed of lower-case letters with initial upper-case letters. The letters and the numerals used shall be Series E(M) of the FHWA "Standard Highway Signs and Markings" book (see Section 1A.11). The nominal loop height of the lower-case letters shall be 3/4 of the height of the initial upper-case letter (see Paragraph 2 of Section 2D.5 for additional information on the specification of letter heights). Other word legends shall be composed of upper-case letters. Interline and edge spacing shall be as provided in Section 2E.15.

Lettering size on freeway and expressway signs shall be the same for both rural and urban conditions.

SUPPORT:

Sign size is determined primarily in terms of the length of the message and the size of the lettering necessary for proper legibility. Letter style and height, and arrow design have been standardized for freeway and expressway signs to assure uniform and effective application.

Designs for upper-case and lower-case alphabets together with tables of recommended letter spacing, are shown in the FHWA "Standard Highway Signs and Markings" book and the MnDOT "Standard Signs Manual".

GUIDANCE:

Freeway lettering sizes (see Tables 2E-4 and 2E-5) should be used when expressway geometric design is comparable to freeway standards.

Other sign letter size requirements not specifically identified elsewhere in this Manual should be guided by these specifications. Abbreviations (see Section 2E.17) should be kept to a minimum.

2E.20 Signing for Option Lanes at Splits and Multi-Lane Exits

SUPPORT:

Some freeway and expressway splits or multi-lane exit interchanges contain an interior option lane serving both movements in which traffic can either leave the route or remain on the route, or choose either destination at a split, from the same lane.

STANDARD:

On freeways and expressways, either the Overhead Arrow-per-Lane or Diagrammatic guide sign designs as provided in Sections 2E.21 and 2E.22 shall be used for all multi-lane exits at major interchanges (see Section 2E.32) that have an optional exit lane that also carries the through route (see Figures 2E-4, 2E-5, 2E-8, and 2E-9) and for all splits that include an option lane (see Figures 2E-6 and 2E-10). Overhead Arrow-per-Lane or Diagrammatic guide signs shall not be used on freeways and expressways for any other types of exits or splits, including single-lane exits and splits that do not have an option lane.

GUIDANCE:

The Overhead Arrow-per-Lane guide sign design (see Section 2E.21) should also be considered for multi-lane exits with an option lane at intermediate interchanges (see Section 2E.32) based on such factors as the extent of the need to optimize the mainline operation by maximizing the usage of the option lane, the extent of the period(s) of the day during which the exiting volumes warrant the multi-lane exit arrangement, and the nature of the traffic that primarily uses the option lane during the high-volume periods.

Signing for multi-lane exits at minor interchanges (see Section 2E.32) that have an optional exit lane or at intermediate interchanges that have an optional exit lane at which it has been determined that the Overhead Arrow-per-Lane guide sign design is not warranted should use a combination of conventional guide signing and regulatory lane-use signing, in accordance with the provisions of Section 2E.23.

2E.21 Design of Overhead Arrow-per-Lane Guide Signs for Option Lanes

SUPPORT:

Overhead Arrow-per-Lane guide signs (see Figure 2E-3) are used where an option lane is present at freeway and expressway multi-lane exit interchanges and splits. They display an upward-pointing arrow above each lane that conveys the direction(s) of travel that the lane serves at the point of departure. At locations where an option lane is present at a multi-lane exit or split, Overhead Arrow-per-Lane guide signs have been shown to be superior to either

conventional guide signs or Diagrammatic guide signs because they convey positive direction about which destination and direction each approach lane serves, particularly for the option lane, which is otherwise difficult to clearly sign.

Overhead Arrow-per-Lane guide signs shall be used on all new or reconstructed freeways and expressways as described in Section 2E.20.

Where used, the Overhead Arrow-per-Lane guide sign at the exit or split shall be located at or in the immediate vicinity of the point where the exiting lanes begin to diverge from the through lanes or, for a split, at the point where the approach lanes begin to diverge from one another, preserving the relation of the arrows displayed on the sign to their respective lanes. The Overhead Arrow-per-Lane guide sign at the exit shall not be located at or near the theoretical gore.

OPTION:

At existing or non-reconstructed locations where Exit Direction and Pull-Through signs exist at the theoretical gore, the existing sign support structure may remain in place, continuing to use Exit Direction and Pull-Through signs, in conjunction with a replacement of the advance signs using the Overhead Arrow-per-Lane guide sign design.

STANDARD:

If existing Exit Direction and Pull-Through signs are being retained at an interchange as provided in the previous Option, an Overhead Arrow-per-Lane guide sign shall not be used at the location of the Exit Direction and Pull-Through signs at or in the vicinity of the theoretical gore. New installations of Exit Direction and Pull-Through signs shall not be permitted in conjunction with Overhead Arrow-per-Lane guide signs on new or reconstructed facilities.

GUIDANCE:

Overhead Arrow-per-Lane guide signs should be located at approximately 1/2 mile and 1 mile in advance of the exit or split, and at approximately 2 miles in advance of the exit or split where space is available and conditions allow.

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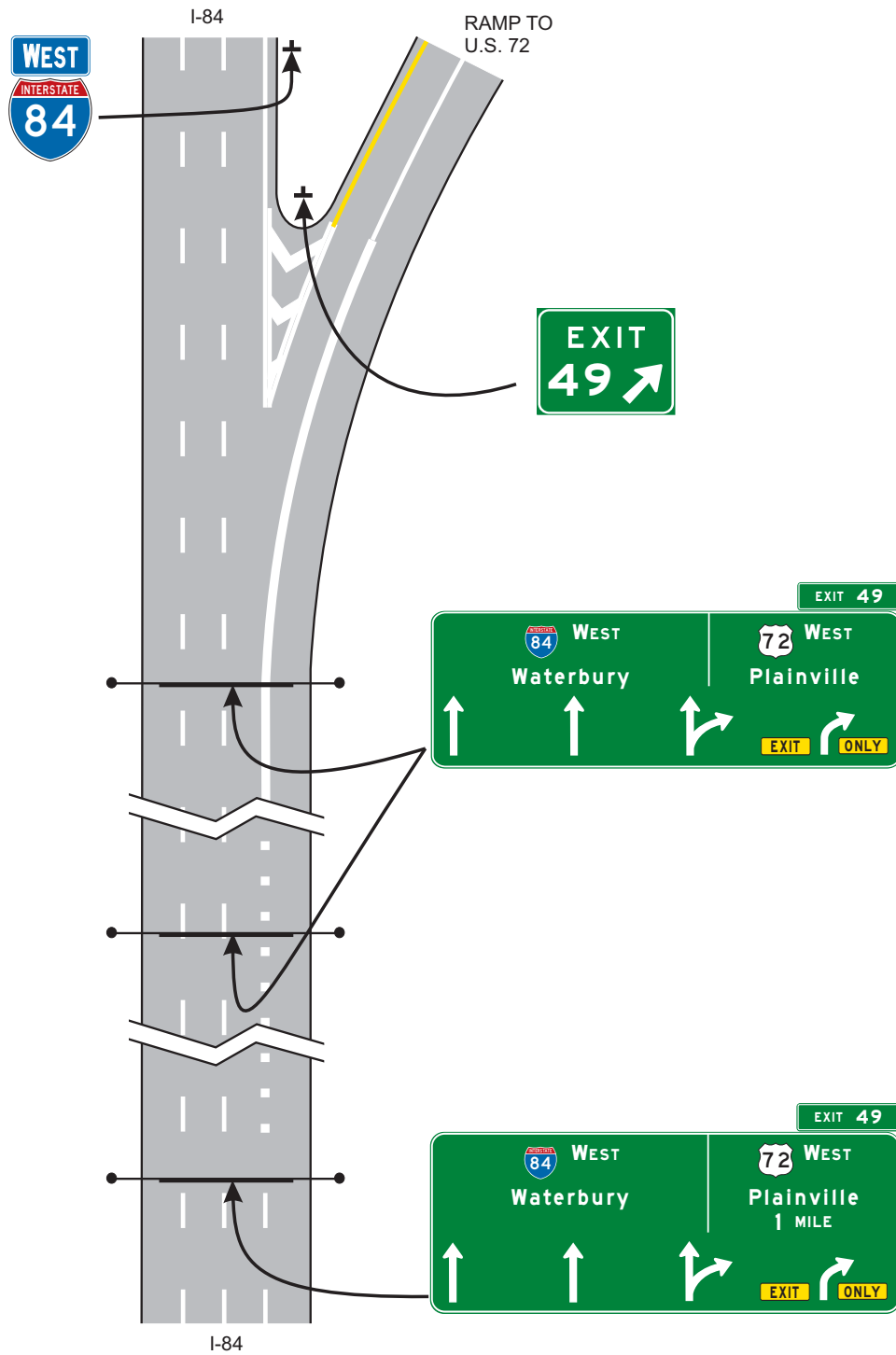


Figure 2E-4 Overhead Arrow-per-Lane Guide Signs for a Two-Lane Exit to the Right with an Option Lane

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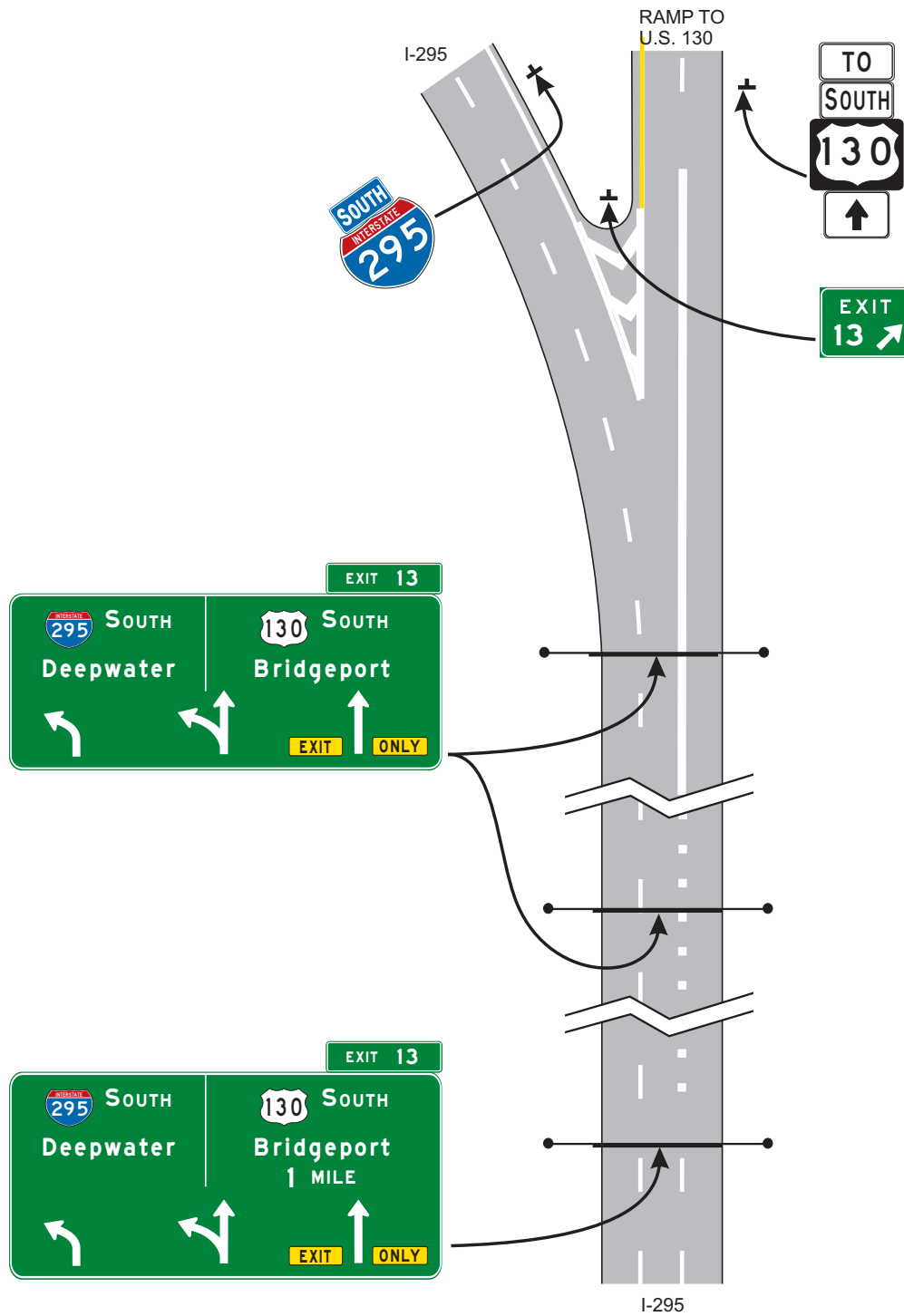
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Figure 2E-5 Overhead Arrow-per-Lane Guide Signs for a Two-Lane Exit to the Right with an Option Lane (Through Lanes Curve to the Left)

2E-17

December, 2011

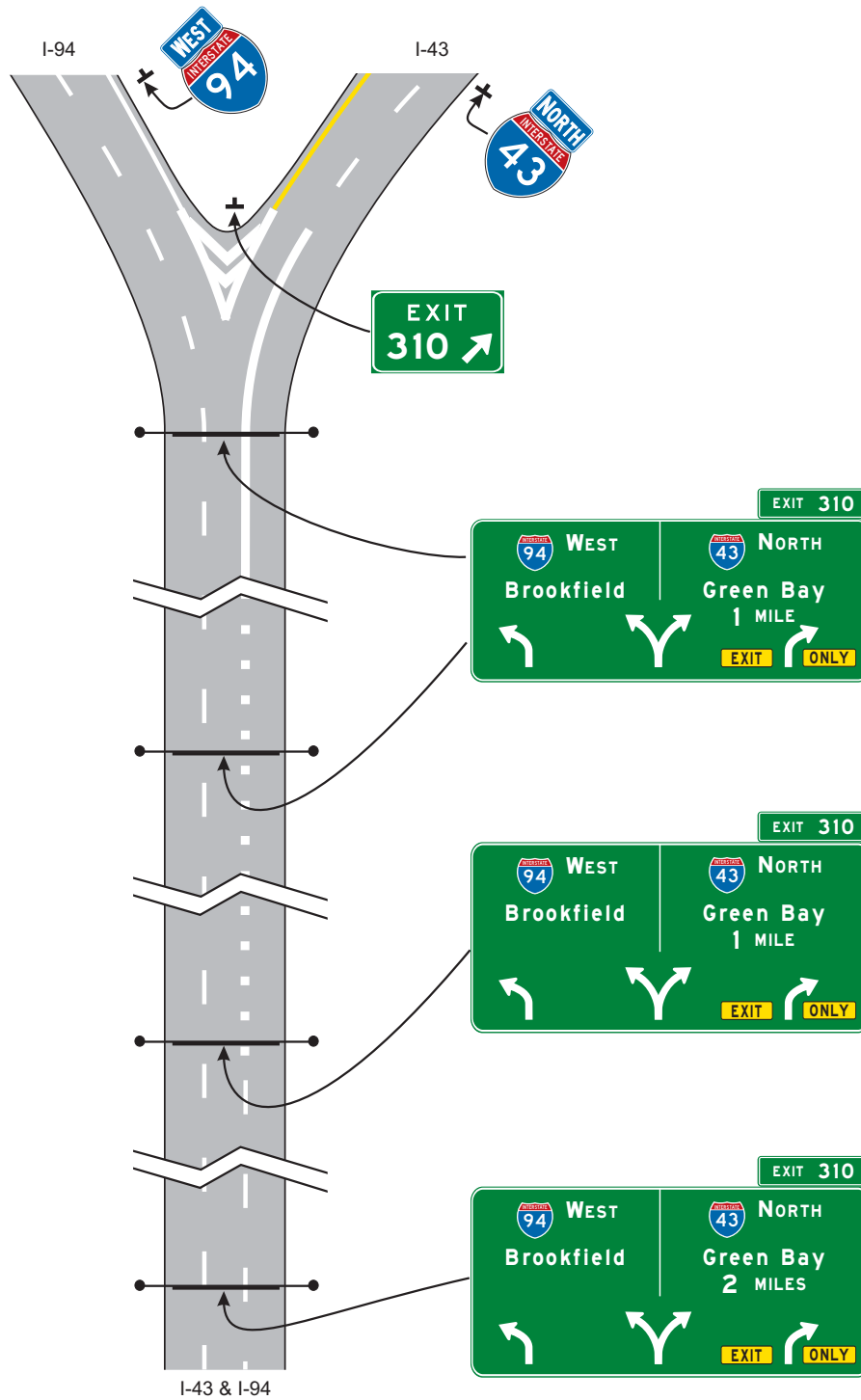


Figure 2E-6 Overhead Arrow-per-Lane Guide Signs for a Split with an Option Lane

July, 2013

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2E.22 Design of Freeway and Expressway Diagrammatic Guide Signs for Option Lanes

SUPPORT:

Diagrammatic guide signs (see Figure 2E-7) are guide signs that show a simplified graphic view of the exit arrangement in relationship to the main highway. While the use of such guide signs might be helpful for the purpose of conveying relative direction of each movement, Diagrammatic guide signs have been shown to be less effective than conventional or Overhead Arrow-per-Lane guide signs at conveying the destination or direction(s) that each approach lane serves, regardless of whether dedicated or option lanes are present.

STANDARD:

Diagrammatic guide signs used where an option lane is present at a freeway or expressway split or multi-lane exit shall be designed in accordance with the following criteria:

- A. The graphic legend shall be of a plan view showing the off-ramp arrangement.
- B. No other symbols or route shields shall be used as a substitute for arrowheads.
- C. They shall not be installed at the Exit Direction sign location (see Section 2E.36).
- D. The EXIT ONLY sign panel shall not be used on diagrammatic guide signs in advance of the interchange.
- E. For numbered exits, the Exit Number (E1-5P) or Left Exit Number (E1-5bP) plaque shall be used at the top of the sign in accordance with Section 2E.31. For unnumbered left exits, the LEFT (E1-5aP) plaque shall be used at the top left edge of the sign.

- F. The EXIT ONLY (E11-1e or E11-1f) sign panels shall be used on the Exit Direction sign at the theoretical gore, except at splits of two overlapping routes where neither of the routes is designated as an exit.

GUIDANCE:

Diagrammatic guide signs used on freeways and expressways should be designed in accordance with the following additional criteria:

- A. The graphic should not depict deceleration lanes.
- B. No more than one destination should be displayed for each movement, and no more than two destinations should be displayed per sign.
- C. The arrowhead for the diverging movement should be positioned lower on the sign than the arrowhead for the movement that continues straight ahead, independent of which movement carries the through route (see Figures 2E-8 and 2E-9). Where the movements are freeway or expressway splits rather than exits, the arrowheads should be positioned at approximately the same height on the sign (see Figure 2E-10).
- D. Arrow shafts should contain lane lines.
- E. Route shields, cardinal directions, and destinations should be positioned on the sign such that they are clearly related to the arrowhead(s), and the arrowhead for the off movement should point toward the route shield for the off movement.
- F. For exits or splits leading in a single direction, the cardinal direction should be placed adjacent to the route shield, and the destination should be placed below the route shield and cardinal direction.



Figure 2E-7 Diagrammatic Guide Sign for a Multi-Lane Exit with an Option Lane

STANDARD:

Diagrammatic guide signs shall not be used at cloverleaf interchanges for the purpose of depicting successive departures from the mainline or separate downstream departures from a collector-distributor roadway. The use of Diagrammatic guide signs at cloverleaf interchanges shall be limited to the following cases:

- A. Where the outer (non-loop) exit ramp of the cloverleaf is a multi-lane exit having an optional exit lane that also carries the through route; and
- B. At cloverleaf interchanges that include collector-distributor roadways, such as those illustrated in Figure 2E-36, that are accessed from the mainline by a multi-lane exit having an optional exit lane that also carries the through route. In this case, the Diagrammatic guide sign shall only show the configuration of the lanes at the exit point to the collector-distributor roadway and not the entire interchange configuration.

SUPPORT:

Specific guidelines for more detailed design of Diagrammatic guide signs are contained in the FHWA "Standard Highway Signs and Markings" book (see Section 1A.11).

For more specific guidelines on the detailed design of these types of signs, contact MnDOT, (see Office of Traffic, Safety and Technology, page ii).

OPTION:

Where extra emphasis of an especially low advisory ramp speed is needed, an EXIT XX MPH (E13-2) sign panel (see Figure 2E-27) may be placed below the applicable destination legend to supplement, but not to replace, the exit or ramp advisory speed warning signs.

2E.23 Signing for Intermediate and Minor Interchange Multi-Lane Exits with an Option Lane

SUPPORT:

Intermediate and minor multi-lane exits might have an operational need for the presence of an option lane for only the peak period during which excessive queues might otherwise develop if the option lane were not available. In such cases, the Overhead Arrow-per-Lane or Diagrammatic guide signing described for option lanes in Sections 2E.21 and 2E.22 might not be practical, depending on the level of use of the option lane and the spacing of nearby interchanges, particularly in non-rural areas.

GUIDANCE:

Signing for an intermediate or minor interchange that has a multi-lane exit with an option lane that also carries the through route should use the same basic principles as those for a conventional exit. In such cases, the option lane is not signed on the Advance Guide signs. For such exits that involve the addition of an auxiliary lane that is not present at the Advance Guide sign locations, but do not involve a lane drop (see Figure 2E-12), a sequence of post-mounted or overhead-mounted Advance Guide signs should be used, located in accordance with the interchange classification (see Section 2E.32). The Exit Direction sign should be located at the theoretical gore and display a diagonally upward-pointing directional arrow above each lane that departs from the mainline alignment. The Exit Direction sign should not contain the EXIT ONLY legend.

For such interchanges that also have a lane drop (see Figure 2E-11), the Advance Guide and Exit Direction signs should follow the provisions of Section 2E.24. The Exit Direction sign should be located at the theoretical gore and should contain the EXIT ONLY (E11-1e) sign panel.

The presence of the option lane should be conveyed by the use of post-mounted lane-use (R3-8 Series) signs (see Section 2B.22). When used, the R3-8 signs should be of an appropriate size for their application to optimize their conspicuity. The signs should be located in succession with the Advance Guide signs, where the option and exit lanes have developed (see Figure 2E-11). In cases where the exiting lane or lanes have not developed and the option lane is created by the addition of an auxiliary lane that exits, the R3-8 signs should be located only adjacent to where the lanes have been fully developed and not in advance of the lane or along its transition (see Figure 2E-12).

SUPPORT:

The use of a down arrow on overhead freeway or expressway guide signs has been shown to be misinterpreted by road users as an indication of a dedicated lane.

STANDARD:

Advance Guide signs that are mounted overhead shall not display a down arrow over an option lane.

2E.24 Signing for Interchange Lane Drops

STANDARD:

The provisions of this Section shall only apply to lane drops at exits that do not have an optional exit lane. At exits that have an optional exit lane in addition to the dropped lane, the provisions of Sections 2E.20 through 2E.23 shall apply.

Major guide signs for all lane drops at interchanges shall be mounted overhead. An EXIT ONLY sign panel shall be used for all interchange lane drops at which the through route is carried on the mainline.

Except on Overhead Arrow-per-Lane and Diagrammatic guide signs (See Sections 2E.20 through 2E.22), the EXIT ONLY (down arrow) (E11-1 or E11-1f) sign panel (see Figure 2E-13) shall be used on all signing of lane drops on all overhead Advance Guide signs (see Figures 2E-14 through 2E-16). The number of arrows on each sign shall correspond to the number of dropped lanes at the location of each sign. Placement of the down arrow shall comply with the provisions of Section 2E.19.

For lane drops, the Exit Direction sign (see Section 2E.36 and Figure 2E-26) shall be of the format shown in Figures 2E-15 and 2E-16. The bottom portion of the Exit Direction sign shall be yellow with a black border and shall include a diagonally upward-pointing black directional arrow (left or right) for each lane dropped at the exit, with the sign designed and placed so that each arrow is located over the approximate center of each lane being dropped. The words EXIT and ONLY shall be positioned to the left and right, respectively, of the arrow on the E11-1d sign panel for a single-lane drop. For a two-lane drop, the words EXIT ONLY shall be located between the two arrows on the E11-1e sign panel. The number of arrows on the sign shall correspond to the number of dropped lanes at the location of the sign.

OPTION:

EXIT ONLY messages of either the combination of E11-1a and E11-1b, or E11-1c formats may be used to retrofit existing signing to warn of a lane drop situation ahead.

STANDARD:

If used to retrofit an existing Advance Guide sign, the E11-1a and E11-1b sign panels (see Figure 2E-13) shall be placed on either side of a white down arrow. The E11-1c sign panel, if used to retrofit an existing sign, shall be placed between the lower destination message and the white down arrow.

GUIDANCE:

Except as provided in the following paragraph for an auxiliary lane, Advance Guide signs for lane drops within 1 mile of the interchange should not contain the distance message.

Where the dropped lane is an auxiliary lane that is provided between successive entrance and exit ramps of two separate interchanges and the distance between the two ramps is less than 1 mile, the first Advance Guide sign in the sequence downstream from the entrance ramp should contain the distance message.

Wherever the dropped lane carries the through route, signs should be used without the EXIT ONLY sign panel.

SUPPORT:

Sections 2E.20 through 2E.23 contain information on the signing of lane drops at exits that also have an option lane.

Section 2B.23 contains information regarding regulatory signs that can also be used for freeway lane drop situations and Section 2C.43 contains information regarding warning signs that can also be used for freeway lane drop situations.

2E.25 Overhead Sign Installations

SUPPORT:

Specifications for the design and construction of structural supports for signs have been standardized by the American Association of State Highway and Transportation Officials (AASHTO). Overcrossing structures can often serve for the support of overhead signs, and might in some cases be the only practical location that will provide adequate viewing distance. Use of these structures as sign supports will eliminate the need for additional sign supports along the roadside. Factors justifying the installation of overhead signs are given in Section 2A.17. Vertical clearance of overhead signs is discussed in Section 2A.18.

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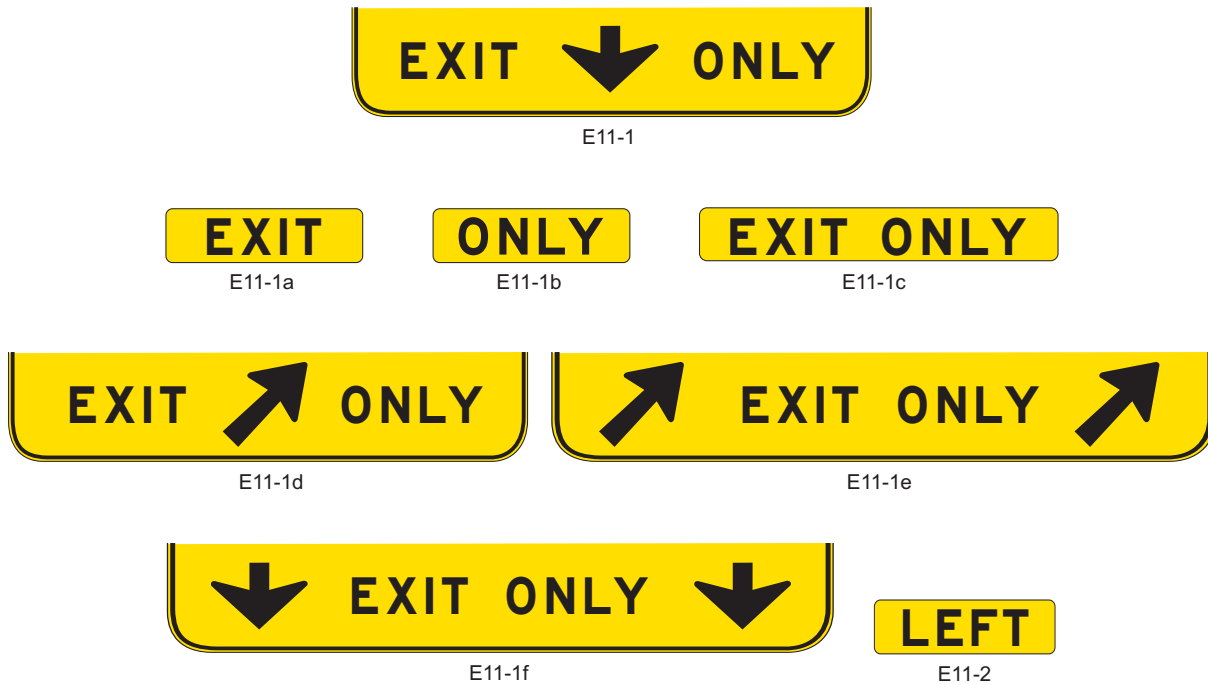


Figure 2E-13 EXIT ONLY and LEFT Panels

2E.26 Lateral Offset

STANDARD:

The minimum lateral offset outside the usable roadway shoulder for post-mounted freeway and expressway signs or for overhead sign supports, either to the right-hand or left-hand side of the roadway, shall be 6 feet. This minimum clearance shall also apply outside of a curb. If located within the clear zone, the signs shall be mounted on crashworthy supports or shielded by appropriate crashworthy barriers.

GUIDANCE:

Where practical, a sign should not be less than 10 feet from the edge of the nearest traffic lane. Large guide signs especially should be farther removed, preferably 30 feet or more from the nearest traffic lane.

Where an expressway median is 12 feet or less in width, consideration should be given to spanning both roadways without a center support.

Where overhead sign supports cannot be placed sufficiently far away from the line of traffic or in an otherwise protected site, they should either be designed to minimize the impact forces, or be adequately shielded by a traffic barrier of suitable design.

STANDARD:

Butterfly-type sign supports and other overhead non-crashworthy sign supports shall not be installed in gores or other unshielded locations within the clear zone.

OPTION:

Lesser clearances, but not generally less than 6 feet, may be used on connecting roadways or ramps at interchanges.

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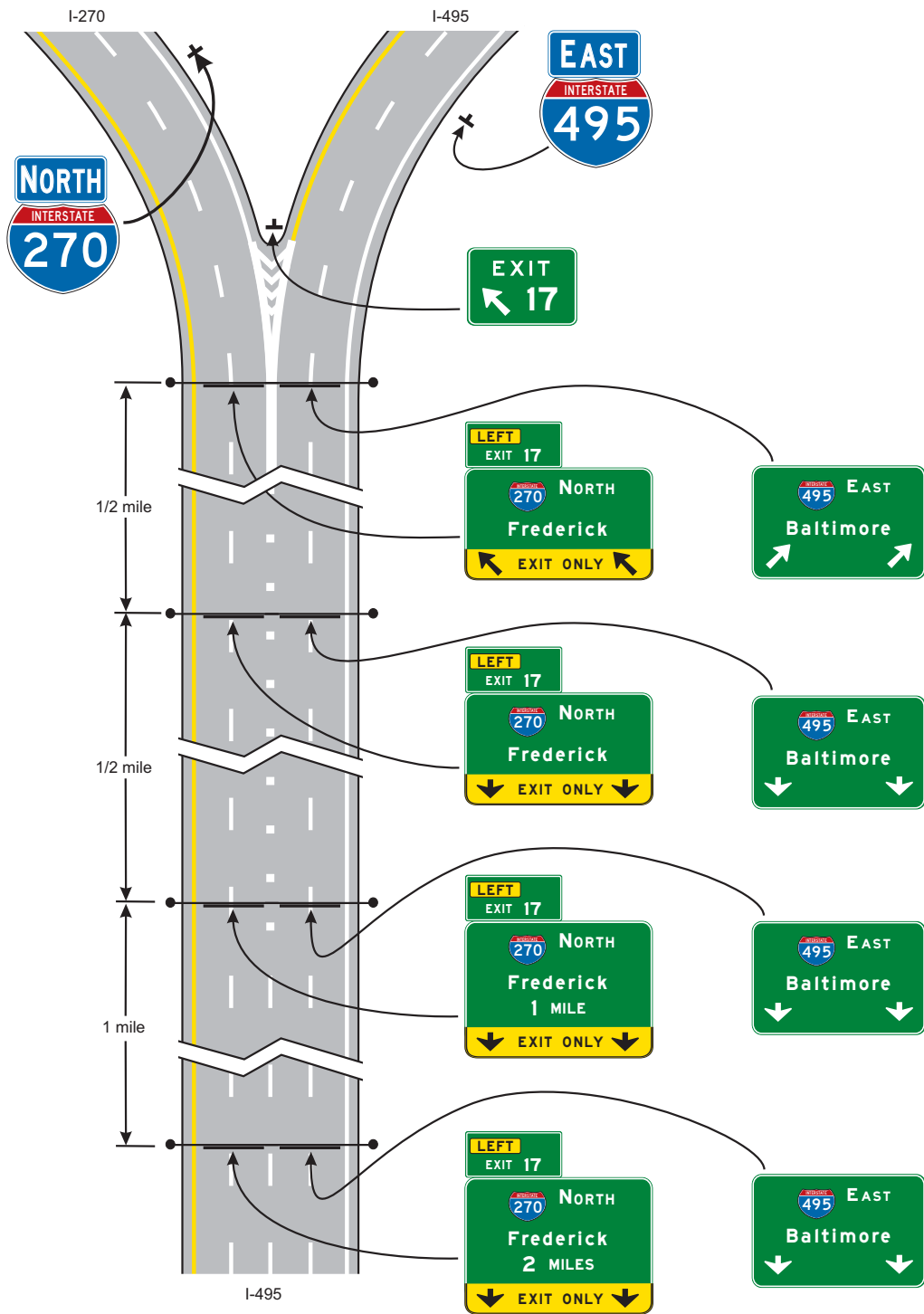


Figure 2E-14 Guide Signs for a Split with Dedicated Lanes

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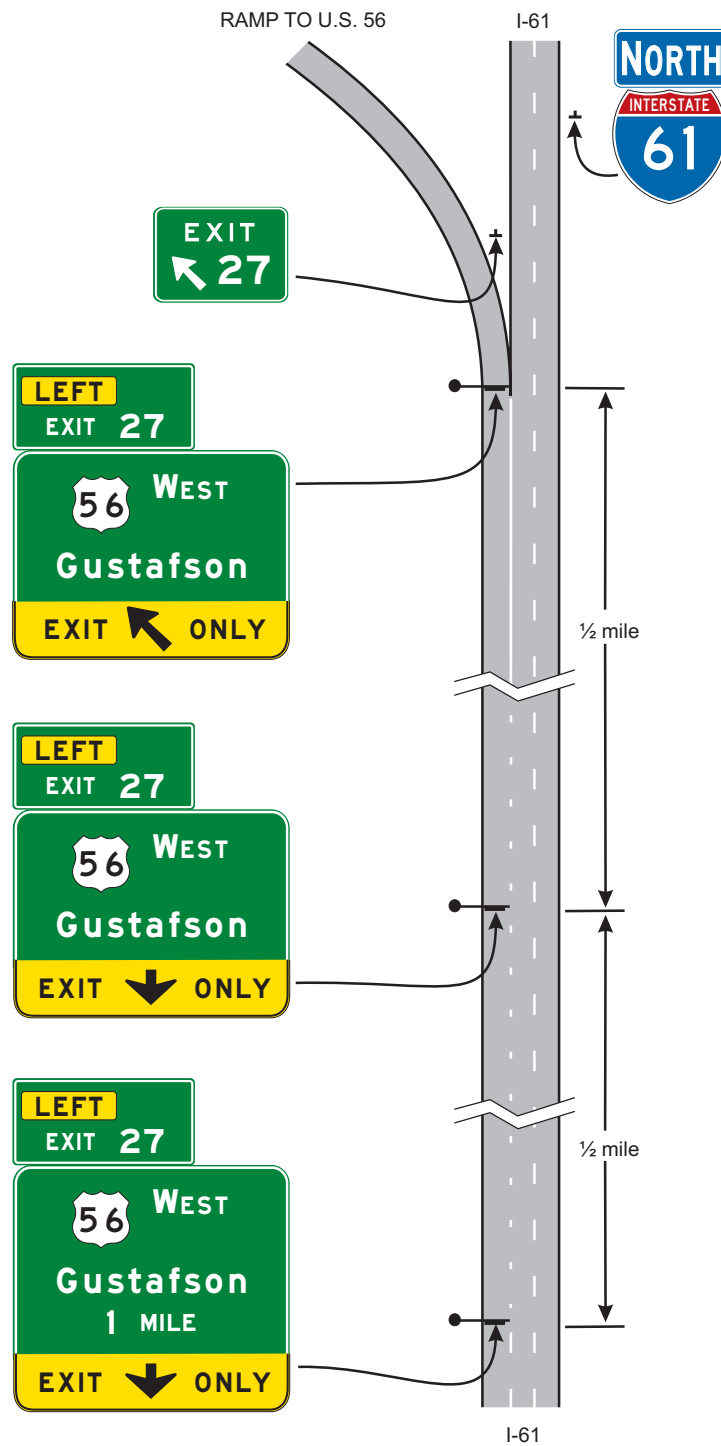


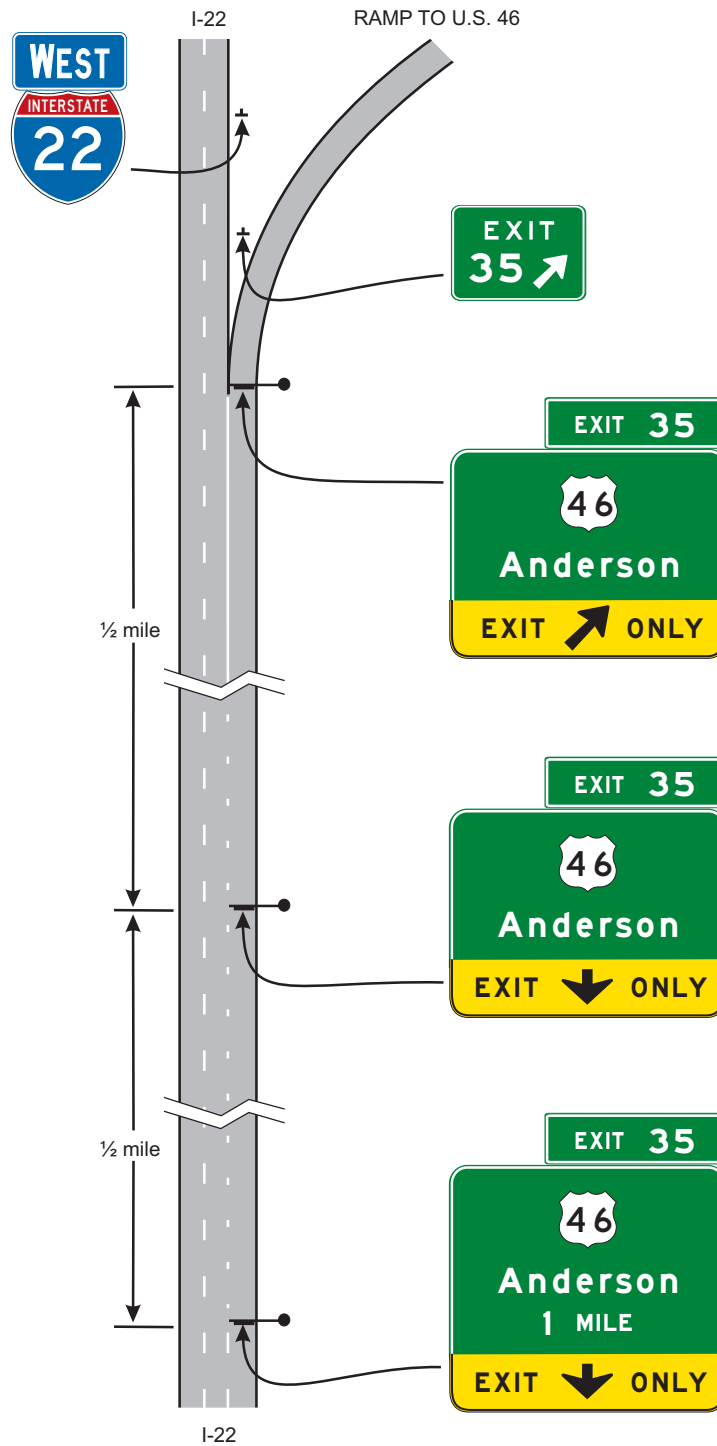
Figure 2E-15 Guide Signs for a Single-Lane Exit to the Left with a Dropped Lane

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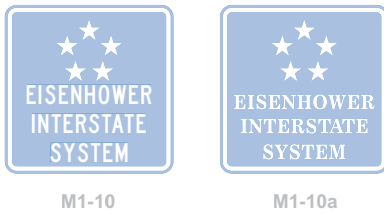
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Figure 2E-16 Guide Signs for a Single-Lane Exit to the Right with a Dropped Lane

December, 2011

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2E.28 Eisenhower Interstate System Signs (M1-10, M1-10a)



M1-10

M1-10a

OPTION:

The Eisenhower Interstate System (M1-10 and M1-10a) signs may be used on Interstate highways at periodic intervals and in rest areas, scenic overlooks, or other similar roadside facilities on the Interstate Highway System.

GUIDANCE:

If used, the M1-10a sign should be used only in rest areas or other similar facilities where the sign can be viewed by occupants of parked vehicles or by pedestrians. The M1-10a sign should not be installed on Interstate highway mainlines, ramps, or other roadways where it can be viewed by vehicular traffic.

STANDARD:

The M1-10 and M1-10a signs shall not be used as part of a Junction, Advance Route Turn, Directional, or Trailblazer Assembly or as part of a guide sign or similar assembly providing direction to a route or destination.

2E.29 Signs for Intersections at Grade

GUIDANCE:

If there are intersections at grade within the limits of an expressway, guide sign types provided in Chapter 2D should be used. However, such signs should be of a size compatible with the size of other signing on the expressway.

OPTION:

Advance Guide signs for intersections at grade may take the form of diagrammatic layouts depicting the geometrics of the intersection along with essential directional information.

2E.30 Interchange Guide Signs

STANDARD:

The signs at interchanges and on their approaches shall include Advance Guide signs and Exit Direction signs. Consistent destination messages shall be displayed on these signs.

GUIDANCE:

New destination information should not be introduced into the major sign sequence for one interchange, nor should destination information be dropped.

Reference should be made to Section 2E.11 and Sections 2E.33 through 2E.42 for a detailed description of the signs in the order that they should appear at the approach to and beyond each interchange. Guide signs placed in advance of an interchange deceleration lane should be spaced at least 800 feet apart.

Supplemental guide signing should be used sparingly as provided in Section 2E.35.

2E.31 Interchange Exit Numbering

SUPPORT:

Interchange exit numbering provides valuable orientation for the road user on a freeway or expressway. The feasibility of numbering interchanges or exits on an expressway will depend largely on the extent to which grade separations are provided. Where there is appreciable continuity of interchange facilities, interrupted only by an occasional intersection at grade, the numbering will be helpful to the expressway user.

STANDARD:

Interchange numbering shall be used in signing each freeway interchange exit. Interchange exit numbers shall be displayed with each Advance Guide sign, Exit Direction sign, and Exit Gore sign. The exit number shall be displayed on a separate plaque at the top of the Advance Guide or Exit Direction sign. The exit number (E1-5P) plaque (see Figure 2E-22) shall be 30 inches in height and shall include the word EXIT and the appropriate exit number in a single-line format. Suffix letters shall be used for exit numbering at a multi-exit interchange. The suffix letter shall also be included on the exit number plaque and shall be separated from the exit number by a space having a width of between 1/2 and 3/4 of the height of the suffix letter. Exit numbers shall not include the cardinal initials corresponding to the directions of the cross route. Minimum numeral and letter sizes are given in Tables 2E-2 through 2E-5. If used, the interchange numbering system for expressways shall comply with the provisions prescribed for freeways.

At a multi-exit interchange where suffix letters are used for exit numbering, an exit of the same number without a suffix letter shall not be used on the same route in the same direction. For example, if an exit is designated as EXIT 256 A, then there shall not be an exit designated as EXIT 256 on the same route in the same direction.

Interchange exit numbering shall use the reference location sign exit numbering method. The consecutive exit numbering method shall not be used.

SUPPORT:

Reference location sign exit numbering assists road users in determining their destination distances and travel mileage, and assists highway agencies because the exit numbering sequence does not have to be changed if new interchanges are added to a route.

OPTION:

Exit numbers may also be used with Supplemental Guide signs and Motorist Service signs.

GUIDANCE:

Exit number (E1-5P) plaques should be added to the top right-hand edge of the sign for an exit to the right.

STANDARD:

Because road users might not expect an exit to the left and might have difficulty in maneuvering to the left, a left exit number (E1-5bP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign for all left-hand exits (see Figures 2E-14 and 2E-15). The word LEFT on the E1-5bP plaque shall be a black legend on a yellow rectangular sign panel and shall be centered above the word EXIT.

Compliance Date: December 31, 2014

SUPPORT:

Example exit number plaque designs are shown in Figure 2E-22. Figures 2E-3, 2E-7, 2E-22, 2E-26, and 2E-27 illustrate the incorporation of exit number plaques on guide signs.

The general plan for numbering interchange exits is shown in Figures 2E-19 through 2E-21. Figure 2E-19 shows a circumferential route, which is a route that makes a complete circle around a city or town and usually has two interchanges (one on each side of the city or town) with each of the mainline routes that travel through the city or town. Figure 2E-20 shows a loop route, which is a route that departs from a mainline route and then rejoins the same mainline route at a subsequent point downstream, and a spur route, which is a route that departs from a mainline route and never rejoins the same mainline route. Figure 2E-21 shows two mainline routes that overlap each other.

STANDARD:

Regardless of whether a mainline route originates within a State or crosses into a State from another State, the southernmost or westernmost terminus within that State shall be the beginning point for interchange numbering.

For circumferential routes, interchange numbering shall be in a clockwise direction. The numbering shall begin with the first interchange west of the south end of an imaginary north-south line bisecting the circumferential route, at a radial freeway or other Interstate route, or some other conspicuous landmark in the circumferential route near a south polar location (see Figure 2E-19).

The interchange numbers on loop routes shall begin at the loop interchange nearest the south or west mainline junction and increase in magnitude toward the north or east mainline junction (see Figure 2E-20).

Spur route interchanges shall be numbered in ascending order starting at the interchange where the spur leaves the mainline route (see Figure 2E-20).

If a circumferential, loop, or spur route crosses State boundaries, the numbering sequence shall be coordinated by the States to provide continuous interchange numbering.

Where numbered routes overlap, continuity of interchange numbering shall be established for only one of the routes (see Figure 2E-21). If one of the routes is an Interstate and the other route is not an Interstate, the Interstate route shall maintain continuity of interchange numbering.

GUIDANCE:

The route chosen for continuity of interchange numbering should also have reference location sign continuity (see Figure 2E-21).

2E.32 Interchange Classification

SUPPORT:

For signing purposes, interchanges are classified as major, intermediate, and minor. The minimum alphabet sizes contained in Tables 2E-2 and 2E-4 are based on this classification. Descriptions of these classifications are as follows:

- A. Major interchanges are subdivided into two categories: (a) interchanges with other expressways or freeways, or (b) interchanges with high-volume multi-lane highways, principal urban arterials, and major rural routes where the volume of interchanging traffic is heavy or includes many road users unfamiliar with the area.
- B. Intermediate interchanges are those with urban and rural routes not in the category of major or minor interchanges.
- C. Minor interchanges include those where traffic is local and very light, such as interchanges with land service access roads. Where the sum of exit volumes is estimated to be lower than 100 vehicles per day in the design year, the interchange is classified as minor.

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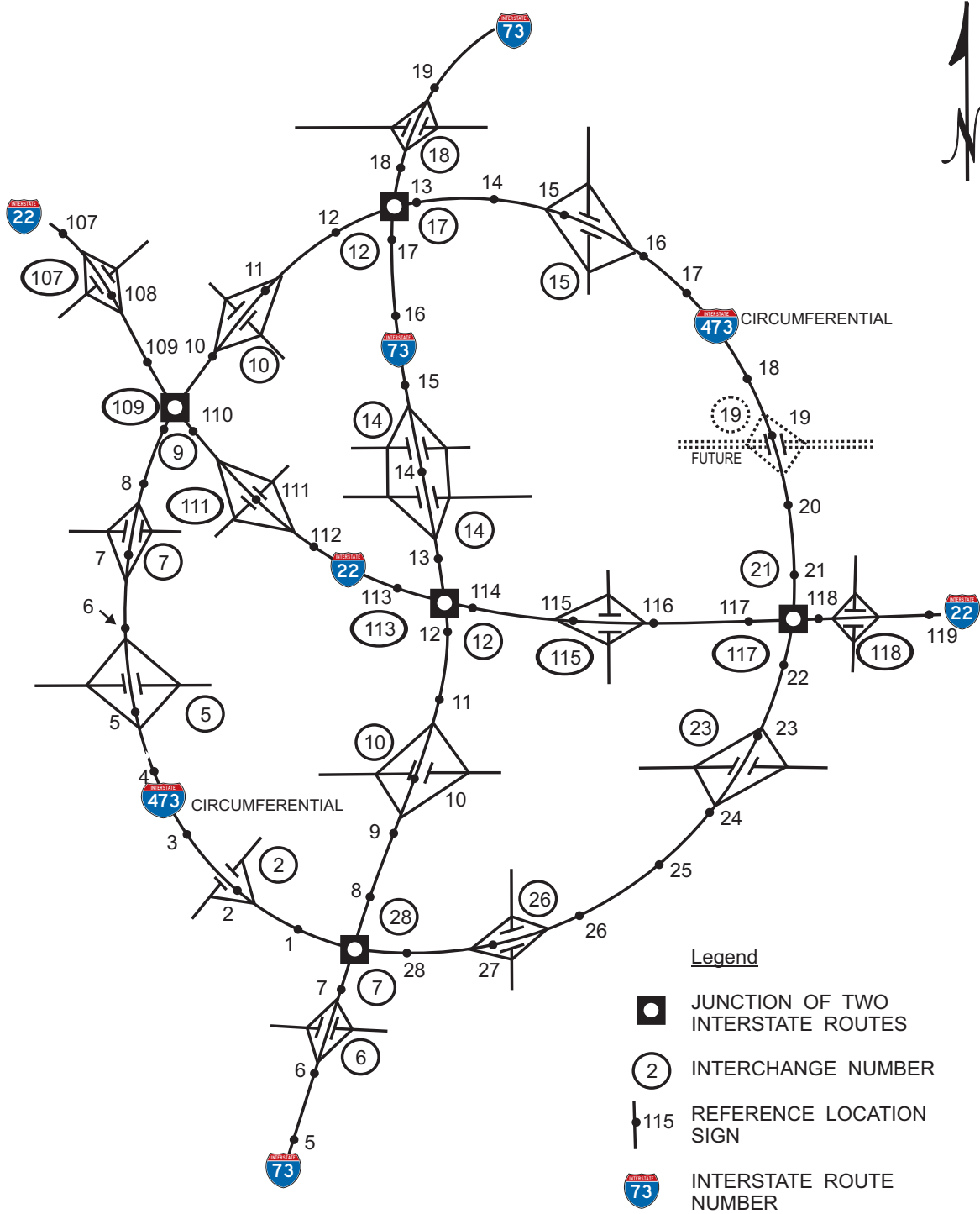


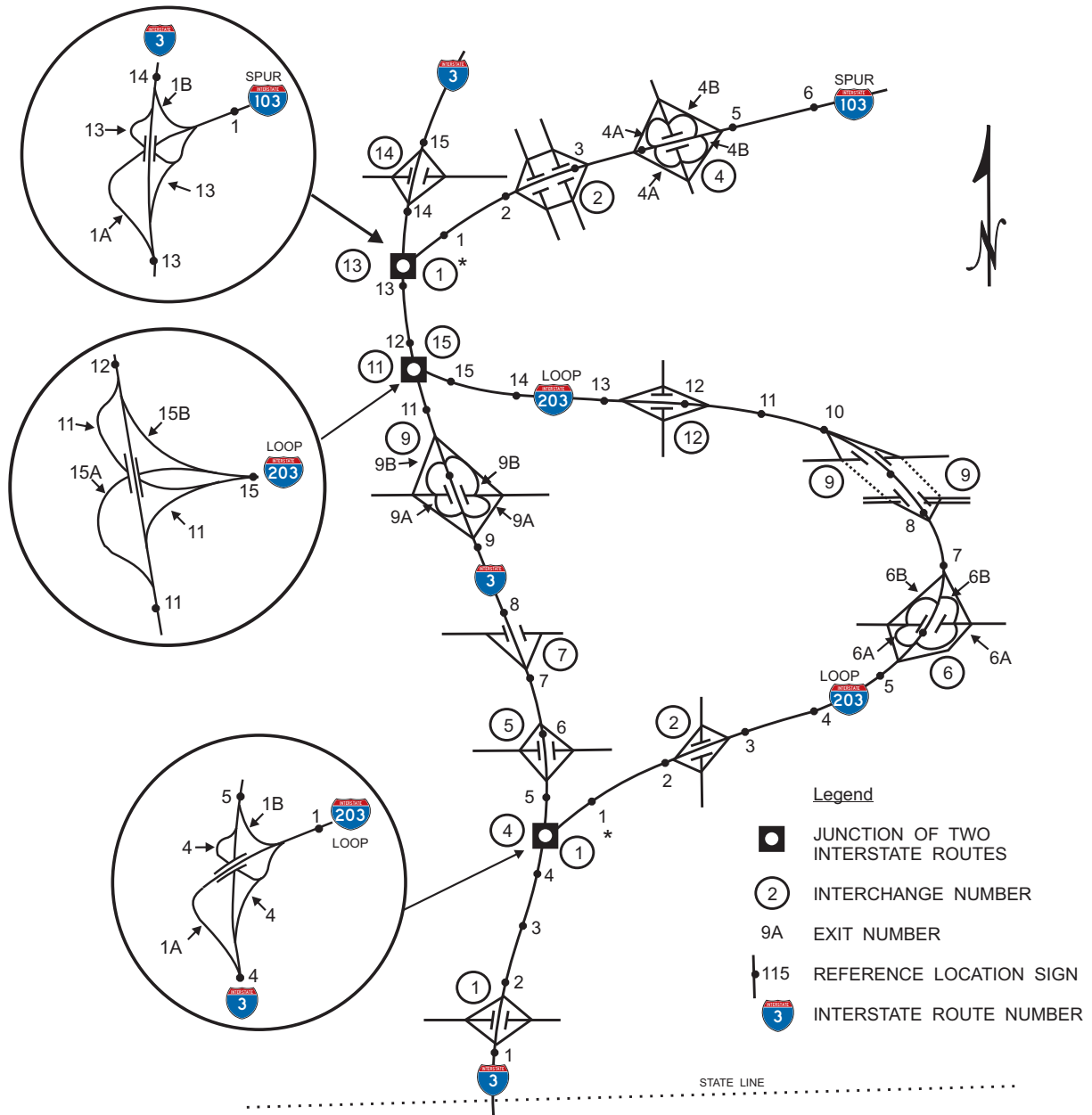
Figure 2E-19. Example of Interchange Numbering for Mainline and Circumferential Routes

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* The freeway/freeway interchange where the beginning of the loop or spur route intersects with the mainline route may be called either Exit 1 or Exit 0 on the loop or spur route.

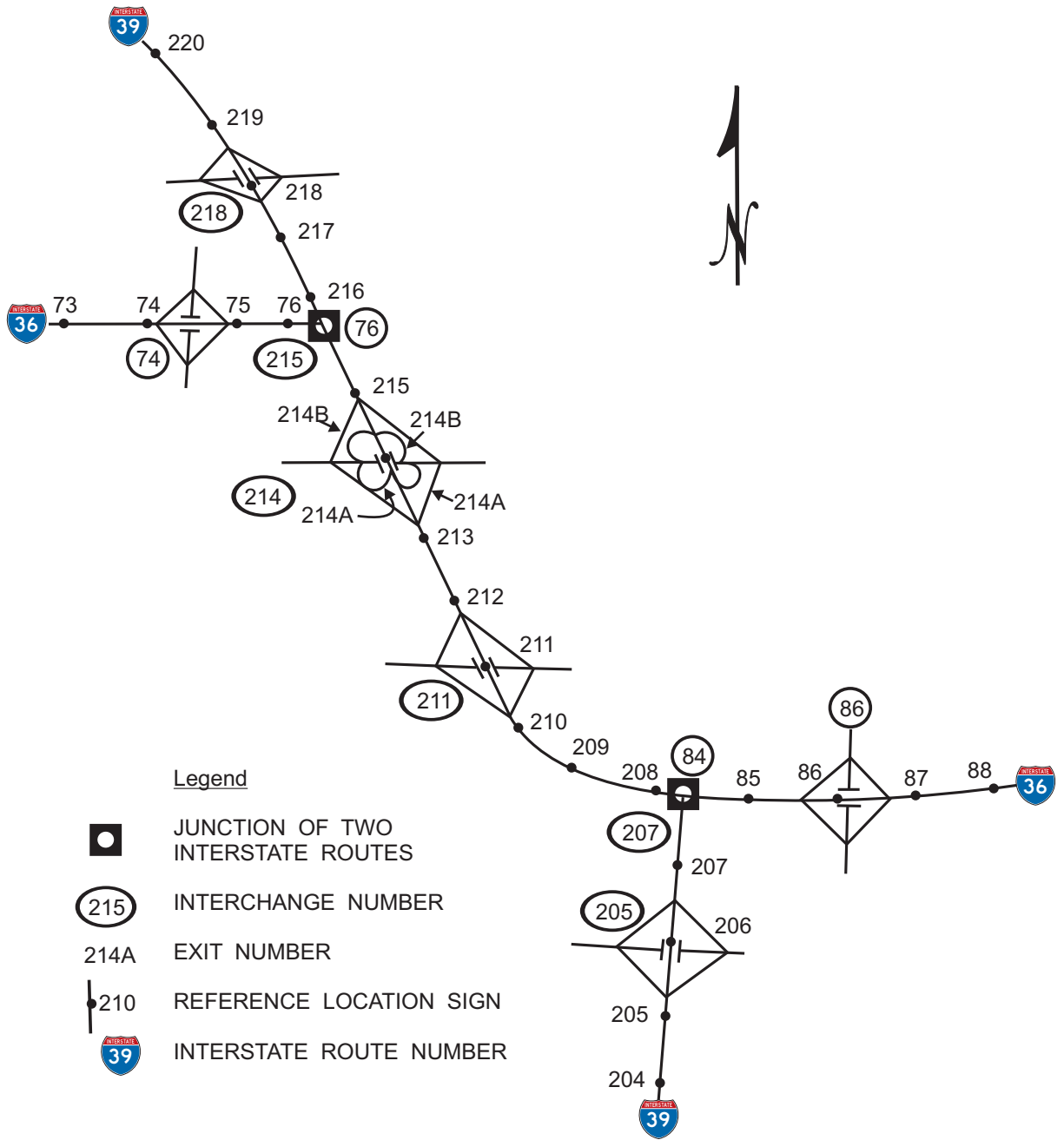
Figure 2E-20. Example of Interchange Numbering for Mainline, Loop, and Spur Routes

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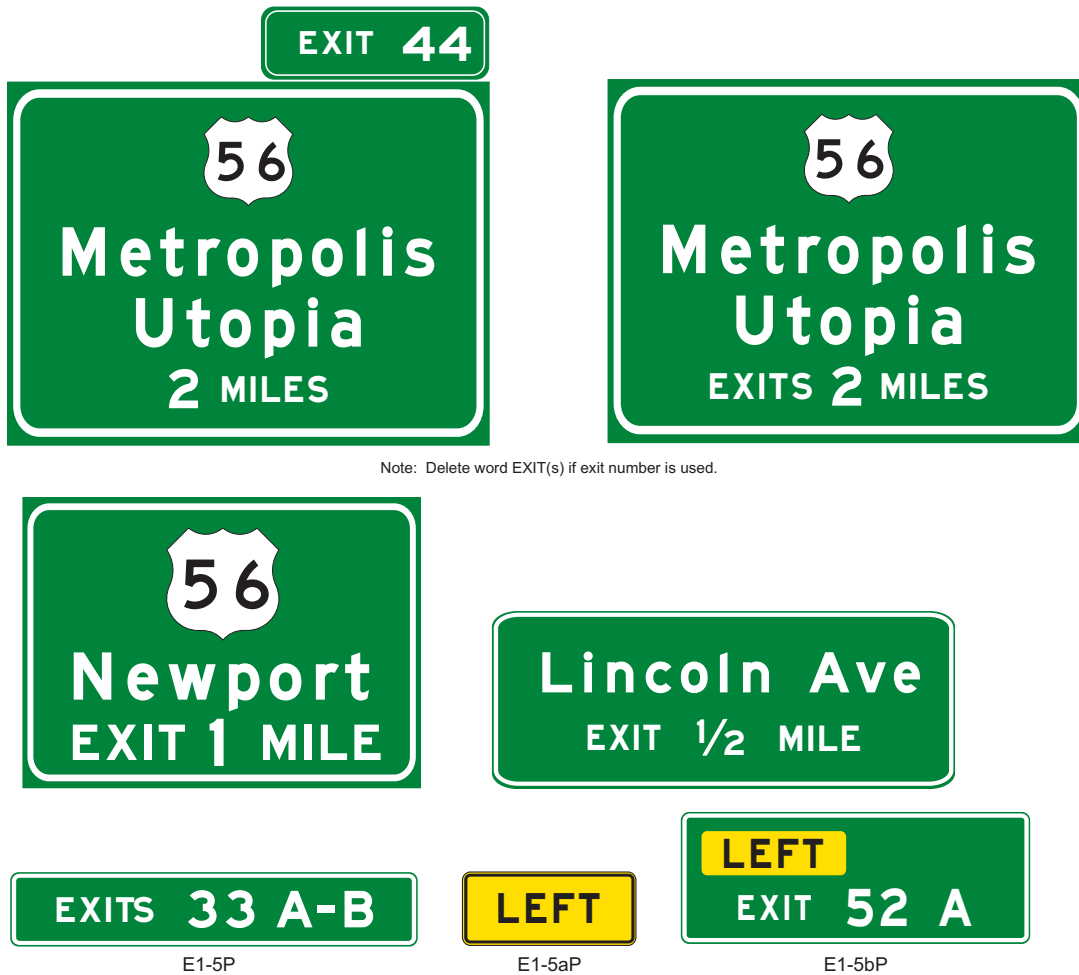
Figure 2E-21. Example of Interchange Numbering for Overlapping Routes

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Note: Delete word EXIT(s) if exit number is used.

Figure 2E-22. Examples of Interchange Advance Guide Signs, Exit Number Plaques, and LEFT Plaque

2E.33 Advance Guide Signs

SUPPORT:

An Advance Guide sign (see Figure 2E-22) gives notice well in advance of the exit point of the principal destinations served by the next interchange and the distance to that interchange.

GUIDANCE:

For major and intermediate interchanges (see Section 2E.32), Advance Guide signs should be placed at 1/2 mile and at 1 mile in advance of the exit with a third Advance Guide sign placed at 2 miles in advance of the exit if spacing permits. At minor interchanges, only one Advance Guide

sign should be used. It should be located 1/2 to 1 mile from the exit gore. If the sign is located less than 1/2 mile from the exit, the distance displayed should be to the nearest 1/4 mile. Fractions of a mile, rather than decimals, should be displayed in all cases.

STANDARD:

For numbered exits to the left, a left exit number (E1-5bP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign.

For non-numbered exits to the left, a LEFT (E1-5aP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign.

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SUPPORT:

Section 2E.31 contains additional information regarding exit numbering.

STANDARD:

Advance Guide signs for multi-lane exits having an optional exit lane that also carries the through route (see Figures 2E-4, 2E-5, 2E-8, and 2E-9) and for splits with an option lane (see Figures 2E-6 and 2E-10) shall be Overhead Arrow-per-Lane or diagrammatic signs designed in accordance with Sections 2E.20 through 2E.22.

Except as provided in Section 2E.24, Advance Guide signs, if used, shall contain the distance message. Except as provided in the following Guidance, the legend on the Advance Guide signs shall be the same as the legend on the Exit Direction sign, except that the last line shall read EXIT XX MILES. If the interchange has two or more exit roadways, the bottom line shall read EXITS XX MILES.

GUIDANCE:

Where interchange exit numbers are used, the word EXIT(S) should be omitted from the bottom line.

OPTION:

Where the distance between interchanges is more than 1 mile, but less than 2 miles, the first Advance Guide sign may be closer than 2 miles, but not placed so as to overlap the signing for the previous exit. Duplicate Advance Guide signs or Interchange Sequence Series signs may be placed in the median on the opposite side of the roadway and are not included in the minimum requirements of interchange signing.

GUIDANCE:

Where there is less than 800 feet between interchanges, Interchange Sequence Series signs (see Section 2E.40) should be used instead of Advance Guide signs for the affected interchanges.

The Advance Guide signs for the last exit from a highway

before it becomes a facility on which toll payments are required should include the LAST EXIT BEFORE TOLL (W16-16P) plaque (see Section 2F.10 and Figure 2F-3). The plaque should be installed above the Advance Guide signs.

OPTION:

If there is insufficient space above the Advance Guide sign because of the presence of an exit number plaque, the W16-16P plaque may be installed below the Advance Guide sign.

2E.34 Next Exit Plaques

OPTION:

Where the distance to the next interchange is unusually long, a Next Exit plaque (see Figure 2E-23) may be installed to inform road users of the distance to the next interchange.

GUIDANCE:

The Next Exit plaque should not be used unless the distance between successive interchanges is more than 5 miles.

STANDARD:

The Next Exit plaque shall carry the legend NEXT EXIT XX MILES. If the Next Exit plaque is used, it shall be placed below the Advance Guide sign nearest the interchange. It shall be mounted so as to not adversely affect the breakaway feature of the sign support structure.

OPTION:

The legend for the Next Exit plaque may be displayed in either one or two lines as shown in Figure 2E-23.

SUPPORT:

The one-line message on the Next Exit plaque is the more desirable choice unless the message causes the sign to have a horizontal dimension greater than that of the Advance Guide sign.



Figure 2E-23. Next Exit Plaques

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Figure 2E-24. Supplemental Guide Signs for a Multi-Exit Interchange

GUIDANCE:

No more than one Supplemental Guide sign should be used on each interchange approach.

A Supplemental Guide sign (see Figure 2E-24) should not list more than two destinations. Destination names should be followed by the interchange number (and suffix), or if interchanges are not numbered, by the legend NEXT RIGHT or SECOND RIGHT or both, as appropriate. The Supplemental Guide sign should be installed as an independent guide sign assembly.

Where two or more Advance Guide signs are used, the Supplemental Guide sign should be installed approximately midway between two of the Advance Guide signs. If only one Advance Guide sign is used, the Supplemental Guide sign should follow it by at least 800 feet. If the interchanges are numbered, the interchange number should be used for the action message.

States and other agencies should adopt an appropriate policy for installing supplemental signs using the "The AASHTO Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to Freeways." In developing policies for such signing, such items as population, amount of traffic generated, distance from the route, and the significance of the destination should be taken into account.

STANDARD:

Guide signs directing drivers to park - ride facilities shall be considered as Supplemental Guide signs (see Figure 2E-25).

2E.35 Other Supplemental Guide Signs

SUPPORT:

Supplemental Guide signs can be used to provide information regarding destinations accessible from an interchange, other than places displayed on the standard interchange signing. However, such Supplemental Guide signing can reduce the effectiveness of other more important guide signing because of the possibility of overloading the road user's capacity to receive visual messages and make appropriate decisions. "The AASHTO "Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to Freeways" is incorporated by reference in this section (see Page i for AASHTO's address).

A - Route without exit numbering



B - Route with exit numbering



Figure 2E-25. Supplemental Guide Sign for a Park - Ride Facility

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OPTION:

A pictograph (see definition in Section 1A.13) may be used on a Supplemental Guide sign in conjunction with a destination that is associated with governmental agencies, military bases, universities, or other government-approved institutions.

STANDARD:

The maximum dimension (height or width) of a pictograph shall not exceed two times the upper-case letter height of the destination legend and shall not exceed the size of a route shield on the guide sign. If used, the pictograph shall be located to the left of the destination legend it represents, except as provided in the following paragraph for the park-ride Supplemental Guide sign.

When a transit pictograph is displayed on the park-ride Supplemental Guide sign, it shall be located on the same line as the carpool symbol, if used, above the word legend.

A pictograph representing a State, county, or municipal corporation or other incorporated or unincorporated community shall not be displayed on a Supplemental Guide sign.

Pictographs shall otherwise comply with the provisions of Section 2A.6.

2E.36 Exit Direction Signs

SUPPORT:

The Exit Direction sign (see Figure 2E-26) repeats the route and destination information that was displayed on the Advance Guide sign(s) for the next exit, and thereby assures road users of the destination served and indicates whether they exit to the right or left for that destination.

STANDARD:

Exit Direction signs shall be used at major and intermediate interchanges. Populations or other similar information shall not be displayed on Exit Direction signs.

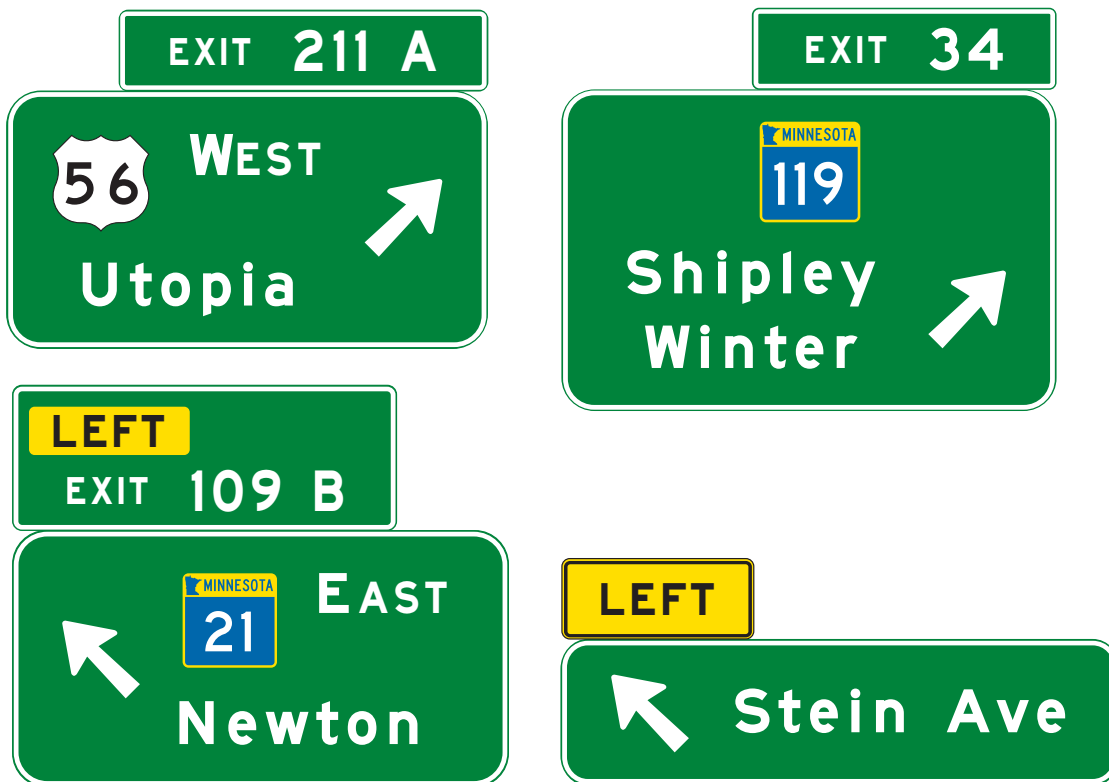


Figure 2E-26. Examples of Interchange Exit Direction Signs

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GUIDANCE:

Exit Direction signs should be used at minor interchanges.

Post-mounted Exit Direction signs should be installed at the beginning of the deceleration lane. If there is less than 300 feet from the upstream end of the deceleration lane to the theoretical gore (see Figure 3B-8), the Exit Direction sign should be installed overhead over the exiting lane in the vicinity of the theoretical gore.

STANDARD:

Except where Overhead Arrow-per-Lane guide signs are used (see Section 2E.21 and the following paragraph, where a through lane is being terminated (dropped) at an exit, the Exit Direction sign shall be placed overhead at the theoretical gore (see Figures 2E-8 through 2E-11, and 2E-14 through 2E-16).

Except as provided in the first Option in Section 2E.21, where Overhead Arrow-per-Lane guide signs are used for the Advance Guide sign(s) for a multi-lane exit having an optional exit lane that also carries the through route or for a split with an option lane (see Section 2E.21), an Overhead Arrow-per-Lane guide sign shall also be used instead of the Exit Direction sign. This Overhead Arrow-per-Lane guide sign shall include the appropriate exit number (E1-5P or E1-5bP) plaque (if a numbered exit) and it shall be located near, but not downstream from, the point where the outside edge of the dropped lane begins to diverge from the mainline (see Figures 2E-4 through 2E-6).

The following provisions shall govern the design and application of overhead Exit Direction signs:

- A. The sign shall carry the exit number (if exit numbering is used), the route number, cardinal direction, and destination, as applicable, with a diagonally upward-pointing directional arrow (see Figure 2E-26).
- B. The message EXIT ONLY in black on a yellow sign panel (E11-1d or E11-1e) shall be used on the overhead Exit Direction sign to advise road users of a lane drop situation (see Figures 2E-8 through 2E-11). The sign shall comply with the provisions of Section 2E.24.

GUIDANCE:

For numbered exits to the right, an exit number (E1-5P) plaque (see Figure 2E-22) should be added to the top right-hand edge of the sign.

STANDARD:

For numbered exits to the left, a left exit number (E1-5bP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign.

For non-numbered exits to the left, a LEFT (E1-5aP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign.

Compliance Date: December 31, 2014

SUPPORT:

Section 2E.31 contains additional information regarding exit numbering.



Figure 2E-27. Interchange Exit Direction Sign with an Advisory Speed Panel

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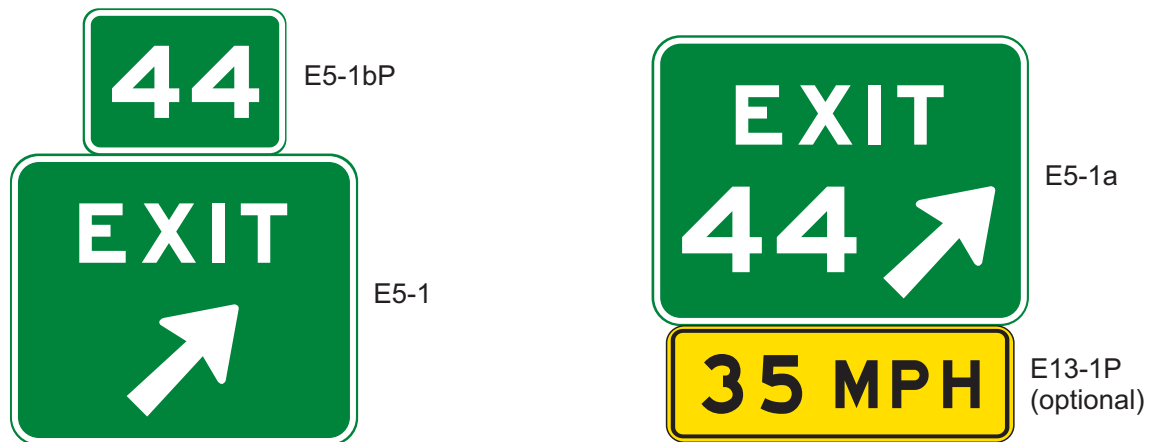


Figure 2E-28. Exit Gore Signs

OPTION:

In some cases, principally in urban areas, where restricted sight distance because of structures or unusual alignment make it impossible to locate the Exit Direction sign without violating the required minimum spacing (see Section 2E.33) between major guide signs, Interchange Sequence signs (see Section 2E.40) may be substituted for an Advance Guide sign.

GUIDANCE:

At multi-exit interchanges, the Exit Direction sign should be located directly over the exiting lane for the first exit. At the same location, and normally over the right-hand through lane, an Advance Guide sign for the second exit should be located. Only for those conditions where the through movement is not evident should a confirmatory message (Pull-Through sign as shown in Figure 2E-2) be used over the left lane(s) to guide road users traveling through an interchange. In the interest of sign spreading, three signs on one structure should not be used. When the freeway or expressway is on an overpass, the Exit Direction sign should be installed on an overhead support over the exit lane in advance of the gore point.

OPTION:

If the second exit is beyond an underpass, the Exit Direction sign may be mounted on the face of the overhead structure.

Where extra emphasis of an especially low advisory ramp speed is needed, an EXIT XX MPH (E13-2) sign panel (see Figure 2E-27) may be placed at the bottom of the Exit

Direction sign to supplement, but not to replace, the exit or ramp advisory speed warning signs.

GUIDANCE:

At the last exit from a highway before it becomes a facility on which toll payments are required, the LAST EXIT BEFORE TOLL (W16-16P) plaque (see Section 2F.10 and Figure 2F-3) should be installed above the Exit Direction sign.

OPTION:

If there is insufficient space above the Exit Direction sign because of the presence of an Exit Number (E1-5P) plaque, the W16-16P plaque may be mounted below the Exit Direction sign.

2E.37 Exit Gore Signs (E5-1 Series)

SUPPORT:

The Exit Gore (E5-1 or E5-1a) sign (see Figure 2E-28) in the gore indicates the exiting point or the place of departure from the main roadway. Consistent application of this sign at each exit is important.

STANDARD:

The gore shall be defined as the area located between the main roadway and the ramp just beyond where the ramp branches from the main roadway. The Exit Gore sign shall be located in the gore and shall carry the word EXIT or EXIT XX (if interchange numbering is used) and an appropriate upward slanting arrow. If suffix letters are used for exit numbering at a multi-exit interchange, the suffix letter shall also be included on the Exit Gore sign and shall be separated from the exit number by a space having a width

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of between 1/2 and 3/4 of the height of the suffix letter. Breakaway or yielding supports shall be used.

GUIDANCE:

The arrow should be aligned to approximate the angle of departure. Each gore should be treated similarly, whether the interchange has one exit roadway or multiple exits.

OPTION:

Where extra emphasis of an especially low advisory ramp speed is needed, an E13-1P plaque indicating the advisory speed may be mounted below the Exit Gore sign (see Figure 2E-28) to supplement, but not to replace, the exit or ramp advisory speed warning signs.

To improve the visibility of the gore for exiting drivers, a Type 1 object marker (see Chapter 2C) may be installed on each sign support below the Exit Gore sign.

An Exit Number (E5-1bP) plaque (see Figure 2E-28) may be installed above an existing Exit Gore (E5-1) sign when a non-numbered exit is converted to a numbered exit.

STANDARD:

An Exit Gore (E5-1a) sign shall be used when the replacement of an existing assembly of an E5-1 sign and an E5-1bP plaque becomes necessary.

OPTION:

The Narrow Exit Gore (E5-1c) sign may be used in gore areas of limited width where the width of the Exit Gore (E5-1a) sign would not permit sufficient lateral offset (see Section 2A.19), such as for ramp departures that are nearly parallel to the mainline roadway where the Exit Gore sign would be mounted on a narrow island or barrier. Where the E5-1c sign is mounted at a height of 14 feet or more from the roadway, the directional arrow may point diagonally downward.

GUIDANCE:

The E5-1c should not be used in gore areas where an E5-1a sign could be installed with sufficient lateral offset.

2E.38 Post-Interchange Signs

GUIDANCE:

If space between interchanges permits, as in rural areas, and where undue repetition of messages will not occur, a fixed sequence of signs should be displayed beginning 500 feet beyond the downstream end of the acceleration lane. At this point a Route sign assembly should be installed followed by a Speed Limit sign and a Distance sign, each at a spacing of 1,000 feet.

If space between interchanges does not permit placement

of these three post-interchange signs without encroaching on or overlapping the Advance Guide signs necessary for the next interchange, or in rural areas where the interchanging traffic is primarily local, one or more of the post-interchange signs should be omitted.

OPTION:

Usually the Distance sign will be of less importance than the other two signs and may be omitted, especially if Interchange Sequence signs are used. If the sign for through traffic on an overhead assembly already contains the route sign, the post-interchange route sign assembly may also be omitted.

2E.39 Post-Interchange Distance Signs

STANDARD:

If used, the Post-Interchange Distance sign shall consist of a two- or three-line sign carrying the names of significant destination points and the distances to those points. The top line of the sign shall identify the next meaningful interchange with the name of the community near or through which the route passes, or if there is no community, the route number or name of the intersected highway (see Figure 2E-29)..

SUPPORT:

The minimum sizes of the route shields identifying a significant destination point are prescribed in Tables 2E-3 and 2E-5.

OPTION:

The text identification of a route may be displayed instead of a route shield, such as "US XX," "State Route XX," or "County Route XX."

GUIDANCE:

If a second line is used, it should be reserved for



Figure 2E-29. Post-Interchange Distance Sign

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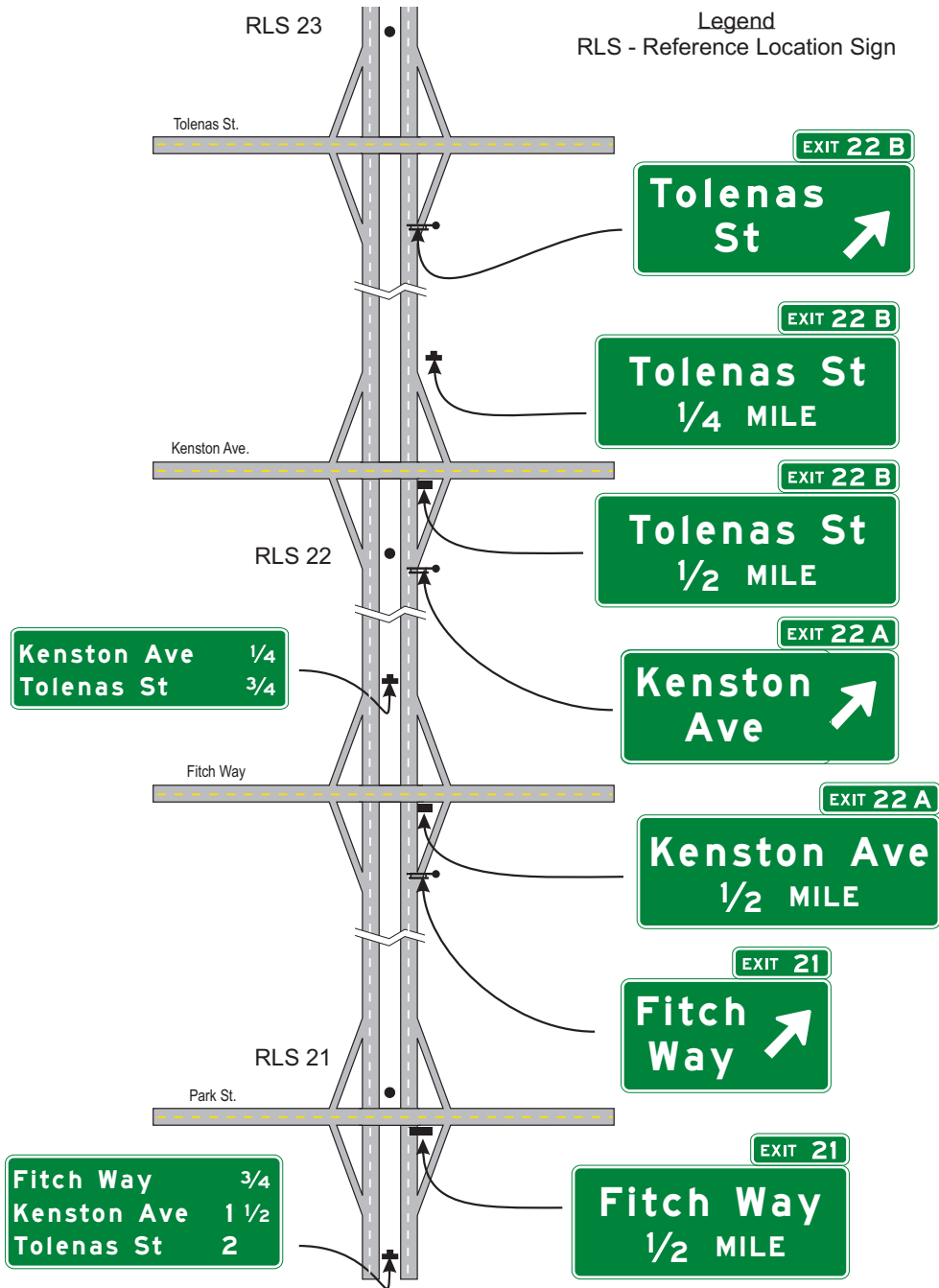


Figure 2E-30. Example of Using an Interchange Sequence Sign for Closely Spaced Interchanges

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communities of general interest that are located on or immediately adjacent to the route or for major traffic generators along the route.

OPTION:

The choice of names for the second line, if it is used, may be varied on successive Distance signs to give road users maximum information concerning communities served by the route.

STANDARD:

The third, or bottom line, shall contain the name and distance to a control city (if any) that has national significance for travelers using the route.

GUIDANCE:

Distances to the same destinations should not be shown more frequently than at 5-mile intervals. The distances displayed on these signs should be the actual distance to the destination points and not to the exit from the freeway or expressway. The distance displayed for each community should comply with the provisions of Section 2D.41.

2E.40 Interchange Sequence Signs

OPTION:

If interchanges are closely spaced, particularly through large urban areas, so that guide signs cannot be adequately spaced, Interchange Sequence signs identifying the next two or three interchanges may be used.

GUIDANCE:

If used, Interchange Sequence signs should be used over the entire length of a route in an urban area. Except as provided in the following paragraph, they should not be used on a single interchange basis.

If there is less than 800 feet between interchanges, Interchange Sequence signs should be used instead of the Advance Guide signs for the affected interchanges.

SUPPORT:

Interchange Sequence signs are generally supplemental to



Figure 2E-31. Interchange Sequence Sign

Advance Guide signs. Signing of this type is illustrated in Figures 2E-30 and 2E-31, and is compatible with the sign spreading concept described in the First Support of Section 2E.11.

These signs are installed in a series and display the next two or three interchanges by name or route number with distances to the nearest 1/4 mile.

STANDARD:

If used, the first sign in the series shall be located in advance of the first Advance Guide sign for the first interchange.

Where the exit direction is to the left, a LEFT (E11-2) sign panel (see Figure 2E-13) shall be displayed on the same line immediately to the right of the interchange name or route number.

Interchange Sequence signs shall not be substituted for Exit Direction signs.

GUIDANCE:

Interchange Sequence signs should be located in the median. After the first of the series, Interchange Sequence signs should be placed approximately midway between interchanges.

STANDARD:

Interchange Sequence signs located in the median shall be installed at overhead sign height.

OPTION:

Interchange numbers may be displayed to the left of the interchange name or route number.

2E.41 Community Interchanges Identification Signs

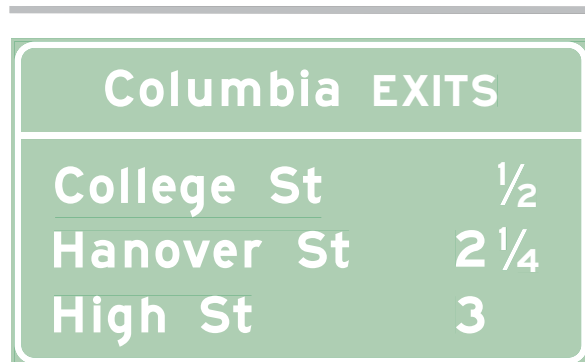


Figure 2E-32. Community Interchanges Identification Sign

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SUPPORT:

For suburban or rural communities served by two or three interchanges, Community Interchanges Identification signs are useful (see Figure 2E-32).

GUIDANCE:

In these cases, the name of the community followed by the word Exits should be displayed on the top line; the lines below should display the destination, road name or route number, and the corresponding distances to the nearest 1/4 mile.

The sign should be located in advance of the first Advance Guide sign for the first interchange within the community.

OPTION:

If interchanges are not conveniently identifiable or if there are more than three interchanges to be identified, the NEXT XX EXITS sign (see Section 2E.42) may be used.

2E.42 NEXT XX EXITS Sign

SUPPORT:

Many freeways or expressways pass through historical or recreational regions, or urban areas served by a succession of several interchanges.

OPTION:

Such regions or areas may be indicated by a NEXT XX EXITS sign (see Figure 2E-33) located in advance of the Advance Guide sign or signs for the first interchange.

GUIDANCE:

The sign legend should identify the region or area followed by the words NEXT X EXITS.

2E.43 Signing by Type of Interchange

SUPPORT:



Figure 2E-33. NEXT EXITS Sign

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Road users need signs to help identify the location of the exit, as well as to obtain route, direction, and destination information for specific exit ramps. Figures 2E-34 through 2E-40 show examples of guide signs for common types of interchanges. The interchange layouts shown in most of the figures illustrate only the major guide signs for one direction of traffic on the freeway and on the exit ramps. Section 2D.45 contains information regarding the signing of the crossroad approaches and connecting roadways to freeways and expressways.

STANDARD:

Interchange guide signing shall be consistent for each type of interchange along a route.

GUIDANCE:

The signing layout for all interchanges having only one exit ramp in the direction of travel should be similar, regardless of the interchange type. For the sake of uniform application, the significant features of the signing plan for each of the more frequent kinds of interchanges (illustrated in Figures 2E-34 through 2E-40) should be followed as closely as possible. Even when unusual geometric features exist, variations in signing layout should be held to a minimum.

2E.44 Freeway-to-Freeway Interchange

SUPPORT:

Freeway-to-freeway interchanges are major decision points where the effect of taking a wrong ramp cannot be easily corrected. Reversing direction on the connecting freeway or reentering to continue on the intended course is usually not possible. Figure 2E-34 shows examples of guide signs at a freeway-to-freeway interchange.

GUIDANCE:

The sign messages should contain only the route shield, cardinal direction, and the name of the next control city on the route. Arrows should point as indicated in Section 2D.08, except where Overhead Arrow-per-Lane or Diagrammatic signs are used in accordance with the provisions of Sections 2E.20 through 2E.22.

SUPPORT:

At splits where the off-route movement is to the left or where there is an optional lane split, expectancy problems usually result.

STANDARD:

At splits where the off-route movement is to the left, the Left Exit Number (E1-5bP) plaque shall be added at the top left-hand edge of the guide sign (see Section 2E.31).

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A - Example of Signing for a Two-Lane Exit Ramp with Two Dropped Lanes and a Bifurcation Beyond the Mainline Gore

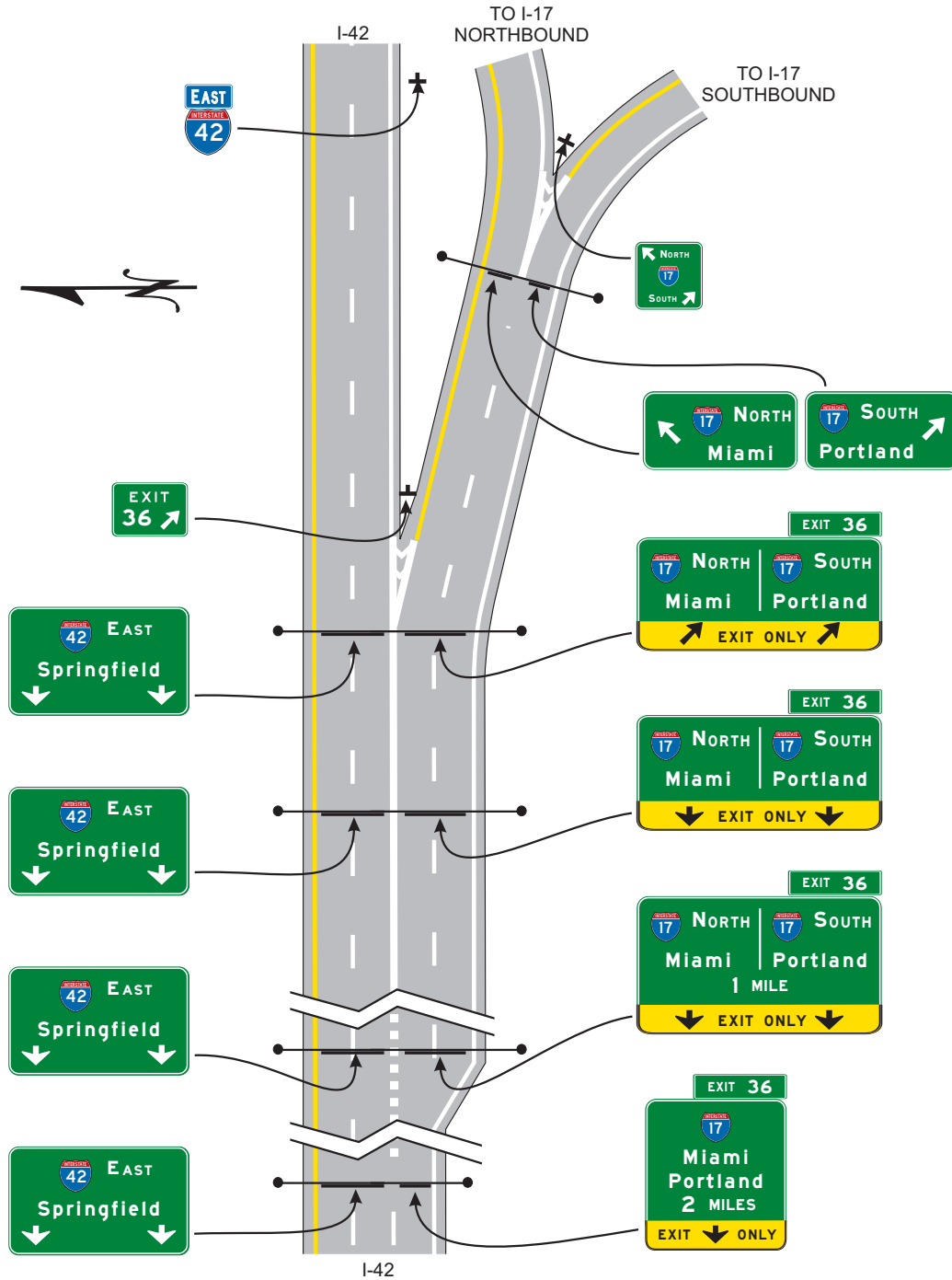


Figure 2E-34. Examples of Guide Signs for a Freeway-to-Freeway Interchange (Sheet 1 of 2)

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July, 2013

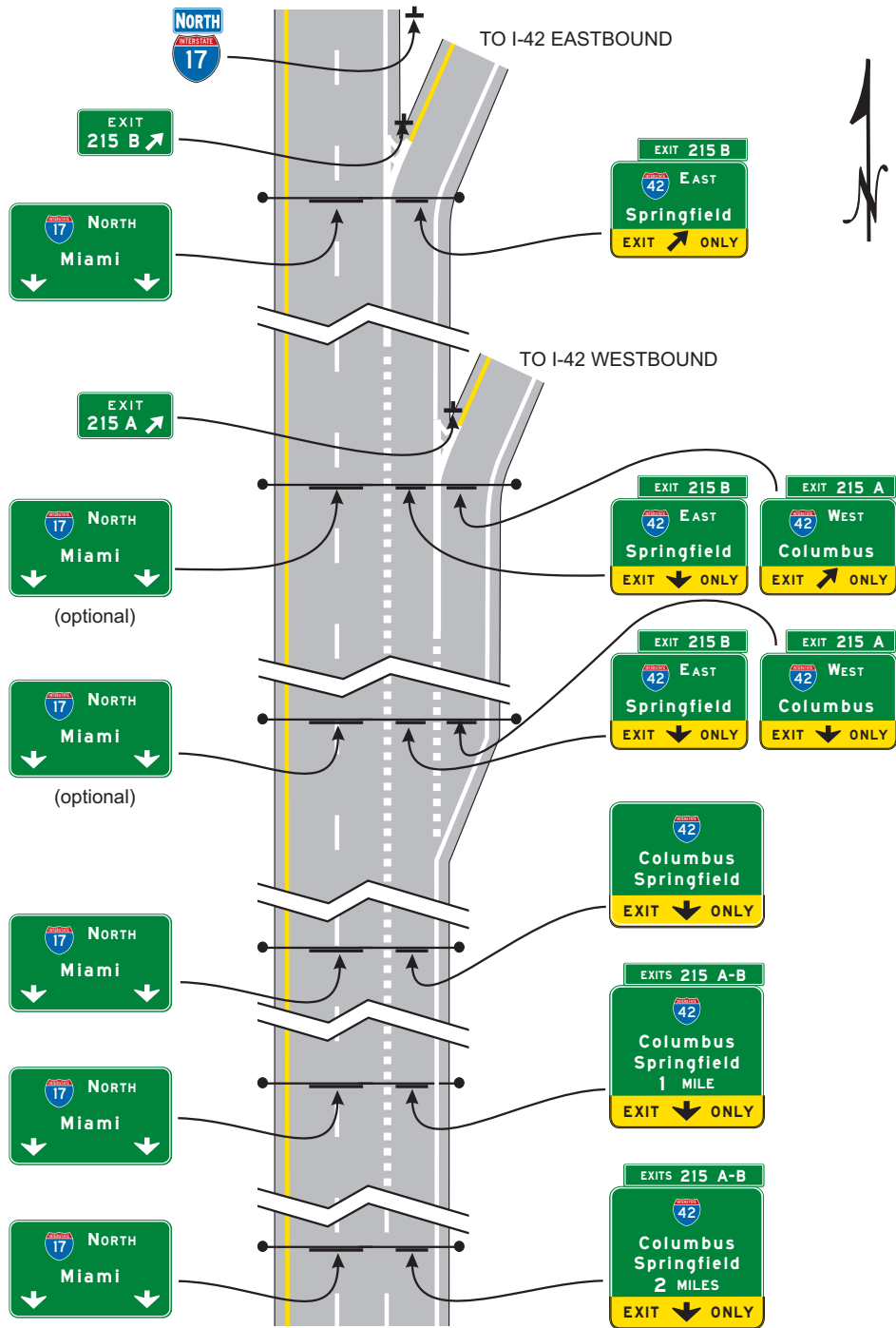
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B - Example of Signing for Successive Exit Ramps with a Dropped Lane at the Second Exit



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Figure 2E-34. Examples of Guide Signs for a Freeway-to-Freeway Interchange (Sheet 2 of 2)

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Overhead Arrow-per-Lane or Diagrammatic guide signs (see Sections 2E.21 and 2E.22) shall be used for freeway splits with an option lane and for multi-lane freeway-to-freeway exits having an option lane.

Overhead signs shall be used at a distance of 1 mile and at the theoretical gore of each connecting ramp. When Overhead Arrow-per-Lane or Diagrammatic guide signs are used, they shall comply with the provisions of Sections 2E.21 and 2E.22.

OPTION:

Overhead signs may also be used at the 1/2-mile and 2-mile locations.

The arrow and/or the name of the control city may be omitted on signs that indicate the straight-ahead continuation of a route on a Pull-Through sign (see Section 2E.12).

An Advisory Exit Speed sign may be used where an engineering study shows that it is necessary to display a speed reduction message for ramp signing (see Section 2C.14).

Where extra emphasis of an especially low advisory ramp speed is needed, an EXIT XX MPH (E13-2) sign panel (see Figure 2E-27) may be placed at the bottom of the Exit Direction sign to supplement, but not to replace, the exit or ramp advisory speed warning signs.

2E.45 Cloverleaf Interchange

SUPPORT:

A cloverleaf interchange has two exits for each direction of travel. The exits are closely spaced and have common Advance Guide signs. Examples of guide signs for cloverleaf interchanges are shown in Figure 2E-35.

GUIDANCE:

The Advance Guide signs should include two place names, one corresponding to each exit ramp, with the name of the place served by the first exit on the upper line.

STANDARD:

An overhead guide sign shall be placed at the theoretical gore of the first exit ramp, with a diagonally upward-pointing directional arrow on the Exit Direction sign for that exit and the message XX MILES, or EXIT XX MILES if interchange numbering is not used, on the Advance Guide sign for the second exit, as shown in Figure 2E-35. The second exit shall be indicated by an overhead Exit Direction sign over the auxiliary lane. An Exit Gore sign shall also be used at each gore (see Section 2E.37).

Interchanges with more than one exit from the main line shall be numbered as described in Section 2E.31 with an appropriate suffix.

Diagrammatic signs shall not be used for cloverleaf inter-

changes except as otherwise provided in Section 2E.22.

GUIDANCE:

Where the mainline passes under the crossroad and the exit roadway is located beyond the overcrossing structure, the overhead Exit Direction sign for the second exit should be placed either on the overcrossing structure (see Figure 2E-35) or on a separate structure located immediately in front of the overcrossing structure.

2E.46 Cloverleaf Interchange with Collector-Distributor Roadways

SUPPORT:

Examples of guide signs for full cloverleaf interchanges with collector-distributor roadways are shown in Figure 2E-36.

GUIDANCE:

Signing on the collector-distributor roadways should be the same as the signing on the mainline of a cloverleaf interchange.

STANDARD:

Guide signs at exits from the collector-distributor roadways shall be overhead and located at the theoretical gore of the collector-distributor roadway and the exit ramp.

OPTION:

Exits from the collector-distributor roadways may be numbered with an appropriate suffix. If the exits from a collector-distributor roadway are numbered with suffixes, the Advance Guide signs on the mainline may include two place names and their corresponding exit numbers with the plural EXITS. If only the exit from the mainline is numbered or if interchange numbering is not used, the Advance Guide signs on the mainline may use the singular EXIT.

GUIDANCE:

Both cardinal directions should be used on the guide signs prior to the collector-distributor road exit when a collector-distributor road serves both directions.

2E.47 Partial Cloverleaf Interchange

SUPPORT:

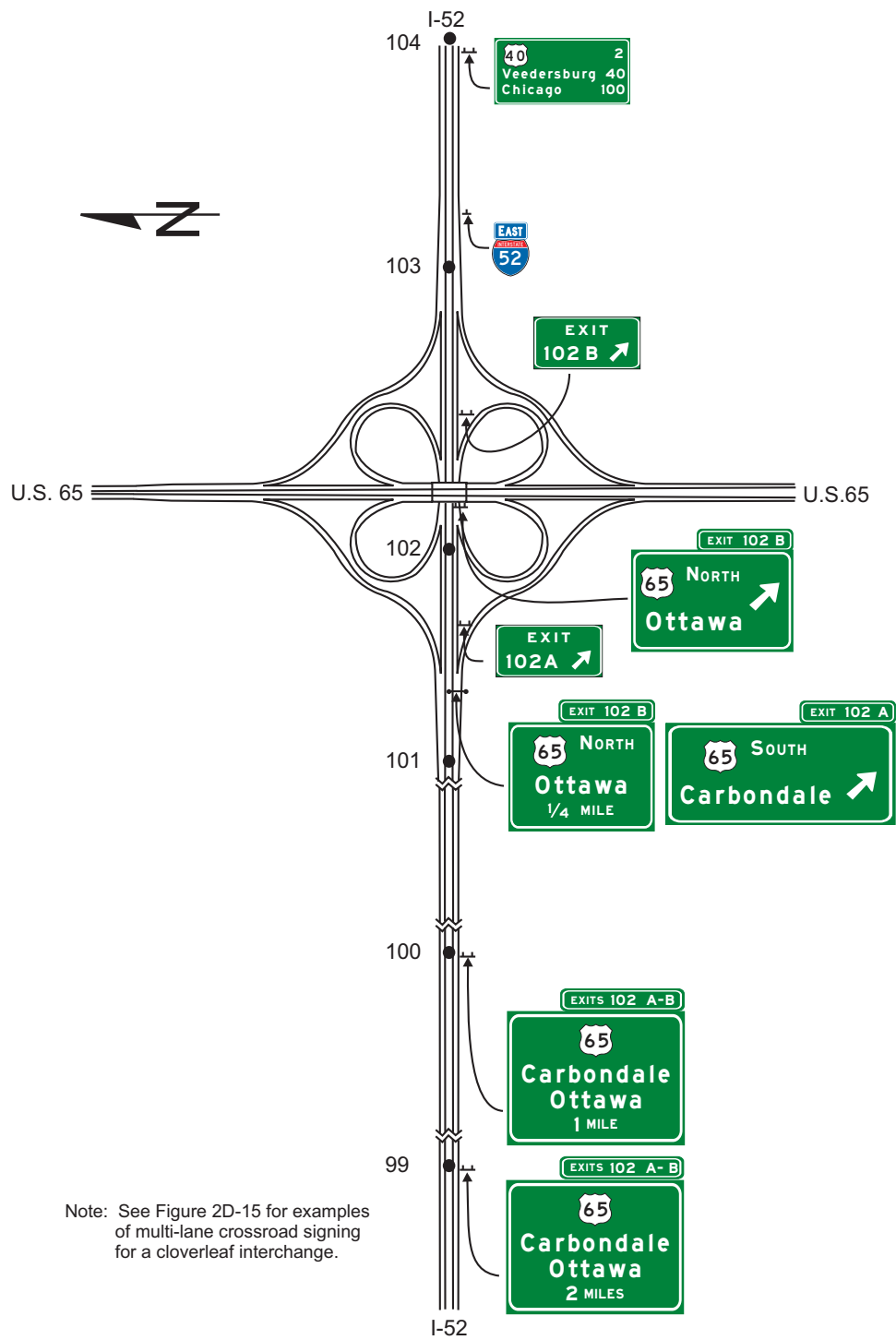
Examples of guide signs for partial cloverleaf interchanges are shown in Figure 2E-37.

GUIDANCE:

Where the mainline passes under the crossroad and the exit roadway is located beyond the overcrossing structure, the overhead Exit Direction sign should be placed either on the overcrossing structure (see Figure 2E-37) or on a separate structure located immediately in front of the over-

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Note: See Figure 2D-15 for examples of multi-lane crossroad signing for a cloverleaf interchange.

Figure 2E-35. Examples of Guide Signs for a Full Cloverleaf Interchange

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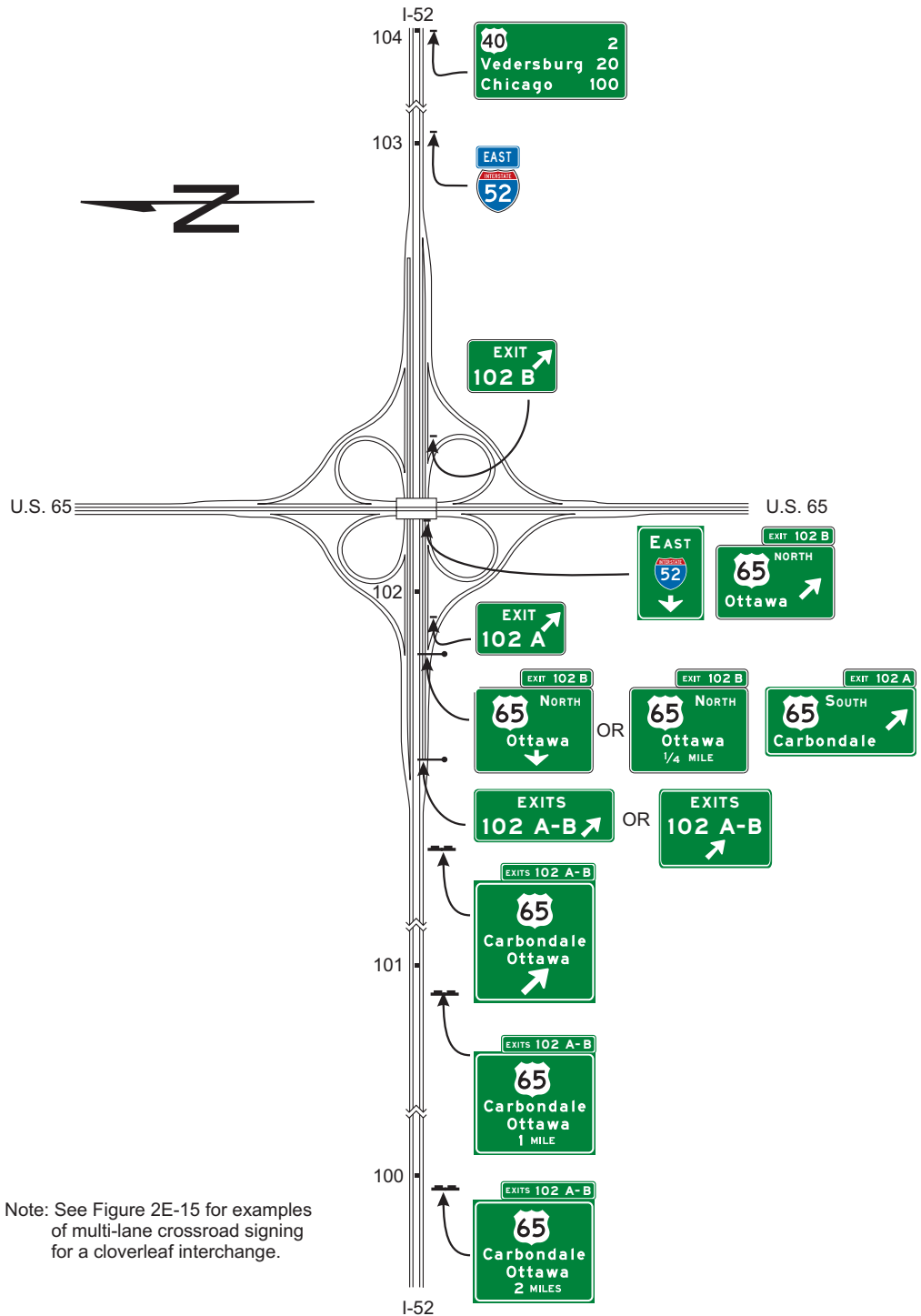
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Note: See Figure 2E-15 for examples of multi-lane crossroad signing for a cloverleaf interchange.

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Figure 2E-36. Examples of Guide Signs for a Full Cloverleaf Interchange with Collector-Distributor Roadways

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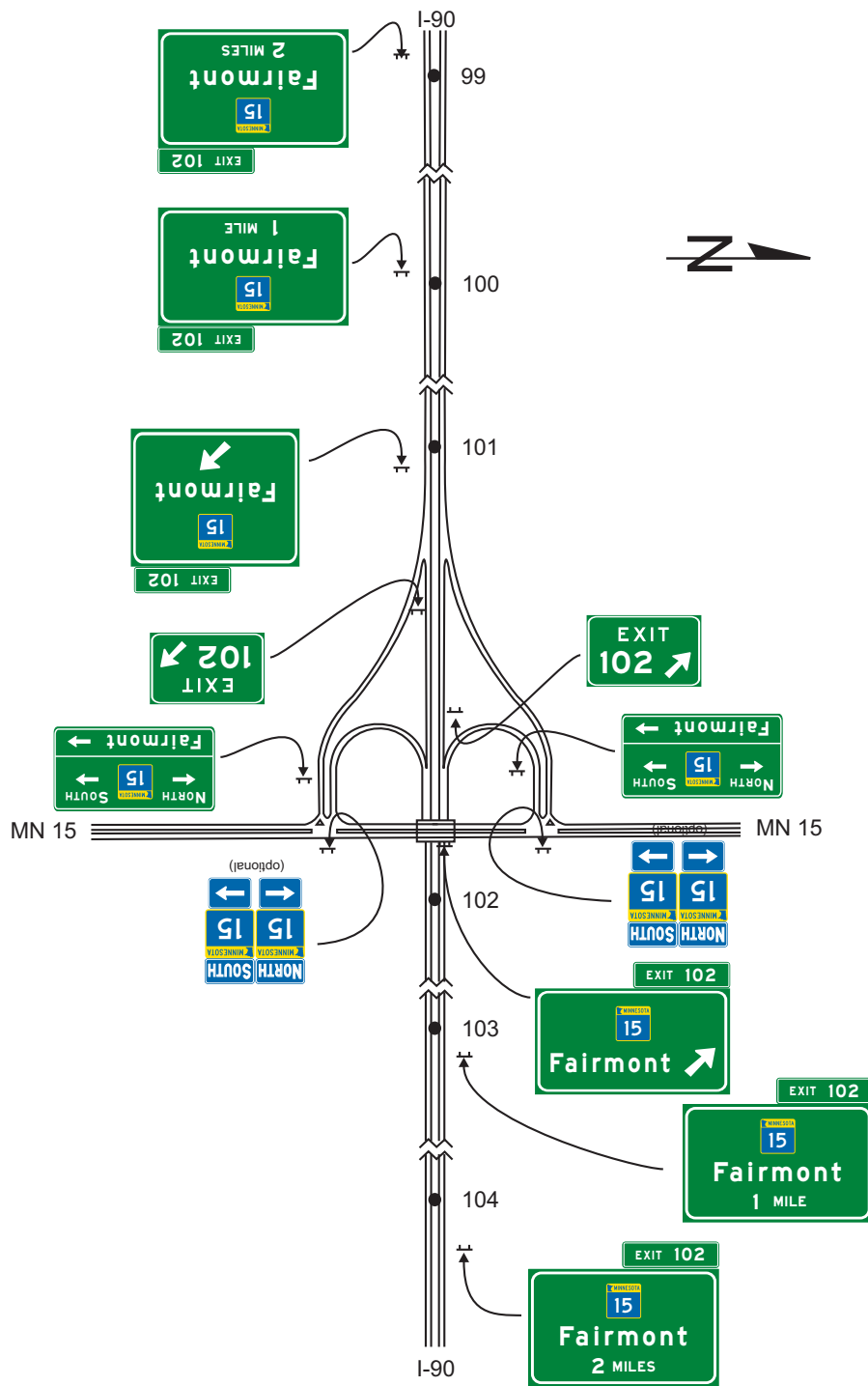


Figure 2E-37. Examples of Guide Signs for a Partial Cloverleaf Interchange

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crossing structure..

STANDARD:

A post-mounted Exit Gore sign shall also be installed in the ramp gore.

SUPPORT:

Partial cloverleaf interchanges with successive exit ramps from the same direction of travel are signed the same as cloverleaf interchanges for that direction of travel (see Section 2E.45).

2E.48 Diamond Interchange

SUPPORT:

Examples of guide signs for diamond interchanges are shown in Figure 2E-38.

STANDARD:

For numbered exits, the singular message EXIT shall be used on the Exit Number plaques (see Section 2E.31) with the Advance Guide and Exit Direction signs. For non-numbered exits, the singular message EXIT shall be used as part of the distance message on the Advance Guide signs.

SUPPORT:

The typical diamond interchange ramp departs from the mainline roadway such that a speed reduction generally is not necessary in order for a driver to negotiate an exit maneuver from the mainline onto the ramp roadway.

GUIDANCE:

When a speed reduction is not necessary, an exit speed sign should not be used.

OPTION:

An Advisory Exit Speed sign may be used where an engineering study shows that it is necessary to display a speed reduction message for ramp signing (see Section 2C.14).

GUIDANCE:

The Advisory Exit Speed sign should be located along the deceleration lane or along the ramp such that it is visible to the driver far enough in advance to allow the driver to decelerate before reaching the curve associated with the exiting maneuver.

OPTION:

A Stop Ahead or Signal Ahead warning sign may be placed, where engineering judgment indicates a need, along the ramp in advance of the cross street, to give notice to the

driver (see Section 2C.36).

GUIDANCE:

When used on two-lane ramps, Stop Ahead or Signal Ahead signs should be used in pairs with one sign on each side of the ramp.

2E.49 Diamond Interchange in Urban Area

SUPPORT:

Examples of guide signs for diamond interchanges in an urban area are shown in Figure 2E-39. This example includes the use of the Community Interchanges Identification sign (see Section 2E.41), which might be useful if two or more interchanges serve the same community.

In urban areas, street names are often displayed as the principal message in destination signs.

OPTION:

If interchanges are too closely spaced to properly locate the Advance Guide signs, they may be placed closer to the exit with the distances displayed adjusted accordingly.

2E.50 Closely Spaced Interchanges

OPTION:

Section 2E.11 contains information regarding sign spreading where the Exit Direction sign and the Advance Guide sign for the next interchange are mounted overhead. Sign spreading is particularly beneficial where interchanges are closely spaced and overhead signing is used in conjunction with Interchange Sequence signs as provided in the following paragraph.

GUIDANCE:

Interchange Sequence signs (see Section 2E.40) should be used at closely-spaced interchanges. When used, they should identify and show street names and distances for the next two or three exits as shown in Figure 2E-30.

STANDARD:

Advance Guide signs for closely spaced interchanges shall show information for only one interchange.

2E.51 Minor Interchange

OPTION:

Less signing may be used for minor interchanges because such interchanges customarily serve low volumes of local traffic.

SUPPORT:

Examples of guide signs for minor interchanges are shown in Figure 2E-40.

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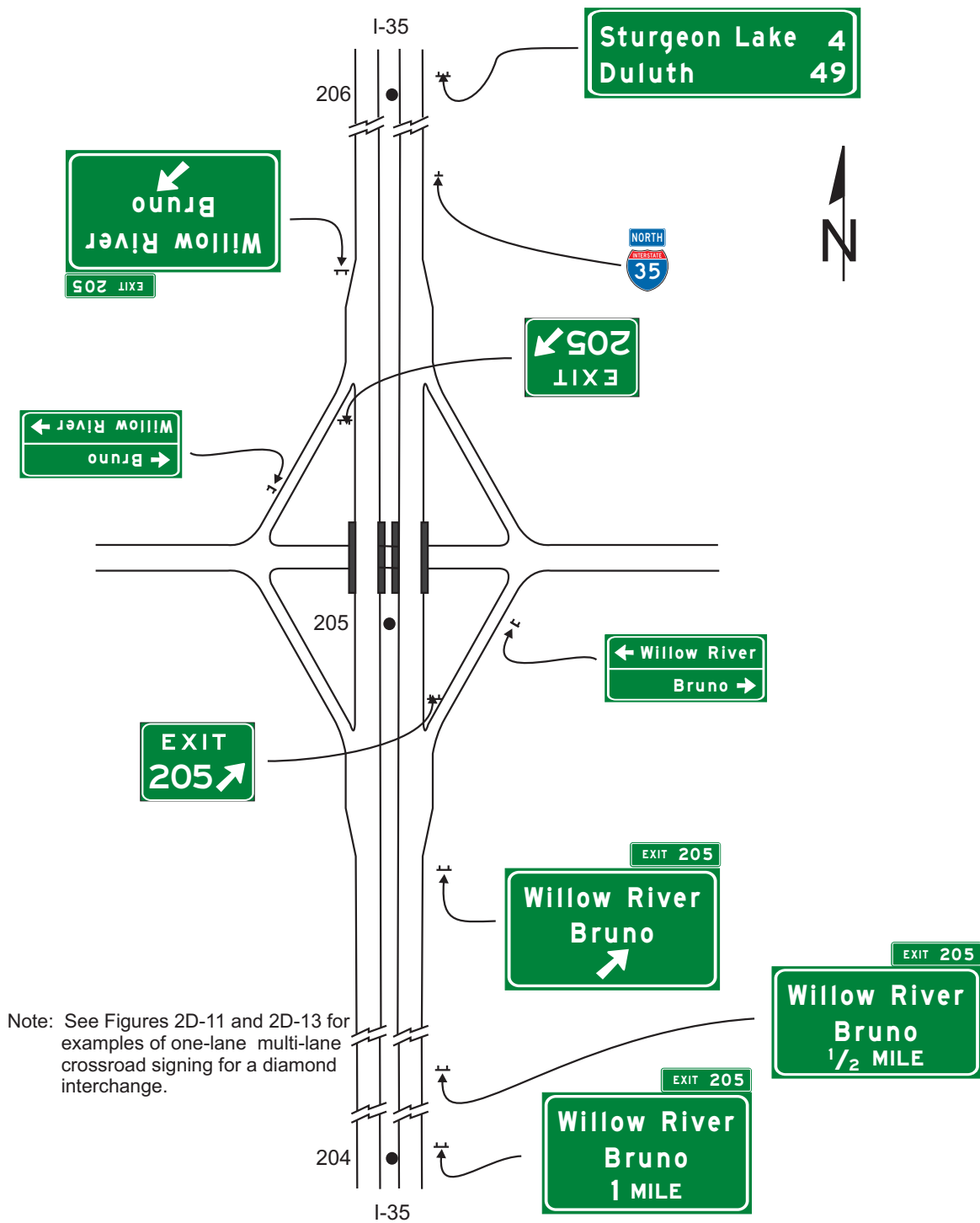
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Figure 2E-38. Examples of Guide Signs for a Diamond Interchange

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Note: See Figures 2D-11 through 2D-13 for examples of one-lane and multi-lane crossroad signing for a diamond interchange.

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Figure 2E-39. Examples of Guide Signs for a Diamond Interchange in an Urban Area

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STANDARD:

At least one Advance Guide sign and an Exit Gore sign shall be used at a minor interchange.

GUIDANCE:

An Exit Direction sign should also be used.

2E.52 Signing on Conventional Road Approaches and Connecting Roadways

SUPPORT:

Section 2D.45 contains information regarding the signing on conventional roads on the approaches to interchanges and the signing on connecting roadways.

2E.53 Wrong-Way Traffic Control at Interchange Ramps

SUPPORT:

Section 2B.41 contains information regarding the use of regulatory signs to deter wrong-way movements at intersections of freeway or expressway ramps with conventional roads, and in the area where entrance ramps intersect with the mainline lanes.

Section 2D.46 contains information regarding the use of a Directional assembly or a guide sign to mark the entrance to a freeway or expressway from a conventional road.

2E.54 Weigh Station Signing

STANDARD:

Weigh Station signing on freeways and expressways shall be the same as that provided in Section 2D.49, except for lettering size and the advance posting distance for the Exit Direction sign, which shall be located a minimum of 1,500 feet in advance of the gore.

SUPPORT:

Weigh Station sign layouts for expressway and freeway applications are available from MnDOT (see Office of Traffic, Safety and Technology, page ii).

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8. SIGNING PLAN SETS

8.1 Signing Plan Sets

Standard detail sheets for signing plans can be found on the OTST website:

<http://www.dot.state.mn.us/trafficeng/signing/plans.html>. The plan format and sequence of details is as follows:

1. Title sheet.
2. Statement of Estimated Quantities.
3. Utility Sheet.
4. Sign tabulation sheets giving pertinent information for each sign.
5. Traffic barrier data sheets.
6. Roadway plan sheets for signing.
7. Sign panel drawings for all non-standard signs.
8. Standard details.
9. Structural details.
10. Electrical details.
11. Cross sections for Type A and Type OH signs

Several sample plan sets are included in this manual in Chapter 9 through 12.

8.2 Signing Plan Assembly Steps

Note: The Plan Assembly Steps shown below may be downloaded from the [MnDOT OTST Signing Section Website](#). Since these steps are subject to change, be sure to get the latest version from the website.

The Sample Signing Plans have been organized to follow an established format. As a designer progresses through the following numbered sequential steps in assembling a complete signing plan, refer to the appropriate sheets in the Sample Plan for clarification. The Sample Signing Plans and updates to the Signing.

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-CDSstds-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.

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.

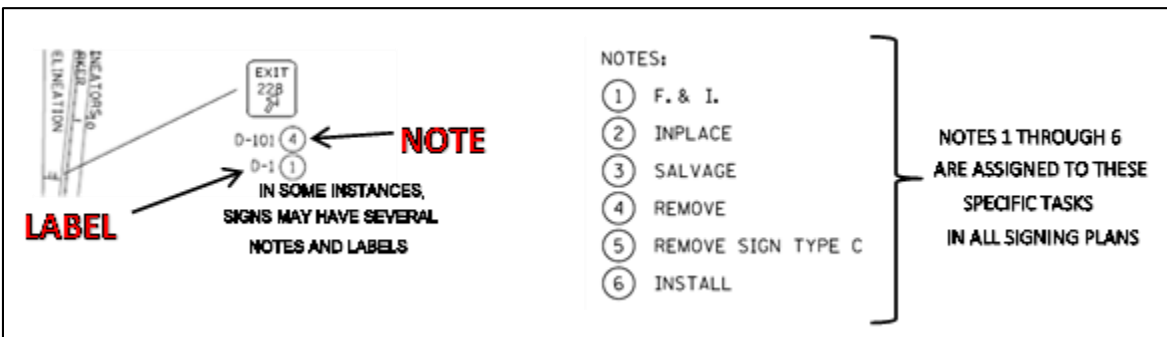
- Existing signs being Salvaged are labelled with their sign type and a sequential number beginning with 201

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.

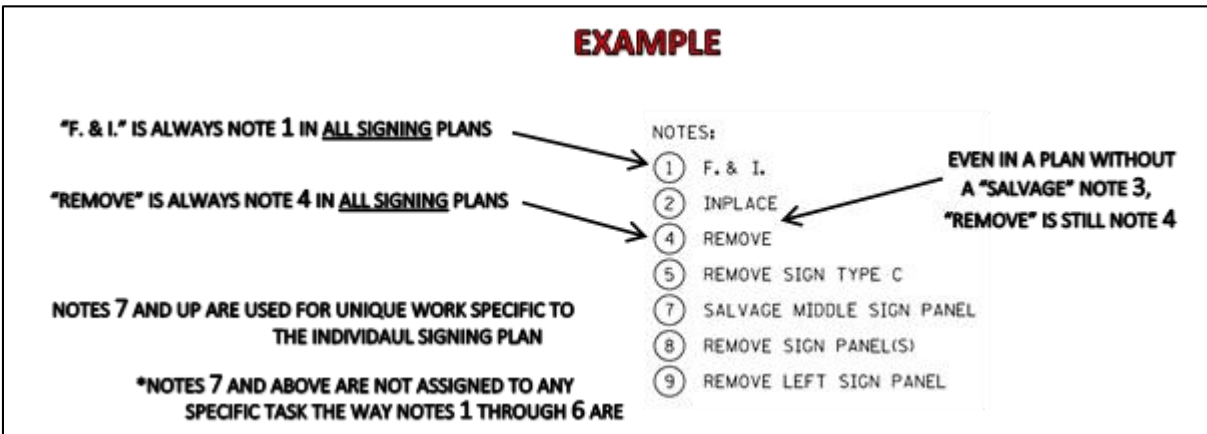
NOTE: Different labels are required if the signs have differences in mounting, size, etc. (for example, a 36" x 36" STOP sign needs a different label than a 48" x 48" STOP sign, or a 36" x 36" R5-1 sign mounted on U posts in dirt would get a different label than a 36" x 36" R5-1 mounted on a square tube 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 (Rick Sunstrom 651-234-7381 or 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.



8.3 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.



9. FREEWAY SAMPLE PLAN (URBAN)

The following is a handout of a freeway sample plan (urban). This sample plan can be downloaded from the OTST Signing website, <http://www.dot.state.mn.us/trafficeng/signing/plans.html>.

MINNESOTA DEPARTMENT OF TRANSPORTATION

CONSTRUCTION PLAN FOR SIGN REPLACEMENT

LOCATED ON T. H. 94 FROM 2300' S. OF DOWLING AVE. TO T. H. 252

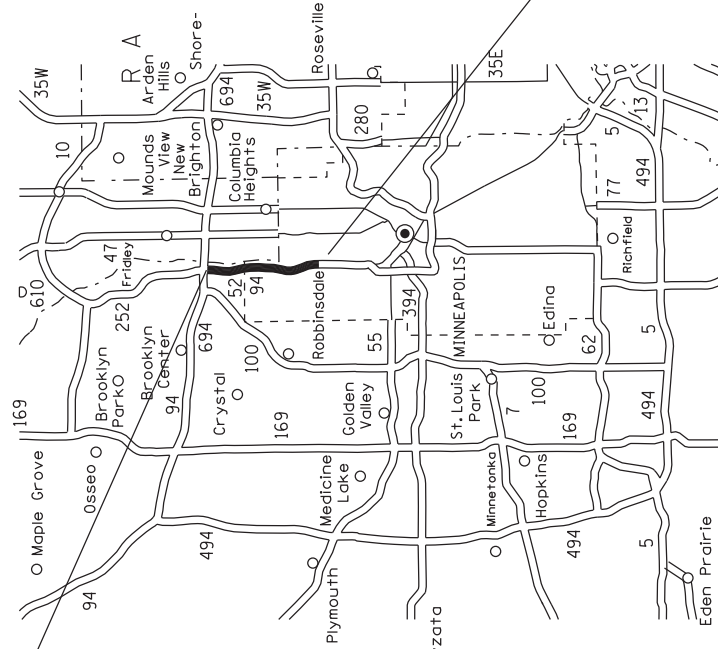


STATE PROJ. NO. 2781-438
 GROSS LENGTH 16932 FEET 3.207 MILES
 BRIDGES-LENGTH FEET MILES
 EXCEPTIONS-LENGTH FEET MILES
 NET LENGTH 16932 FEET 3.207 MILES
 REF. POINT 228+00.184 TO REF. POINT 224+00.977

STATE PROJ. NO.
 GROSS LENGTH FEET MILES
 BRIDGES-LENGTH FEET MILES
 EXCEPTIONS-LENGTH FEET MILES
 NET LENGTH FEET MILES
 REF. POINT TO REF. POINT

LENGTH AND DESCRIPTION IS BASED ON T.H. 94 W.B.

END S. P. 2781-438
 T.H. 94 W.B. STA. 442+00



WARNING!!
 PETROLEUM
 PRODUCTS
 PIPELINE

BEG. S. P. 2781-438
 T.H. 94 W.B. STA. 255+00

PLAN 100 FEET
 INDEX MAP 4 MILES

DESIGN DESIGNATION

Design ESALS
 ADT (Current Year)
 ADT (Future Year)
 DHV (Design Hr. Vol.)
 D (Directional Distr.)
 T (Heavy Commercial)
 Design Speed MPH
 Based on Sight Distance
 Height of eye Height of object
 % Design Speed not achieved at:
 % STA. TO STA. MPH
 % STA. TO STA. MPH

PROJECT LOCATION
 COUNTY : HENNEPIN
 DISTRICT : METRO

DATE	PLAN REVISIONS	SHEET NO.	APPROVED BY

FOR PLANS AND UTILITIES SYMBOLS SEE TECHNICAL MANUAL
 STATE PROJ. NO. 2781-438 CHARGE IDENTIFIER

FED. PROJ. NO. STATE FUNDS

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
3-12	TABULATIONS
13	UTILITIES
14-26	GUARD RAIL SHEETS (IF NEEDED)
27-34	ROADWAY LAYOUTS
35-47A, 48-54	SIGNING PANEL LAYOUTS
55	CROSS SECTION

THIS PLAN CONTAINS 56 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: M. HOWARD LICENSE #
 DATE: 4/1/2013 SIGNATURE:
 DESIGN SQUAD L. FINE, C. HOWARD

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. 2781-438 (TH 94-392) SHEET NO. 1 OF 55 SHEETS

STATEMENT OF ESTIMATED QUANTITIES

TAB	SHEET NO	ITEM NO	ITEM	UNIT	TOTAL ESTIMATED QUANTITIES
P	10	2013.603	SAFETY CABLE	LIN FT	166
N	10	2104.501	REMOVE SIGN WALKWAY	LIN FT	340
		2104.509	REMOVE DELINEATOR	EACH	28
		2104.509	REMOVE MARKER	EACH	8
		2104.509	REMOVE SIGN TYPE C	EACH	17
B	4	2104.509	REMOVE SIGN TYPE D	EACH	5
E	7	2104.509	REMOVE SIGN TYPE EO	EACH	7
U	11	2104.509	REMOVE SIGN TYPE OH (BRIDGE MOUNTED)	EACH	1
O	10	2104.509	REMOVE SIGN LIGHTING SYSTEM	EACH	6
D	6	2104.509	REMOVE SIGN PANEL TYPE D	EACH	10
J	9	2104.509	REMOVE SIGN PANEL TYPE OH	EACH	4
M	12	2104.523	SALVAGE SIGN TYPE OH	EACH	1
L	12	2564.511	CONCRETE FOOTINGS (TYPE OH SHAFT)	CU YD	6.9
V	11	2564.522	STRUCT STEEL-POSTS FOR OH SIGNS (B)	POUND	781
K,L	9,12	2564.522	STR STEEL-TRUSSES FOR OH SIGNS BR.MTD	POUND	1190
A	3	2564.531	STR STEEL-PANEL MT PST FOR OH SIGNS (B)	POUND	2788
C	5	2564.531	SIGN PANELS TYPE C	SQ FT	375
F	7	2564.531	SIGN PANELS TYPE D	SQ FT	408
R	11	2564.531	SIGN PANELS TYPE EO	SQ FT	270
H	9	2564.531	SIGN PANELS TYPE OVERLAY	SQ FT	236
G	8	2564.535	SIGN PANELS TYPE OH	SQ FT	1073
M	12	2564.537	SIGN PANEL OVERLAY TYPE OH	SQ FT	2226
I	9	2564.539	INSTALL SIGN TYPE OH	EACH	1
S	11	2564.550	OVERHEAD SIGN IDENTIFICATION PLATE	EACH	15
Q	11	2564.551	DELINEATOR	EACH	35
T	11	2564.553	REFERENCE LOCATION SIGN	EACH	8
			OBJECT MARKER X4-4	EACH	5

(P) DENOTES PLAN QUANTITY

SIGN PANELS TYPE C										A
SIGN NO	QTY	NO & TYPE	POSTS KNEE BRACES QTY	MTG HT (1) FEET	LENGTH FEET	SIZE INCH	PANEL		CODE NO	PANEL LEGEND
							AREA SQ.FT	TOTAL AREA SQ.FT		
(3) C-1	3	2-U	1	7	17	36 x 18	4.50	13.50	M3-2A	EAST
C-2	1	1-ST	1	7	12	36 x 36	9.00	27.00	M1-1	INTERSTATE 94
C-3	1	2-U	1	7	18	42 x 12	3.50	3.50	R4-X7P	ADDED LANE RIGHT
C-4	6	2-U	1	7	21	42 x 48	14.00	84.00	R4-X7	BEGIN
C-5	3	1-ST	1	7	12	48 x 48	16.00	48.00	W4-1R	SHOULDER AUTHORIZED BUSES ONLY
C-6	2	2-U	1	7	18	24 x 12	2.00	4.00	M3-4A	MERGE RIGHT
C-7	4	2-U	2	7	21	42 x 48	14.00	28.00	M1-1	WEST
C-8	1	(4)		7	21	48 x 96	32.00	128.00	R2-4B	94
(4)							9.00	9.00	R3-7R	SPEED LIMIT 60 MINIMUM 40
										RIGHT LANE MUST TURN RIGHT
							TOTAL	375.00		

SPECIFIC NOTES:

- (1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET NO. 39 FOR TYPICAL MOUNTING.
- (2) FOR PUNCHING AND MOUNTING DETAILS, SEE SHEET NO. 40.
- (3) PLACE PER MANUFACTURER'S DETAIL USING A 10 GAUGE, 2-1/2" x 2-1/2" PRE-PUNCHED, GALVANIZED STEEL, SQUARE TUBE POST WITH A 10 GAUGE, 2-3/16" x 2-3/16" x 8', PRE-PUNCHED GALVANIZED STEEL INTERNAL SQUARE TUBE INSERT. THIS ASSEMBLY REQUIRES STRINGERS AND SLIP BASES.
- (4) BRIDGE RAIL MOUNTED SEE SHEET 43 FOR DETAILS.

GENERAL NOTES:

1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEETS 38 TO 40 FOR STRUCTURAL DETAILS.
3. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS OF TYPE C SIGN PANELS.

DRAWN BY: LBJ

CHECKED BY: RFK

LIC. NO. _____

DATE 1/28/2016

STATE PROJ. NO. 2781-438 (TH 94)

SHEET NO. 3

OF 55 SHEETS

TABLATIONS-TYPE C

REMOVE SIGN TYPE D						B
SIGN NO	QTY	POSTS NO & TYPE	KNEE BRACES QTY	PANEL SIZE (1)		PANEL LEGEND
				INCH	INCH	
D-101	2	2-U	2	72	x 84	EXIT 228
D-104	2	2-U	2	72	x 84	EXIT 226
D-108	1	2-U	2	72	x 84	EXIT 225
TOTAL	5					

SPECIFIC NOTE:
 (1) SIZES ARE APPROXIMATE.

TABULATIONS-TYPE D

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY:

LICENSED PROFESSIONAL ENGINEER

LIC. NO.

DATE 1/28/2016

STATE PROJ. NO. 2781-438 (TH 94)

SHEET NO. 4

OF 55 SHEETS

SIGN PANELS TYPE D

SIGN NO	POSTS				MTG HT (1) FEET	PANEL			TOTAL AREA SQ FT	PANEL LEGEND
	QTY	NO & TYPE	KNEE BRACES QTY	LENGTH FEET		SPACING INCH	SIZE INCH	AREA SQ FT		
(2)(4) D-1	2	2-ST		14	48	72 x 84	42.00	84.00	EXIT 228	
(3) D-2	2					84 x 24	14.00	28.00	41ST AVE N	
(3) D-3	2					96 x 24	16.00	32.00	42ND AVE N	
(2)(4) D-4	2	2-ST		14	48	72 x 84	42.00	84.00	EXIT 226	
(3) D-5	2					96 x 24	16.00	32.00	49TH AVE N	
(3) D-6	2					96 x 24	16.00	32.00	53RD AVE N	
(3) D-7	2					96 x 24	16.00	32.00	57TH AVE N	
(2)(4) D-8	2	2-ST		14	48	72 x 84	42.00	84.00	EXIT 225	
TOTAL								408.00		

SPECIFIC NOTES:
 (1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET NO. 39 FOR TYPICAL MOUNTING.
 (2) SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL (E5-1B).
 (3) BRIDGE MOUNTED, SEE DETAIL SHEET 44.
 (4) 2-1/2" x 2-1/2" 10 GAUGE PRE-PUNCHED GALVANIZED STEEL SQUARE TUBE POST WITH A 2-3/16" x 2-3/16" 10 GAUGE PRE-PUNCHED GALVANIZED STEEL SQUARE TUBE INTERNAL POST. THIS ASSEMBLY REQUIRES STRINGERS AND SLIP BASES. PLACE PER MANUFACTURER'S DETAIL.

GENERAL NOTES:
 1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
 2. SEE SHEETS 38 TO 40 FOR STRUCTURAL DETAILS.
 3. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR TYPE D STRINGER AND PANEL JOINT DETAILS.
 4. SEE SHEET 27 FOR SIGN PANELS.

REMOVE SIGN PANEL TYPE D			
SIGN NO	QTY	PANEL SIZE (1)	PANEL LEGEND
		INCHES	
D-102	2	84 x 24	41ST AVE N
D-103	2	96 x 24	42ND AVE N
D-105	2	84 x 24	49TH AVE N
D-106	2	84 x 24	53RD AVE N
D-107	2	84 x 24	57TH AVE N
TOTAL	10		

SPECIFIC NOTE:
 (1) SIZES ARE APPROXIMATE.

TABULATIONS-TYPE D

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY:

LIC. NO.

DATE 1/28/2016

STATE PROJ. NO. 2781-438 (TH 94)

SHEET NO. 6

OF 55 SHEETS

REMOVE SIGN TYPE EO					E
SIGN NO	QTY	LOCATION	POSTS NO & TYPE	PANEL SIZE (IN)	LEGEND
EO-101	2	OH I94-305, OH I94-311(R)	3-U	114 x 24	EXIT 228
EO-102	4	OH I94-306, OH I94-314 OH I94-317, OH I94-331	3-U	114 x 24	EXIT 226
EO-103	1	OH I94-311(L)	3-U	114 x 24	EXIT 229
TOTAL	7				

SIGN PANELS TYPE EO							F	
SIGN NO	QTY	LOCATION	PANEL SIZE			POSTS		
			SIZE (IN)	AREA (SQ FT)	TOTAL AREA (SQ FT)	NO	SPACING	LEGEND
EO-1	3	OH I94-305, OH I94-311(R), OH I94-585	108 x 30	22.50	67.50	3	36	EXIT 228
EO-2	4	OH I94-306, OH I94-314 OH 94-317, OH 331(R)	108 x 30	22.50	90.00	3	36	EXIT 226
EO-3	1	OH I94-311(L)	108 x 30	22.50	22.50	3	36	EXIT 229
EO-4	4	OH I94-310(R), OH I94-316(R) OH I94-318(R), OH I94-020(R)	108 x 30	22.50	90.00	3	36	EXIT 225
					TOTAL	270		

GENERAL NOTES:
 1. SEE SHEET 45 FOR STRUCTURAL DETAIL.
 2. POST SPACING MAY BE VARIED TO MISS MEMBERS OF OH SIGN STRUCTURES.
 3. SEE SHEET 28 FOR SIGN PANELS.

SAW SIGN PANELS TYPE OH (1)				
SIGN NO	LOCATION	PANEL SIZE (IN)		LENGTH OF CUT (FT.)
		EXISTING	MODIFIED	
OH 194-305	259+00 WB	252 x 84	216 x 84	7.0

SPECIFIC NOTE:
 (1) PAID FOR UNDER SIGN PANEL OVERLAY TYPE OH.

SIGN PANEL OVERLAY TYPE OH										G
SIGN NO	LOCATION	PANEL OVERLAY			PANEL OVERLAY			PANEL OVERLAY		TOTAL AREA (SQ FT)
		SIZE (IN)	AREA (SQ FT)	AREA (SQ FT)	SIZE (IN)	AREA (SQ FT)	AREA (SQ FT)	SIZE (IN)	AREA (SQ FT)	
OH 194-020(L)	430+95 WB	204 x 114	161.50							161.50
OH 194-305	259+00 WB	216 x 84	126.00							126.00
OH 194-306	BR.27812	180 x 90	112.50							112.50
OH 194-307	BR.27812	228 x 90	142.50							142.50
OH 194-310(L)	351+50 WB	204 x 132	187.00							187.00
OH 194-311	292+60 EB	168 x 132	154.00	156 x 108	117.00					271.00
OH 194-312	BR.27819	312 x 90	195.00							195.00
OH 194-314	336+90 WB	216 x 84	126.00							126.00
OH 194-316(L)	BR.27807	204 x 132	187.00							187.00
OH 194-317	393+70 EB	216 x 84	126.00							126.00
OH 194-318(L)	BR.27806	204 x 132	187.00							187.00
OH 194-319	BR.27806	282 x 84	164.50							164.50
OH 194-331	427+50 EB	180 x 96	120.00	180 x 96	120.00					240.00
TOTAL										2226.00

GENERAL NOTE:
 1. SEE SHEET 31 TO 34 FOR SIGN PANEL OVERLAYS.

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY: _____

LICENSED PROFESSIONAL ENGINEER

LIC. NO. _____

DATE 1/28/2016

STATE PROJ. NO. 2781-438 (TH 94)

SHEET NO. 8

OF 55 SHEETS

TABLATIONS-TYPE OH

SIGN PANELS TYPE OH

SIGN NO	LOCATION	PANEL		TOTAL AREA (SQ FT)
		SIZE (IN)	AREA (SQ FT)	
OH 194-020(R)	430+95 WB	240 x 114	190.00	190.00
OH 194-310(R)	351+50 WB	252 x 138	241.50	241.50
OH 194-316(R)	BR.27807	252 x 114	199.50	199.50
OH 194-318(R)	BR.27806	252 x 114	199.50	199.50
OH 194-629	317+75 EB	258 x 84	150.50	150.50
OH 194-585	BR.27808	138 x 96	92.00	92.00
TOTAL				1073.00

GENERAL NOTE:
1. SEE SHEET 29-30 FOR SIGN PANELS.

OH SIGN IDENTIFICATION PLATE

SIGN NO	QTY	LOCATION	IDENTIFICATION PLATE NO
OH 194-020	1	430+95 WB	94-020
OH 194-305	1	259+00 WB	94-305
OH 194-306	1	BR.27812	94-306
OH 194-307	1	BR.27812	94-307
OH 194-310	1	351+50 WB	94-310
OH 194-311	1	292+60 EB	94-311
OH 194-312	1	BR.27819	94-312
OH 194-314	1	336+90 WB	94-314
OH 194-316	1	BR.27807	94-316
OH 194-317	1	393+70 EB	94-317
OH 194-318	1	BR.27806	94-318
OH 194-319	1	BR.27806	94-319
OH 194-331	1	427+50 EB	94-331
OH 194-585	1	BR.27808	94-630
OH 194-629	1	317+75 EB	94-629
TOTAL			15

GENERAL NOTES:
1. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR OH SIGN IDENTIFICATION PLATE (X5-1).
2. SEE SHEET SEE SHEET 42 FOR MOUNTING DETAILS.

REMOVE SIGN PANEL TYPE OH

SIGN NO	LOCATION	PANEL SIZE (IN)	PANEL SIZE (IN)	PANEL SIZE (IN)	TOTAL PANELS
OH 194-020(R)	430+95 WB	204 x 108			1
OH 194-310(R)	351+50 WB	204 x 108			1
OH 194-316(R)	BR.27807	204 x 108			1
OH 194-318(R)	BR.27806	204 x 108			1
TOTAL					4

PANEL MOUNTING POSTS

SIGN NO	TRUSS DEPTH (IN)	CHORD ANGLES (IN)	NO. OF POSTS	LENGTH APPROX (IN)	SIZE	WEIGHT (LBS)
OH 194-020(R)	96	6 x 3 1/2 x 3/8	4	129	S4 x 7.7	404
OH 194-310(R)	72	6 x 6 x 3/4	4	142	W6 x 12	640
OH 194-316(R)			4	126	W6 x 12	576
OH 194-318(R)			4	126	W6 x 12	576
OH 194-629	72	6 x 6 x 1/2	4	88	S4 x 7.7	296
TOTAL						2492

SPECIFIC NOTES:
(1) SEE SHEET 47A FOR ATTACHMENT DETAILS.
(2) SEE SHEET 53 FOR ATTACHMENT DETAILS.

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY

DATE 1/28/2016

STATE PROJ. NO. 2781-438 (TH 94)

SHEET NO. 9 OF 55 SHEETS

TABLATIONS-TYPE OH

REMOVE SIGN WALKWAY (1)(2)				N
OH SIGN NO	LOCATION	LENGTH (FT.)	NUMBER OF FIXTURES	
OH 194-020	430+95 WB	85	6	
OH 194-305	259+00 WB	21	3	
OH 194-310	351+50 WB	48	6	
OH 194-311	292+60 EB	27	4	
OH 194-314	336+90 WB	21	3	
OH 194-317	393+70 EB	21	3	
OH 194-331	427+50 EB	95	4	
OH 194-352	318+00 EB	21.5	3	
TOTAL			339.5	

SPECIFIC NOTES:
 (1) INCLUDES SIGN LIGHTING SYSTEM.
 (2) REMOVE FEED POINT IDENTIFICATION PLATE NUMBER.

REMOVE SIGN LIGHTING SYSTEM				0
SIGN NO	LOCATION	TYPE	NUMBER OF FIXTURES	
OH 194-306	BR.27812	BRIDGE MOUNTED	2	
OH 194-307	BR.27812	BRIDGE MOUNTED	3	
OH 194-312	BR.27819	BRIDGE MOUNTED	4	
OH 194-316	BR.27807	BRIDGE MOUNTED	6	
OH 194-318	BR.27806	BRIDGE MOUNTED	6	
OH 194-319	BR.27806	BRIDGE MOUNTED	3	

SAFETY CABLE				P
SIGN NO	LOCATION	DESIGN	LENGTH FEET	
OH 194-306	BR.27812	BR. MTD.	15	
OH 194-307	BR.27812	BR. MTD.	19	
OH 194-312	BR.27819	BR. MTD.	26	
OH 194-316	BR.27807	BR. MTD.	41	
OH 194-318	BR.27806	BR. MTD.	41	
OH 194-319	BR.27806	BR. MTD.	23.5	
TOTAL			165.5	

REFERENCE LOCATION SIGN (1)				Q	
CODE NO	QTY	SIZE		LEGEND	
		INCH	INCH		
D10-3	2	12	x 48	MILE 225	
D10-3	2	12	x 48	MILE 226	
D10-3	2	12	x 48	MILE 227	
D10-3	2	12	x 48	MILE 228	
TOTAL	8				

SPECIFIC NOTES:
 (1) PLACE ON 3 LB/FT POST (MNDOT 3401).
 GENERAL NOTE:
 1. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR REFERENCE LOCATION SIGN.

SIGN PANELS TYPE OVERLAY						R
CODE NO	QTY	SIZE		AREA		LEGEND
		INCH	INCH	SQ. FT.	SQ. FT.	
M1-5B	5	45	x 36	11.25	56.25	MINNESOTA 252
M1-1	9	45	x 36	11.25	101.25	INTERSTATE 694
M1-1	5	36	x 36	9.00	45.00	INTERSTATE 94
(1)	1	96	x 24	16.00	16.00	55 MPH
M1-6A	1	36	x 36	9.00	9.00	COUNTY 81
M1-1	1	24	x 24	4.00	4.00	INTERSTATE 694
M1-5B	1	24	x 24	4.00	4.00	MINNESOTA 252
TOTAL				235.50		

SPECIFIC NOTE:
 (1) SEE SHEET 35 FOR DETAILED DRAWING.
 GENERAL NOTE:
 1. SEE STANDARD SIGNS AND MARKINGS MANUAL FOR DETAILED DRAWINGS.

REMOVE SIGN TYPE OH					U
OH SIGN NO.	LOCATION	TYPE	POST TYPE	SPAN	REMARKS
OH 194-315	BR 27808	BR MTD		11'-6"	SEE SPECIAL PROVISIONS

STRUCT. STEEL TRUSSES TYPE OH BR. MTD (1)(2)			V
OH SIGN NO.	BRIDGE NO.	POUNDS	
194-585	27808	1190	
TOTAL		1190	(3)

SPECIFIC NOTES:
 (1) INCLUDES F. & I. OH SIGN IDENTIFICATION PLATE (X5-1).
 (2) SEE SHEET 47 FOR DETAILS.
 (3) QUANTITY SHOWN HERE IS FROM SAMPLE DETAIL FOR DEMONSTRATION PURPOSES. SEE NOTE ON DETAIL.

DELINEATOR				S
CODE NO	QUANTITY		TOTAL	
	COLOR			
	WHITE	YELLOW	15	20
X4-6				35

SPECIFIC NOTES:
 (1) PLACE ON 3LB/FT POST (MNDOT 3401).
 GENERAL NOTES:
 1. FOR DELINEATOR PLACEMENT, SEE SHEET 37.
 2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR DELINEATOR DESIGN.

OBJECT MARKER				T
CODE NO	SIZE INCH	COLOR	QUANTITY EACH	
X4-4(C)	12 x 24	BLACK ON YELLOW	5	
TOTAL QUANTITIES				
CODE NO	QUANTITY EACH			
X4-4	5			

SPECIFIC NOTES:
 (1) PLACE ON 3LB/FT POST (MNDOT 3401).
 GENERAL NOTES:
 1. FOR MARKER PLACEMENT, SEE SHEET NO. 37.
 2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR MARKER DESIGN.

TABULATIONS

STATE PROJ. NO. 2781-438 (TH 94) SHEET NO. 11 OF 55 SHEETS

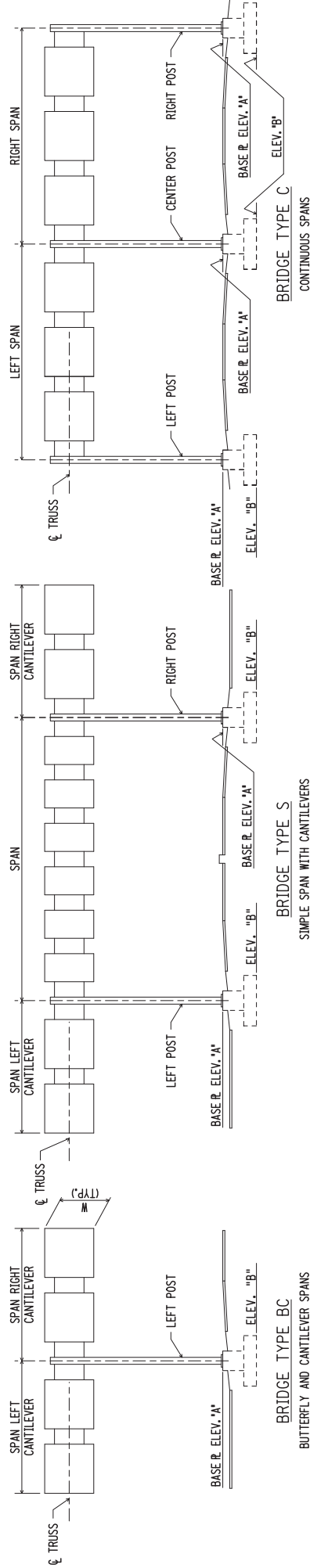
DATE 1/28/2016

LIC. NO.

CERTIFIED BY

CHECKED BY: RFK

DRAWN BY: LBJ



SALVAGE AND INSTALL OVERHEAD SIGN STRUCTURES

INPLACE SIGN NO	INPLACE STATION	NEW SIGN NO	NEW STATION	BRIDGE TYPE	TRUSS TYPE	SPAN LENGTHS			LOW STEEL ELEVATION (1)	LEFT POST		CENTER POST		RIGHT POST		M
						LEFT CANT	RIGHT CANT	SPAN OR LEFT SPAN		RIGHT SPAN	ELEVATION (1)	TYPE	ELEVATION (1)	TYPE	ELEVATION (1)	
OH 194-352	318+00 EB	OH 194-629	317+75 EB	BC	A	32'-6"		917.99	A	B	4E	A	B			

SALVAGE AND INSTALL OVERHEAD SIGN STRUCTURE QUANTITIES (2)

STRUCT. STEEL POSTS	OH 194-629	TOTALS
(3) LBS	(5) 781	781
STRUCT. STEEL TRUSSES		
STRUCT. STEEL WALKWAY SUPPORTS		
STRUCT. STEEL WALKWAY GRATING		
STRUCT. STEEL PANEL MFG. POSTS	296	296
CONCRETE FOOTINGS (SPREAD)		
CONCRETE FOOTINGS (SHAFT)	6.9	6.9

GENERAL NOTES:

1. THE SUBSCRIPTION E ON THE POST TYPE DENOTES THE POST WHICH HAS THE HAND HOLE AND PROVISIONS FOR GROUNDING, I.E. POST TYPE 3E.
2. TABULATED ELEVATIONS AND DIMENSIONS ARE APPROXIMATE ONLY. FABRICATION DEPENDENT ON THESE ELEVATIONS AND DIMENSIONS SHALL NOT BE STARTED UNTIL THE ENGINEER HAS MADE FINAL DETERMINATION OF THEM IN THE FIELD.
3. LEFT AND RIGHT DESIGNATIONS ARE SHOWN LOOKING IN DIRECTION OF TRAFFIC FLOW. WHEN TWO DIRECTIONS OF TRAFFIC ARE SPANNED THE DESIGNATIONS ARE SHOWN LOOKING UP STATIONING.
4. SEE SHEETS 48-54 FOR DETAILS.
5. SEE SHEET 55 FOR CROSS SECTION.

- SPECIFIC NOTES:**
- (1) CENTER LINE ELEVATION IS FIELD ELEVATION.
 - (2) BASED ON TABULATED ELEVATIONS AND DIMENSIONS. REVISE IF NECESSARY USING QUANTITY TABLES ON ST-2.
 - (3) INCLUDES F. & I. OH SIGN IDENTIFICATION PLATE (X5-1), SEE SHEET 42 FOR MOUNTING DETAIL.
 - (4) DRILLED SHAFT FOOTING.
 - (5) ANCHORAGE ASSEMBLY.

GENERAL NOTES:

- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO UTILIZE THE GOPHER ONE CALL EXCAVATION NOTICE SYSTEM , REQUIRED BY MINNESOTA STATUTE 216D, FOR ALL UTILITY LOCATIONS.
- 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

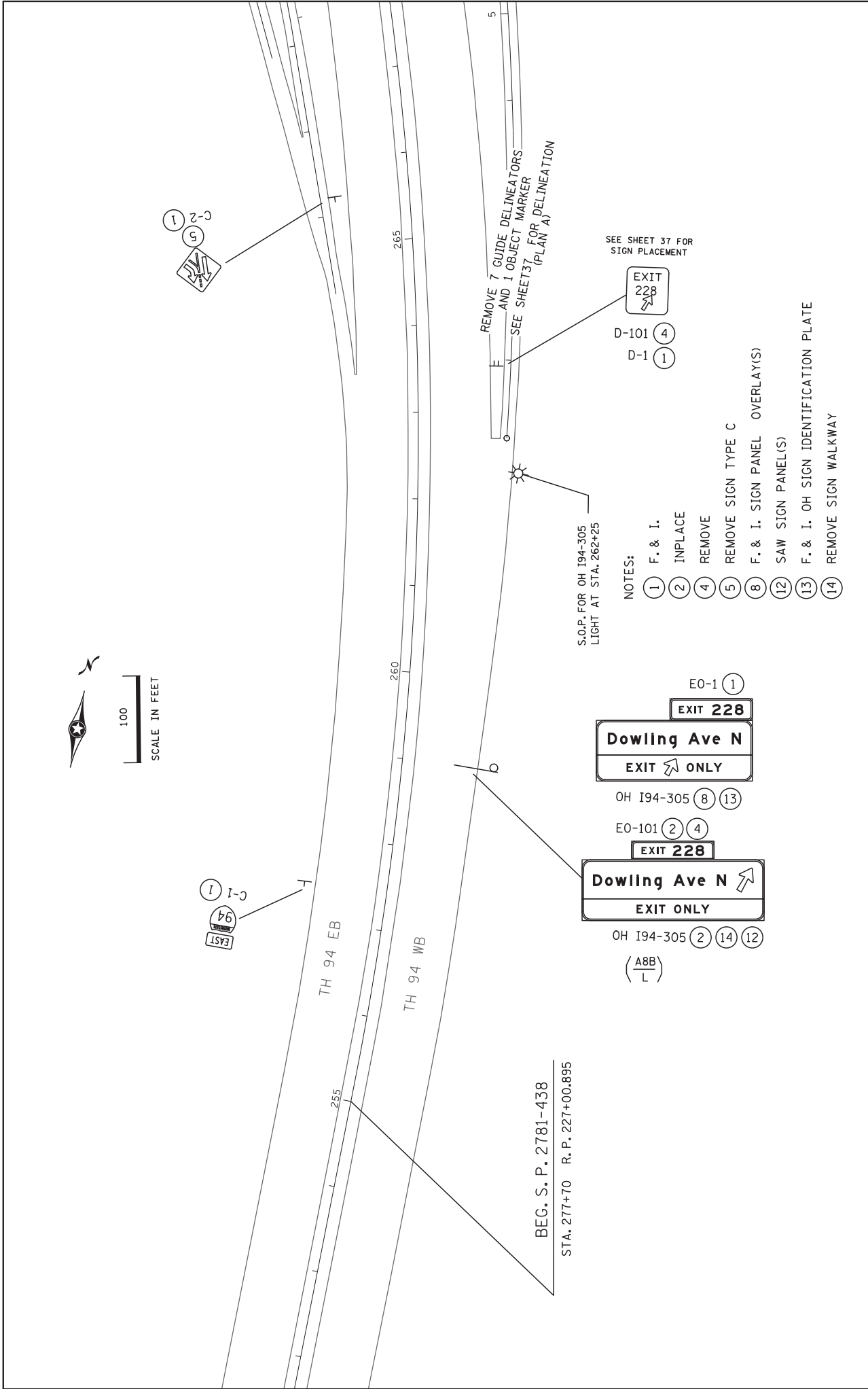
UTILITIES

THE FOLLOWING LIST SHOWS THE UTILITY COMPANIES WITHIN THE PROJECT LIMITS

- | | | |
|---------------------------------------|---|---|
| 1. ACCESS COMMUNICATIONS, INC. | 13. METRO TRANSIT RAIL | 25. MINNEAPOLIS PARK & RECREATION BOARD |
| 2. ARVIG COMMUNICATIONS SYSTEMS | 14. NUSTAR ENERGY, LP | 26. NORTH CENTRAL UNIVERSITY |
| 3. AT&T CORP. | 15. CENTURYLINK | 27. TDS METROCOM |
| 4. AT&T LOCAL SCVS | 16. MCI | 28. TTM OPERATING CORP |
| 5. AUGSBURG COLLEGE | 17. WINDSTREAM COMMUNICATIONS | 29. TW TELECOM, INC. |
| 6. CITY OF BROOKLYN CENTER | 18. MIDWEST NETWORKS DEVELOPMENT, LLC | 30. UNIVERSITY OF MINNESOTA |
| 7. CITY OF MINNEAPOLIS | 19. METRO TRANSIT | 31. US INTERNET CORP. |
| 8. ROGERS COMMUNICATIONS | 20. MINNEAPOLIS ENERGY CENTER | 32. SPRINT COMMUNICATIONS COMPANY, L.P. |
| 9. COMCAST CABLE COMMUNICATIONS, INC. | 21. METROPOLITAN COUNCIL, ENVIRONMENTAL SERVICE | 33. LEVEL 3 COMMUNICATIONS, LLC |
| 10. ENVENTIS TELECOM INC. | 22. CENTERPOINT ENERGY, MINNESOTA GAS | 34. XCEL ENERGY |
| 11. FAIRVIEW HEALTH SERVICES | 23. MINNESOTA COMMERCIAL RAILWAY | 35. XO COMMUNICATIONS INC. |
| 12. HENNEPIN COUNTY PUBLIC WORKS | 24. MNDOT | 36. ZAYO BANDWIDTH |

THE FOLLOWING UTILITIES ARE SHOWN ON THE ROADWAY LAYOUTS.

— 0 ——— 0 ——— 0 ——— NSP GAS
 - - - - - XCEL TRANSMISSION LINES



DRAWN BY: LBJ	CHECKED BY: RFK	CERTIFIED BY: _____	LIC. NO. _____	DATE: 1/28/2016	STATE PROJ. NO. 2781-438 (TH 94)	SHEET NO. 14	OF 55 SHEETS
---------------	-----------------	---------------------	----------------	-----------------	----------------------------------	--------------	--------------

ROADWAY LAYOUTS

DOWNTOWN EXITS
 1/4 4th-7th Sts
 2 3/4 Lyndale Ave

OH 194-307 (2) (18) (19) (8) (13)
 (A8B)
 (P)



SHOULDER
AUTHORIZED
BUSES
ONLY

C-4 (1) (5)

SHOULDER
AUTHORIZED
BUSES
ONLY

(1) (4)

S.O.P. FOR OH 194-307
 MOUNTED LIGHT AT STA. 277+80

SHOULDER
AUTHORIZED
BUSES
ONLY

(4) (1)

S.O.P. FOR OH 194-306
 PULL BOX AT STA. 277+30

NOTES:

- (1) F. & I.
- (2) INPLACE
- (4) REMOVE
- (5) REMOVE SIGN TYPE C
- (8) F. & I. SIGN PANEL OVERLAY(S)
- (13) F. & I. OH SIGN IDENTIFICATION PLATE
- (18) REMOVE SIGN LIGHTING SYSTEM
- (19) F. & I. SAFETY CABLE

BEGIN
SHOULDER
AUTHORIZED
BUSES
ONLY

C-3 (1) (5)

EXIT 226
49th Ave N
53rd Ave N
 1 MILE

OH 194-306 (8) (13)

EXIT 226
49th Ave N
53rd Ave N
 1 MILE

OH 194-306 (2) (18) (19)

(A8B)
 (N)

ROADWAY LAYOUTS

STATE PROJ. NO. 2781-438 (TH 94) SHEET NO. 15 OF 55 SHEETS

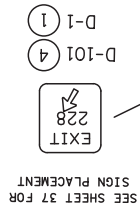
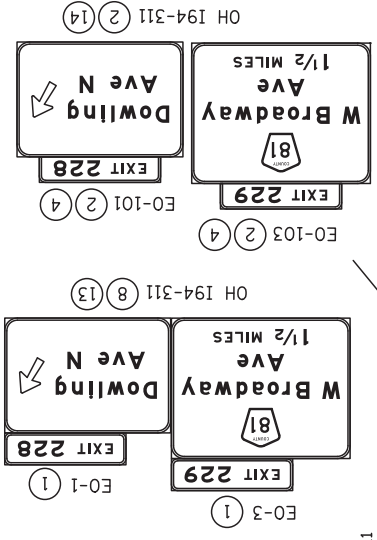
DATE 1/28/2016

LIC. NO.

CERTIFIED BY

CHECKED BY: RFK

DRAWN BY: LBJ



S.O.P FOR OH 194-311
LIGHT AT STA. 290+00 MAINLINE

REMOVE 7 GUIDE DELINEATORS,
AND 1 OBJECT MARKER
SEE SHEET 37 FOR DELINEATION
(PLAN A)

TH 94 EB

TH 94 WB

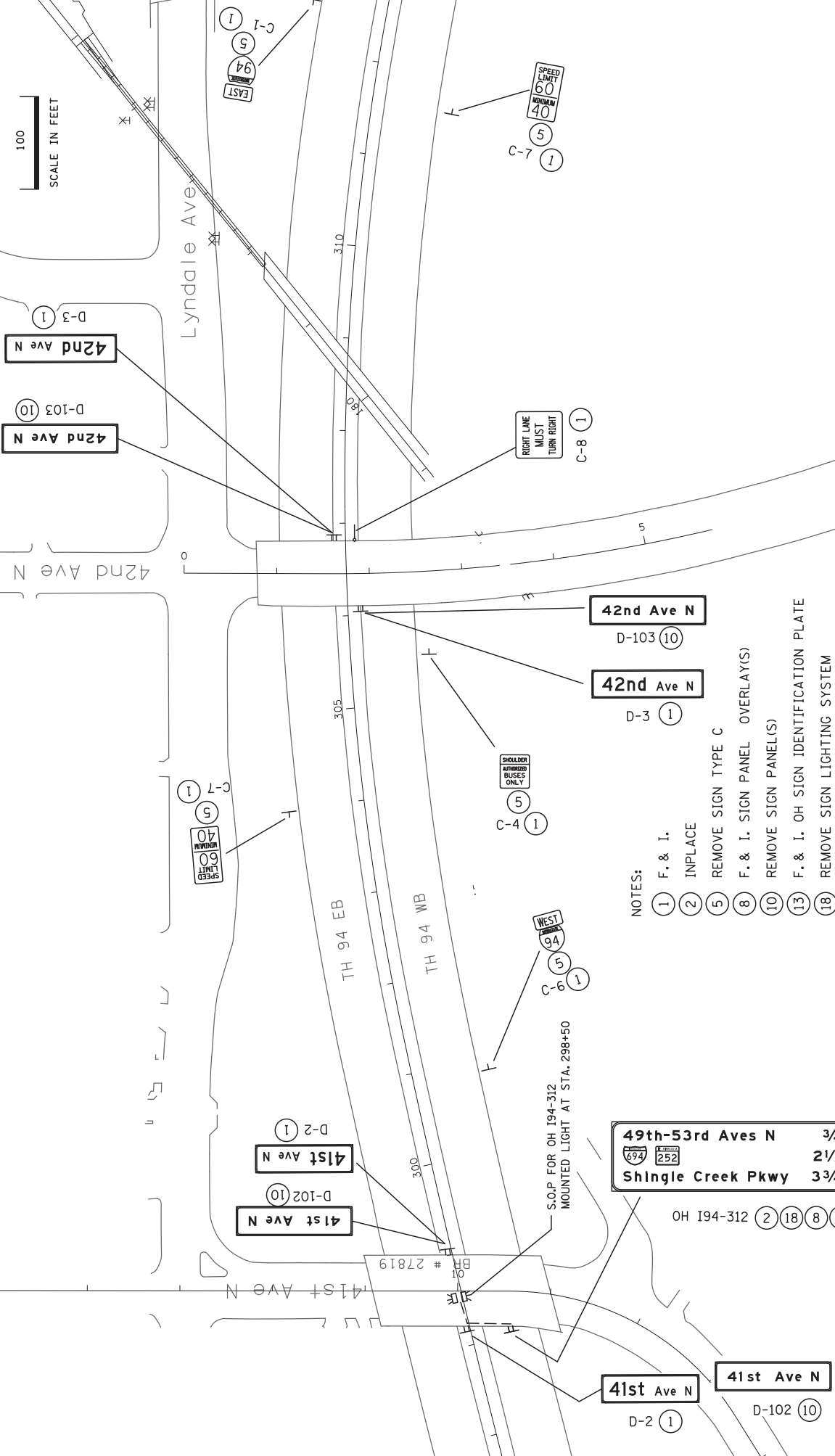
SEE SHEET 36 FOR
SIGN PLACEMENT



NOTES:

- 1 F. & I.
- 2 INPLACE
- 4 REMOVE
- 5 REMOVE SIGN TYPE C
- 8 F. & I. SIGN PANEL OVERLAY(S)
- 13 F. & I. OH SIGN IDENTIFICATION PLATE
- 14 REMOVE SIGN WALKWAY

ROADWAY LAYOUTS



- NOTES:
- 1 F. & I.
 - 2 INPLACE
 - 5 REMOVE SIGN TYPE C
 - 8 F. & I. SIGN PANEL OVERLAY(S)
 - 10 REMOVE SIGN PANEL(S)
 - 13 F. & I. OH SIGN IDENTIFICATION PLATE
 - 18 REMOVE SIGN LIGHTING SYSTEM
 - 19 F. & I. SAFETY CABLE

49th-53rd Aves N	3/4
694 252	2 1/2
Shingle Creek Pkwy	3 3/4

OH I94-312 2 18 8 13 19

S.O.P FOR OH I94-312 MOUNTED LIGHT AT STA. 298+50



100
SCALE IN FEET

1 4
7 2 2 7

4 1
2 2 7

SHOULDER
MARKING
ONLY
5
C-4
1

OH 194-352 (2) (14) (15)
Dowling Ave N 1/2
W Broadway Ave 2
4th-7th Sts N 2 1/4

OH 194-629 (16) (17) (13)
Dowling Ave N 1/2
W Broadway Ave 2
4th-7th Sts N 2 1/4

SHOW GUARDRAIL AND
UTILITIES AS REQUIRED

TH 94 EB

TH 94 WB

NOTES:

- 1 F. & I.
- 2 INPLACE
- 4 REMOVE
- 5 REMOVE SIGN TYPE C
- 13 F. & I. OH SIGN IDENTIFICATION PLATE
- 14 REMOVE SIGN WALKWAY
- 15 SALVAGE OH SIGN STRUCTURE
- 16 INSTALL OH SIGN STRUCTURE
- 17 F. & I. SIGN PANEL AND PANEL MOUNTING POSTS

ROADWAY LAYOUTS

STATE PROJ. NO. 2781-438 (TH 94) SHEET NO. 18 OF 55 SHEETS

DATE 1/28/2016

LIC. NO.

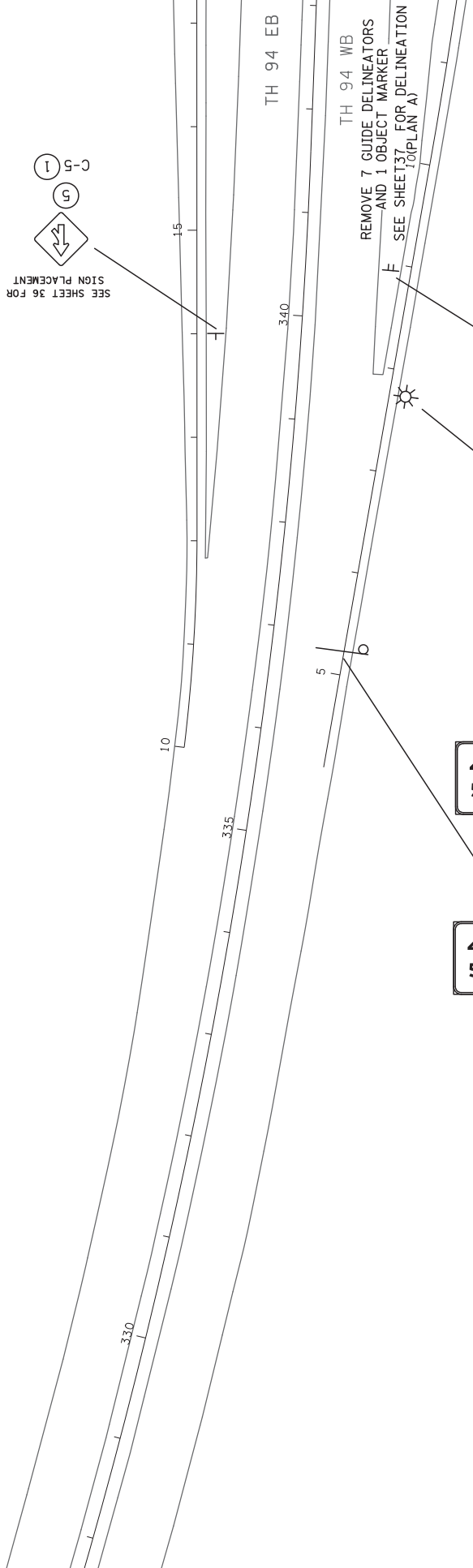
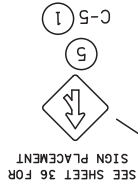
CERTIFIED BY

CHECKED BY: RFK

DRAWN BY: LBJ

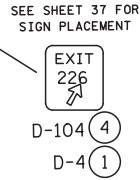
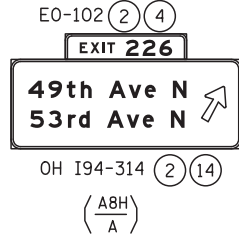


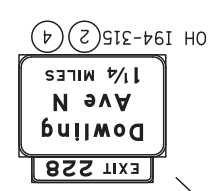
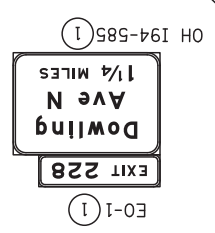
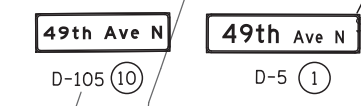
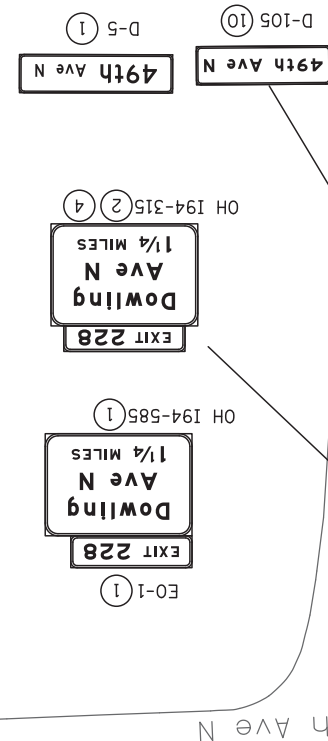
100
SCALE IN FEET



NOTES:

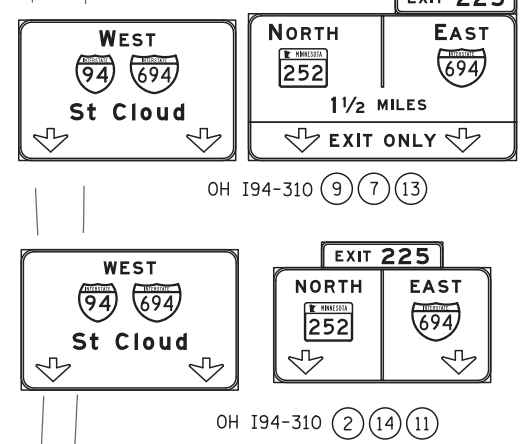
- ① F. & I.
- ② INPLACE
- ④ REMOVE
- ⑤ REMOVE SIGN TYPE C
- ⑧ F. & I. SIGN PANEL OVERLAY(S)
- ⑬ F. & I. OH SIGN IDENTIFICATION PLATE
- ⑭ REMOVE SIGN WALKWAY





S.O.P FOR OH 194-315 MOUNTED LIGHT AT STA. 352+50

S.O.P FOR OH 194-310 PULL BOX AT STA. 352+00



- NOTES:
- 1 F. & I.
 - 2 INPLACE
 - 4 REMOVE
 - 7 F. & I. RIGHT SIGN PANEL AND PANEL MOUNTING POSTS
 - 8 F. & I. SIGN PANEL OVERLAY(S)
 - 9 F. & I. SIGN PANEL OVERLAY LEFT PANEL
 - 10 REMOVE SIGN PANEL(S)
 - 11 REMOVE RIGHT SIGN PANEL
 - 13 F. & I. OH SIGN IDENTIFICATION PLATE
 - 14 REMOVE SIGN WALKWAY



100
SCALE IN FEET

TH 94 EB

TH 94 WB

360

365

370

F



②

NOTE:

② INPLACE

ROADWAY LAYOUTS

STATE PROJ. NO. 2781-438 (TH 94) SHEET NO. 21 OF 55 SHEETS

DATE 1/28/2016

LIC. NO.

LICENSED PROFESSIONAL ENGINEER

CERTIFIED BY

CHECKED BY: RFK

DRAWN BY: LBJ



100
SCALE IN FEET

ROADWAY LAYOUTS

STATE PROJ. NO. 2781-438 (TH 94) SHEET NO. 22 OF 55 SHEETS

DATE 1/28/2016

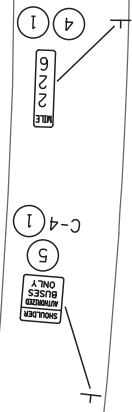
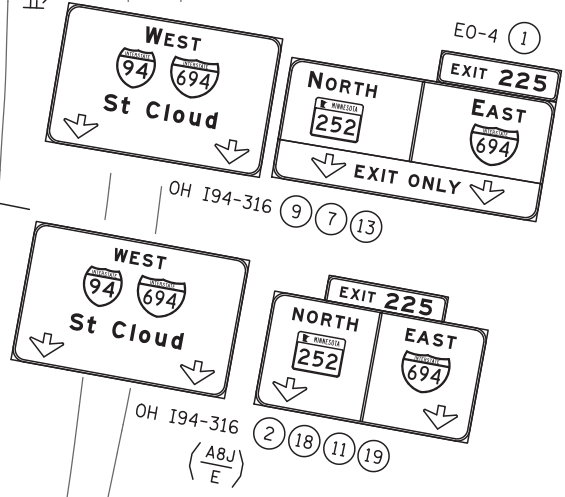
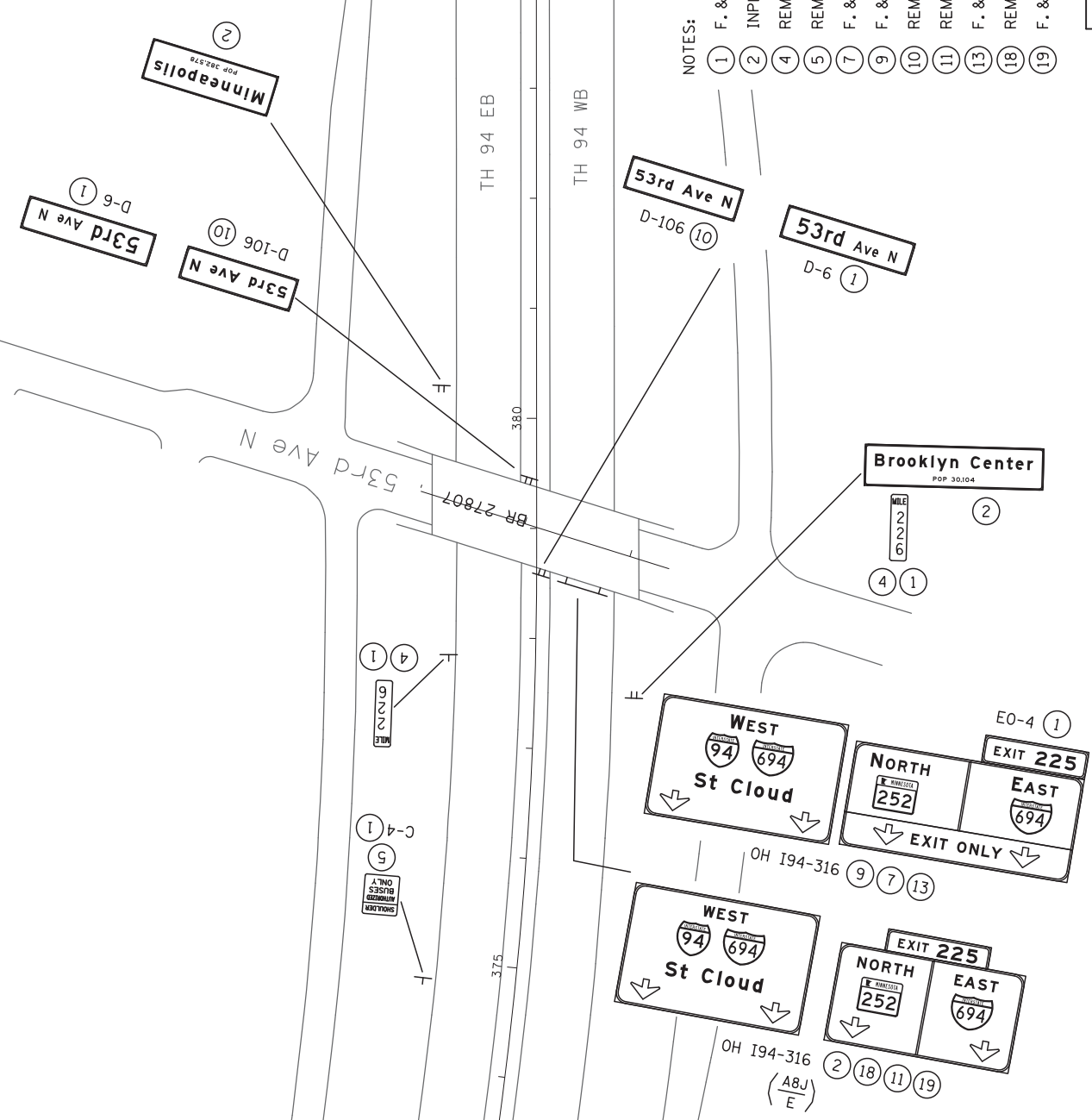
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CERTIFIED BY

CHECKED BY: RFK

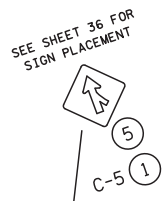
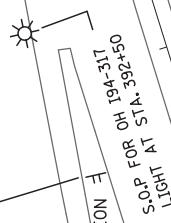
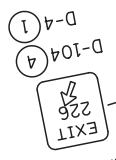
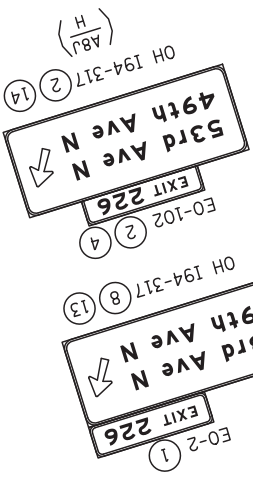
DRAWN BY: LBJ

- NOTES:
- 1 F. & I.
 - 2 INPLACE
 - 4 REMOVE
 - 5 REMOVE SIGN TYPE C
 - 7 F. & I. RIGHT SIGN PANEL AND PANEL MOUNTING POSTS
 - 9 F. & I. SIGN PANEL OVERLAY LEFT PANEL
 - 10 REMOVE SIGN PANEL(S)
 - 11 REMOVE RIGHT SIGN PANEL
 - 13 F. & I. OH SIGN IDENTIFICATION PLATE
 - 18 REMOVE SIGN LIGHTING SYSTEM
 - 19 F. & I. SAFETY CABLE



PLOTTED/REVISED: 1/28/2016

DISTRICT: METRO
PLOT NAME: URBAN FREEWAY PLAN-2014.psl9
PATH & FILENAME: IP-PWP/PT/21848/URBAN FREEWAY PLAN-2014.psl19n

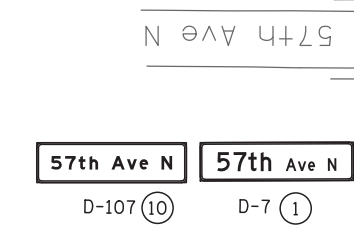
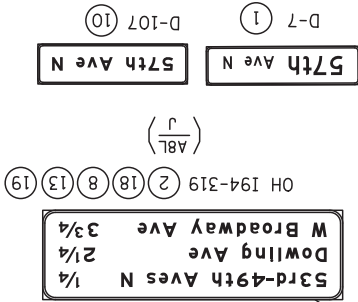


TH 94 EB
400
TH 94 WB

- NOTES:
- ① F. & I.
 - ② INPLACE
 - ④ REMOVE
 - ⑤ REMOVE SIGN TYPE C
 - ⑧ F. & I. SIGN PANEL OVERLAY(S)
 - ⑬ F. & I. OH SIGN IDENTIFICATION PLATE
 - ⑭ REMOVE SIGN WALKWAY

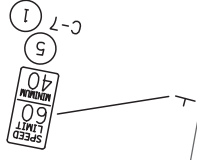


100
SCALE IN FEET



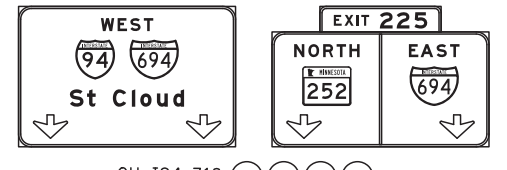
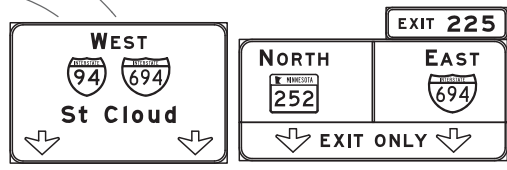
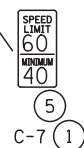
S.O.P FOR OH 194-318
PULL BOX AT STA. 406+70

S.O.P FOR OH 194-319
MOUNTED LIGHT AT STA. 407+30

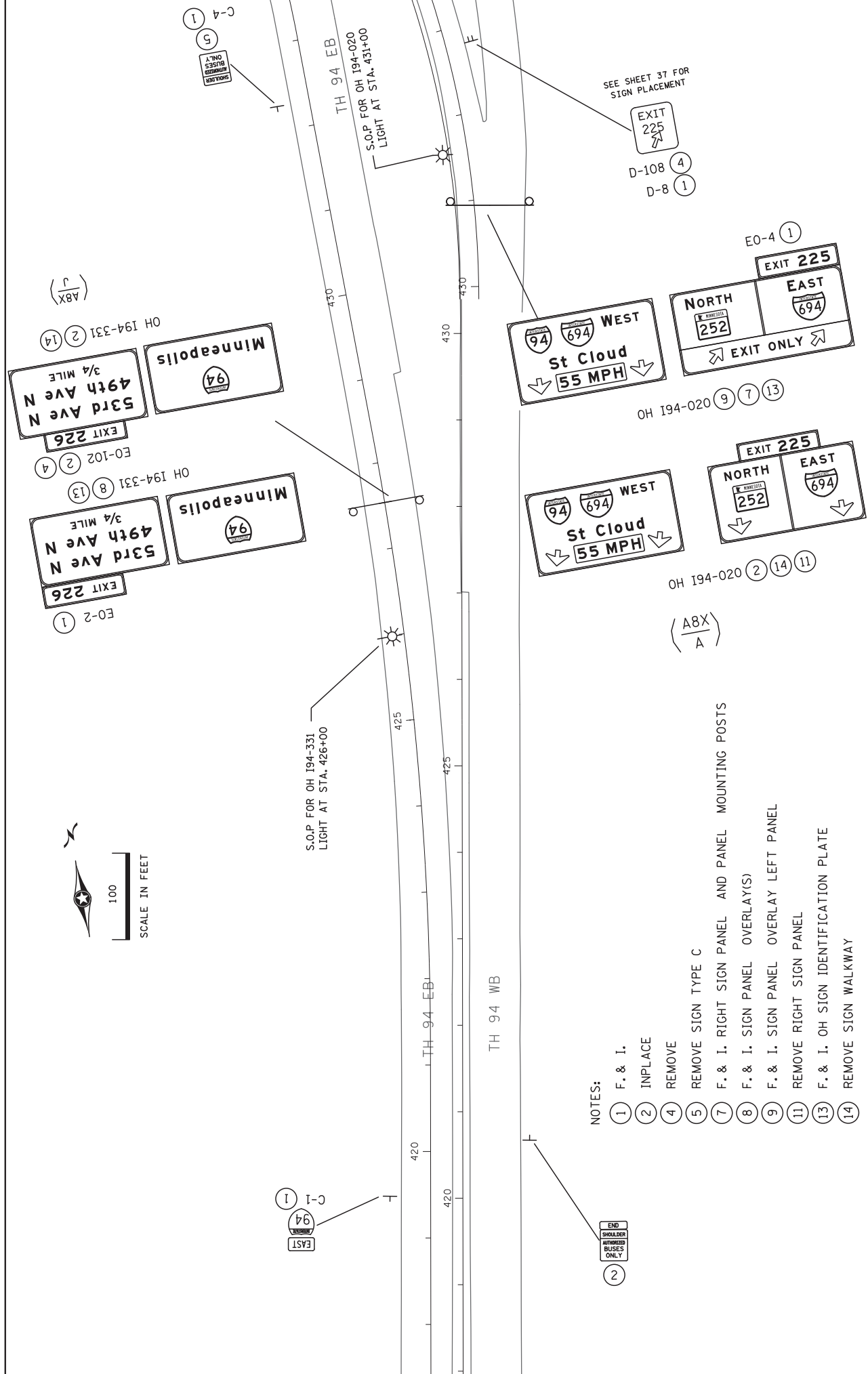


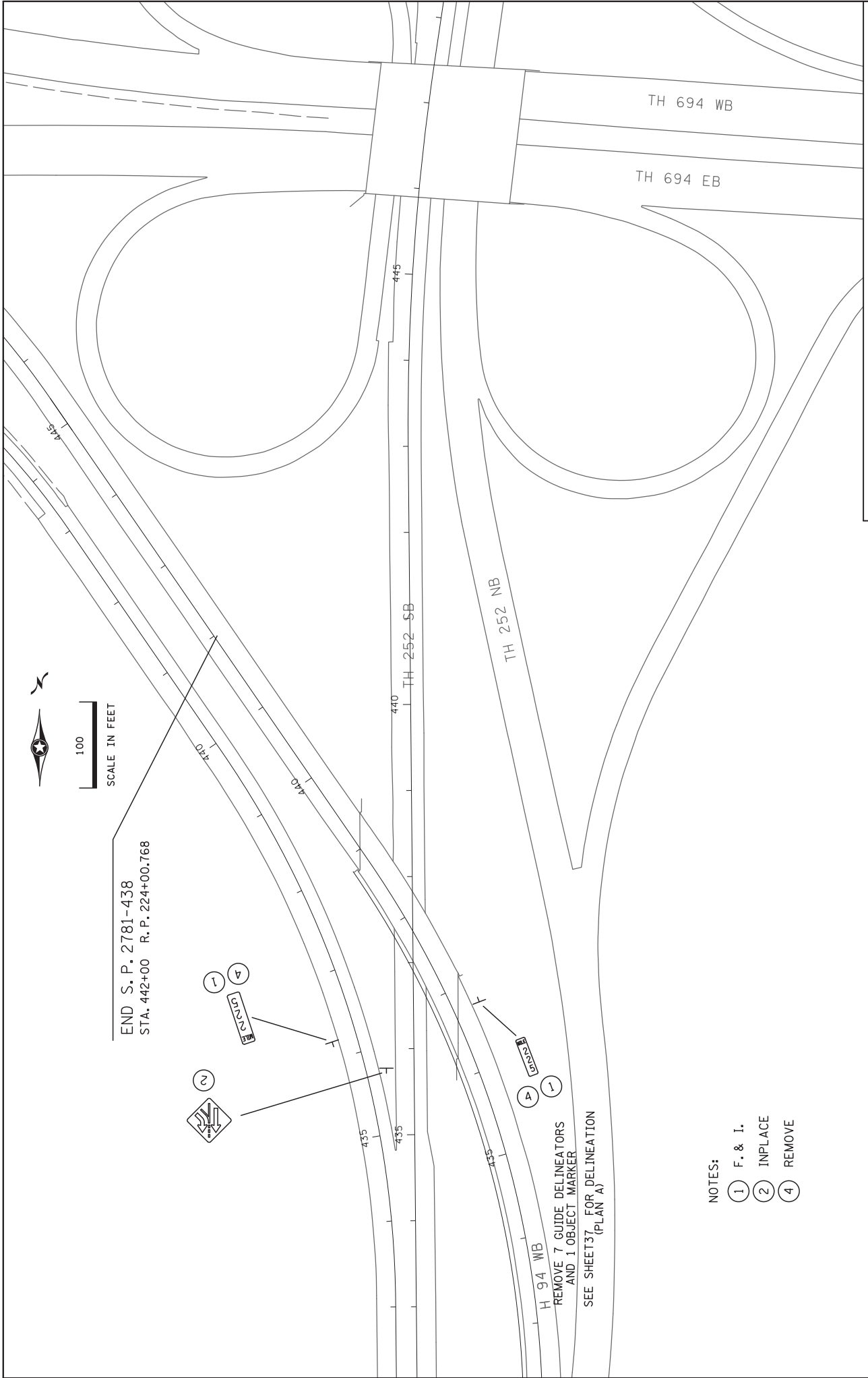
TH 94 EB
TH 94 WB

- NOTES:
- 1 F. & I.
 - 2 INPLACE
 - 5 REMOVE SIGN TYPE C
 - 7 F. & I. RIGHT SIGN PANEL AND PANEL MOUNTING POSTS
 - 8 F. & I. SIGN PANEL OVERLAY(S)
 - 9 F. & I. SIGN PANEL OVERLAY LEFT PANEL
 - 10 REMOVE SIGN PANEL(S)
 - 11 REMOVE RIGHT SIGN PANEL
 - 13 F. & I. OH SIGN IDENTIFICATION PLATE
 - 18 REMOVE SIGN LIGHTING SYSTEM
 - 19 F. & I. SAFETY CABLE



ROADWAY LAYOUTS



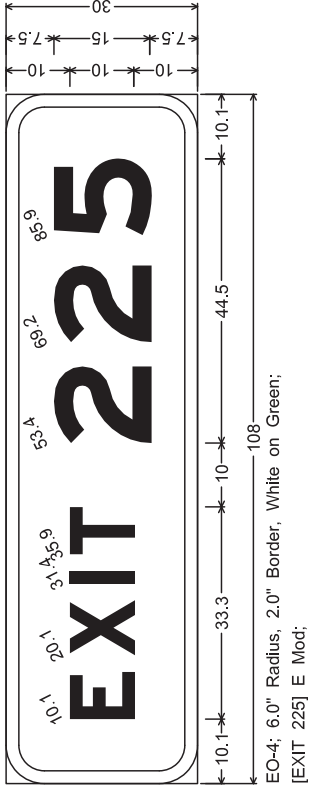
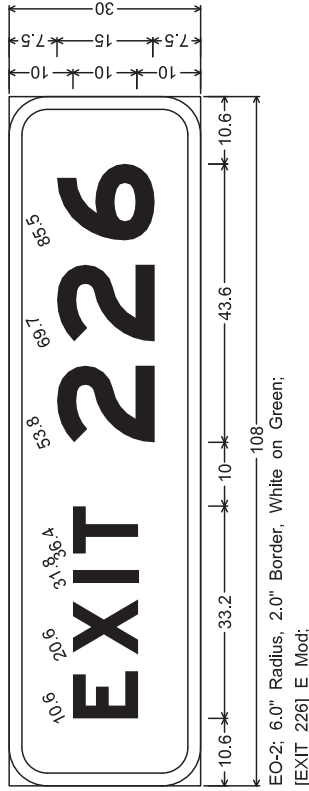
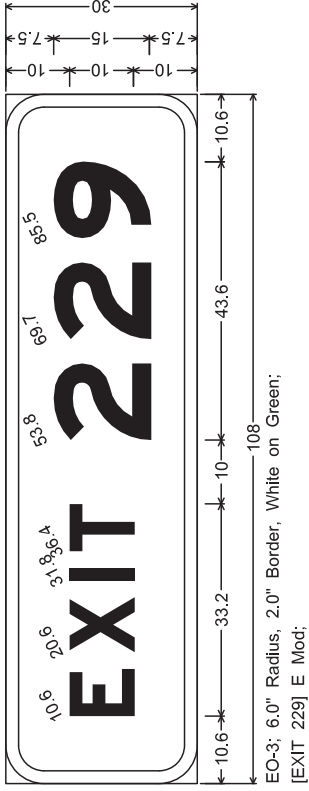
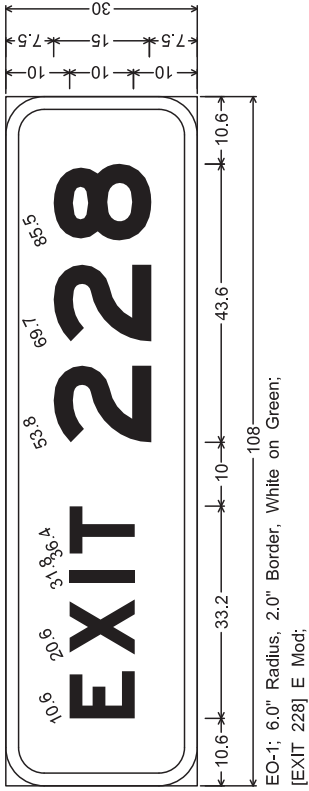


END S. P. 2781-438
 STA. 442+00 R. P. 224+00.768



H 94 WB
 REMOVE 7 GUIDE DELINEATORS
 AND 1 OBJECT MARKER
 SEE SHEET 37 FOR DELINEATION
 (PLAN A)

- NOTES:
- ① F. & I.
 - ② INPLACE
 - ④ REMOVE



- NOTES:
 1. CORNERS OF THE SIGN PANEL EXTENDING BEYOND THE BORDER SHALL NOT BE TRIMMED.
 2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAIL.

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY: _____

LIC. NO. _____

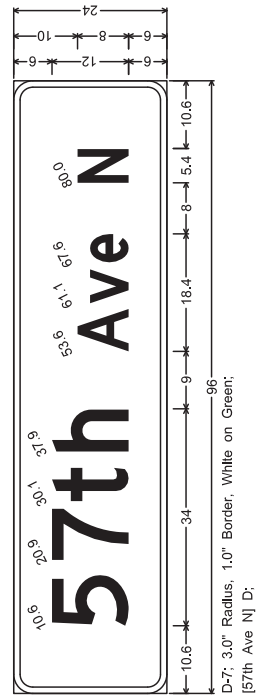
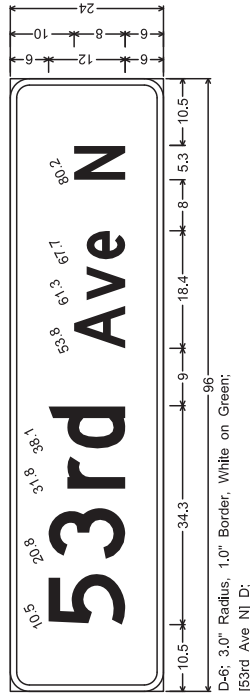
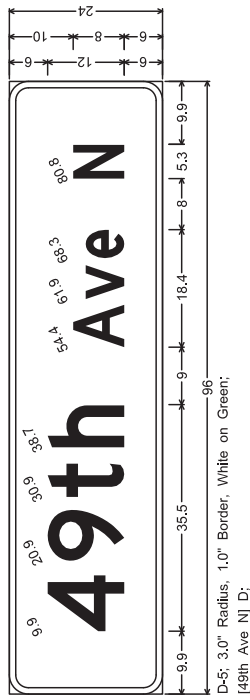
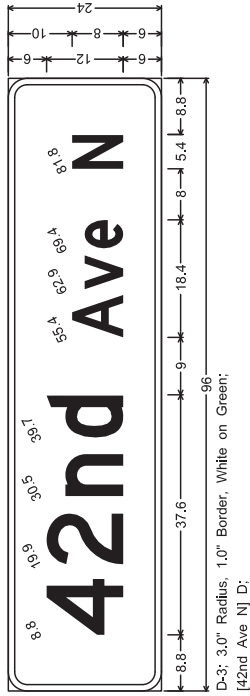
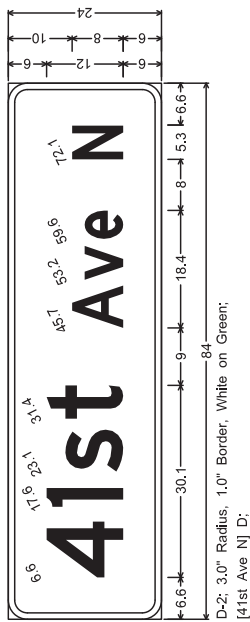
DATE: 1/28/2016

STATE PROJ. NO. 2781-438 (TH 94)

SHEET NO. 28

TYPE EO SIGN PANELS

OF 55 SHEETS



NOTES:

1. CORNERS OF THE SIGN PANEL EXTENDING BEYOND THE BORDER SHALL NOT BE TRIMMED.
2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAIL.

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY: _____ LIC. NO. _____

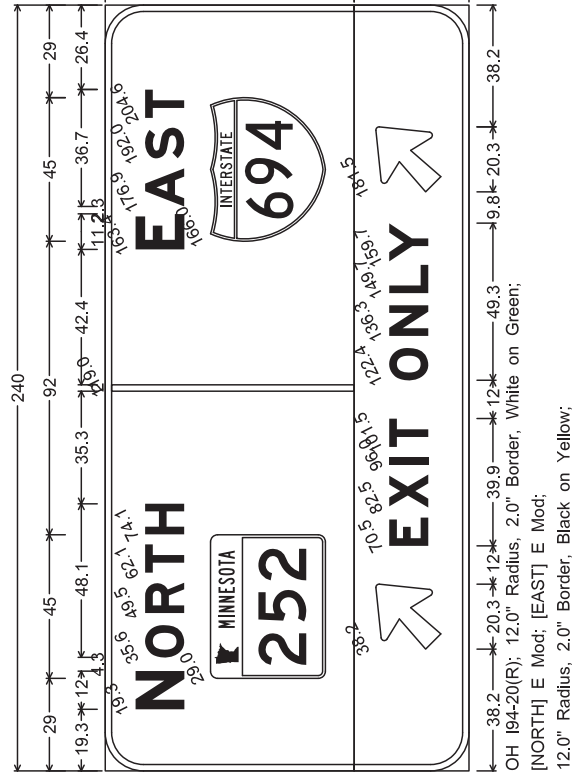
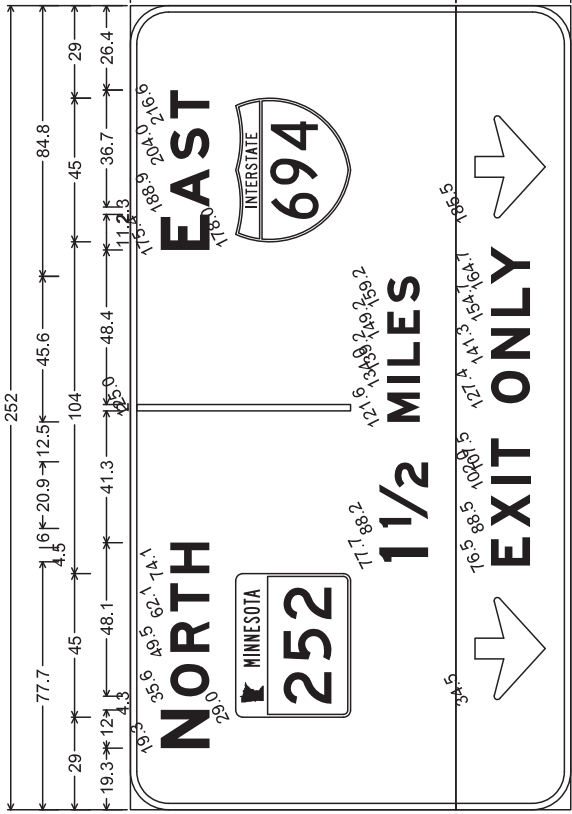
DATE: 1/28/2016

STATE PROJ. NO. 2781-438 (TH 94)

SHEET NO. 27

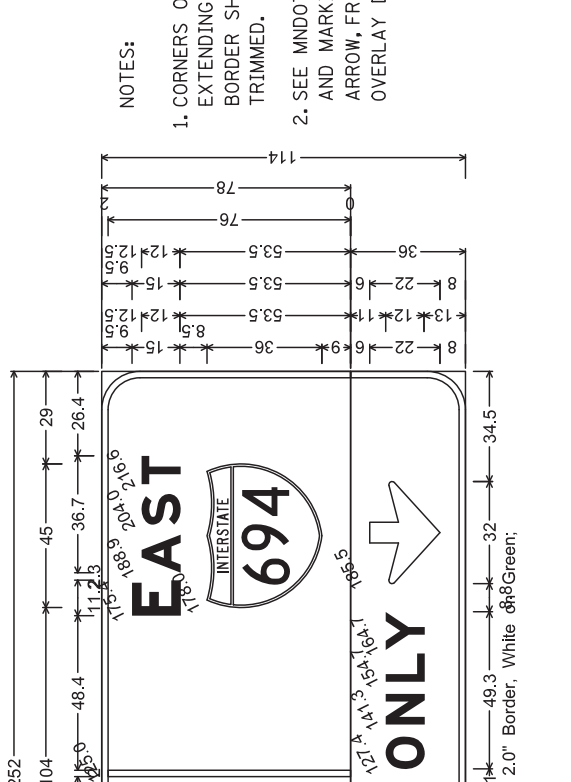
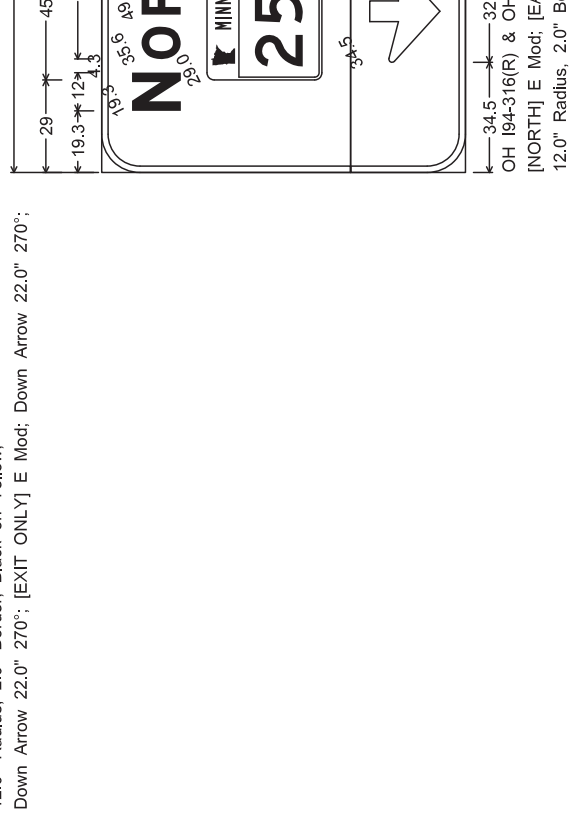
OF 55 SHEETS

TYPE D SIGN PANELS



OH 194-310(R); 12.0" Radius, 2.0" Border, White on Green;
 [NORTH] E Mod; [EAST] E Mod;
 12.0" Radius, 2.0" Border, Black on Yellow;
 Down Arrow 22.0" 270°; [EXIT ONLY] E Mod; Down Arrow 22.0" 270°;

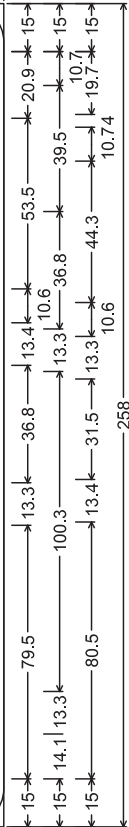
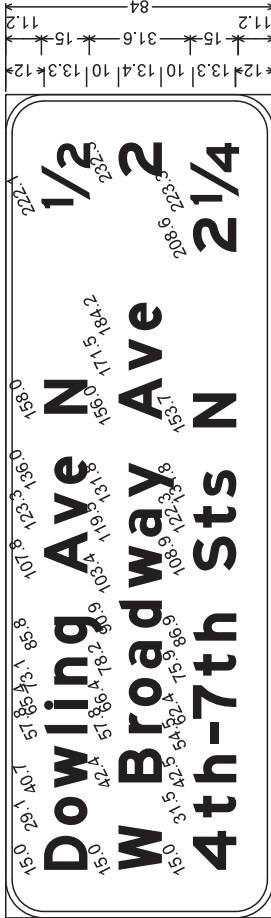
OH 194-20(R); 12.0" Radius, 2.0" Border, White on Green;
 [NORTH] E Mod; [EAST] E Mod;
 12.0" Radius, 2.0" Border, Black on Yellow;
 Arrow 8 - 25.0" 45°; [EXIT ONLY] E Mod; Arrow 8 - 25.0" 45°;



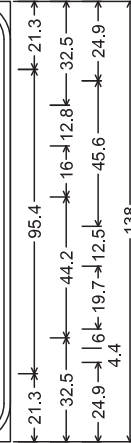
OH 194-316(R) & OH 94-318(R); 12.0" Radius, 2.0" Border, White on Green;
 [NORTH] E Mod; [EAST] E Mod;
 12.0" Radius, 2.0" Border, Black on Yellow;
 Down Arrow 22.0" 270°; [EXIT ONLY] E Mod; Down Arrow 22.0" 270°;

OH 194-20(R); 12.0" Radius, 2.0" Border, White on Green;
 [NORTH] E Mod; [EAST] E Mod;
 12.0" Radius, 2.0" Border, Black on Yellow;
 Arrow 8 - 25.0" 45°; [EXIT ONLY] E Mod; Arrow 8 - 25.0" 45°;

- NOTES:
- CORNERS OF THE SIGN PANEL EXTENDING BEYOND THE BORDER SHALL NOT BE TRIMMED.
 - SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAIL.



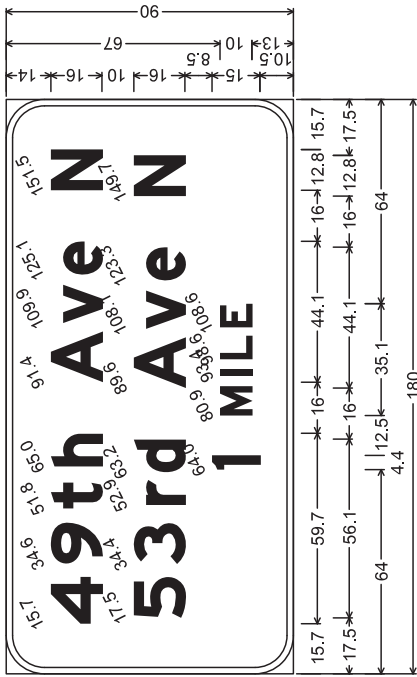
OH 194-629; 12.0" Radius, 2.0" Border, White on Green;
 [Dowling Ave N] E Mod; [1/2] E Mod; [W Broadway Ave] E Mod; [2] E Mod;
 [4th-7th Sts N] E Mod; [2 1/4] E Mod;



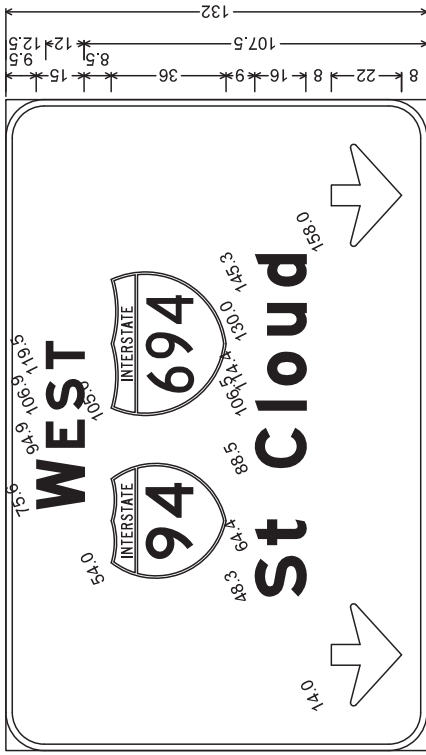
OH 194-585;
 12.0" Radius, 2.0" Border, White on Green;
 [Dowling] E Mod; [Ave N] E Mod;
 [1 1/4 MILES] E Mod;

NOTES:
 1. CORNERS OF THE SIGN PANEL EXTENDING BEYOND THE BORDER SHALL NOT BE TRIMMED.
 2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAIL.

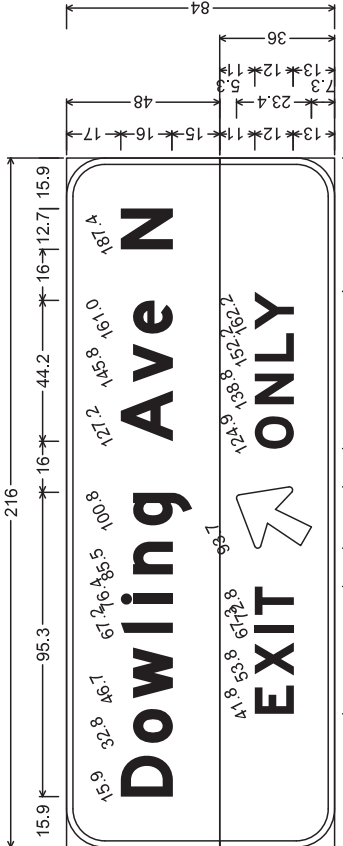
DRAWN BY: LBJ	CHECKED BY: RFK	LIC. NO. _____	DATE: 1/28/2016	TYPE OH SIGN PANELS
			STATE PROJ. NO. 2781-438 (TH 94)	SHEET NO. 30
				OF 55 SHEETS



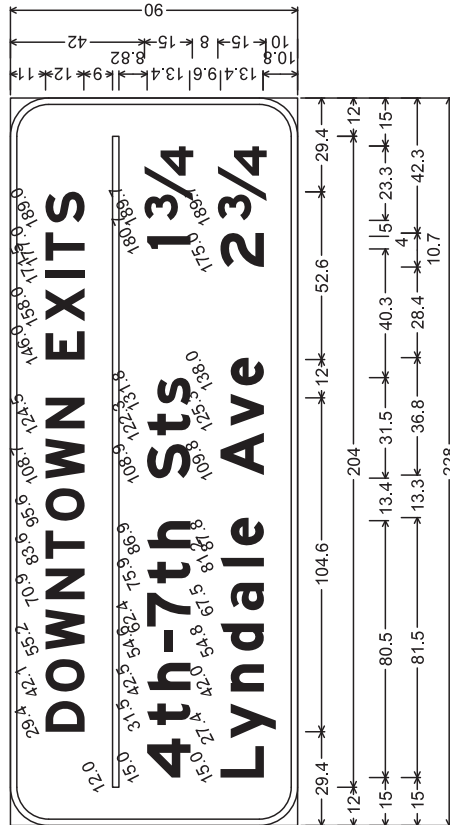
OH 194-306; 12.0" Radius, 2.0" Border, White on Green;
 [49th Ave N] E Mod; [53rd Ave N] E Mod; [1 MILE] E Mod;



OH 194-310(L); OH 94-316(L) & OH 94-318(L);
 12.0" Radius, 2.0" Border, White on Green;
 [WEST] E Mod; [St Cloud] E Mod; Down Arrow 22.0" 270";
 Down Arrow 22.0" 270";



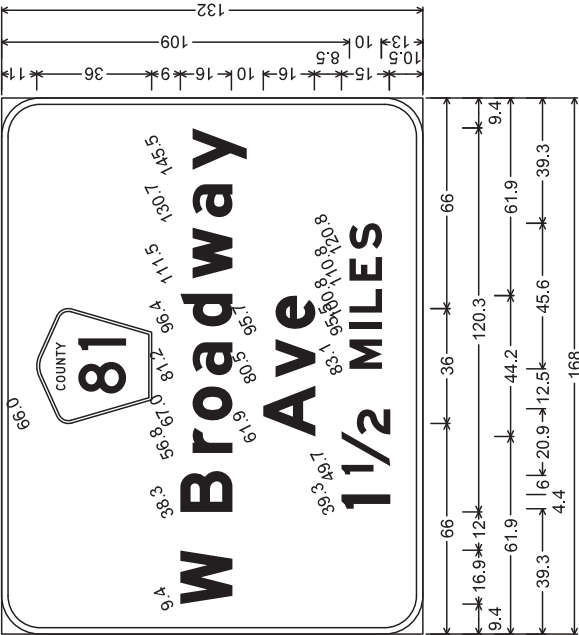
OH 194-305;
 12.0" Radius, 2.0" Border, White on Green;
 [Dowling Ave N] E Mod;
 12.0" Radius, 2.0" Border, Black on Yellow;
 [EXIT] E Mod; Arrow 8 - 25.0" 60"; [ONLY] E Mod;



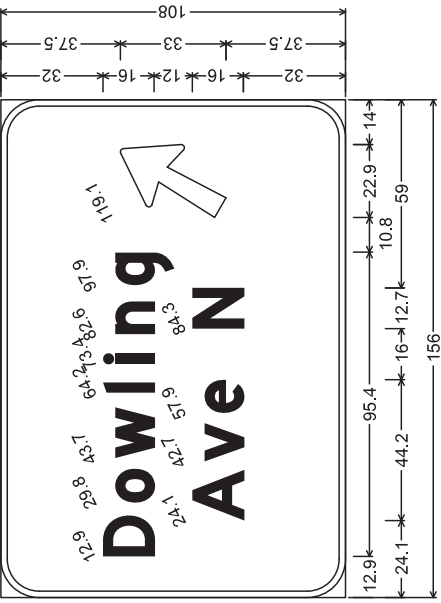
OH 194-307; 12.0" Radius, 2.0" Border, White on Green;
 [DOWNTOWN EXITS] E Mod; [4th-7th Sts] E Mod; [1 3/4] E Mod;
 [Lyndale Ave] E Mod; [2 3/4] E Mod;

NOTES:
 1. CORNERS OF THE SIGN PANEL EXTENDING BEYOND THE BORDER SHALL NOT BE TRIMMED.
 2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAIL.

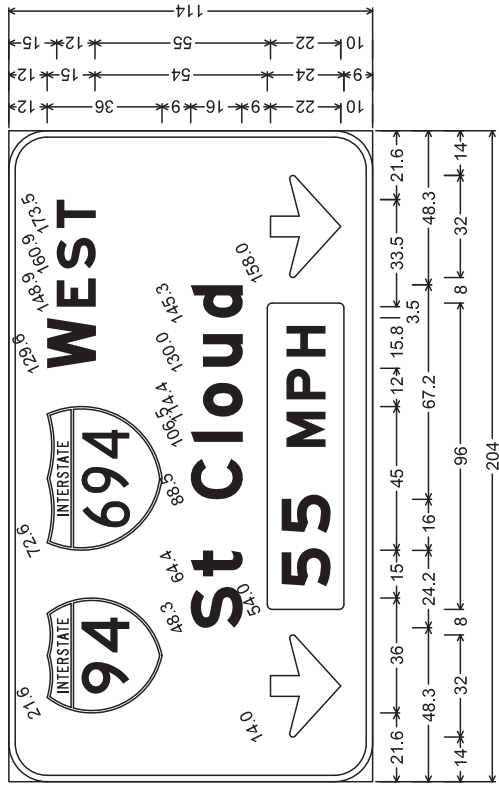
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TYPE OH SIGN PANEL OVERLAYS							



OH 194-311(L); 12.0" Radius, 2.0" Border, White on Green;
 [W Broadway] E Mod; [Ave] E Mod; [1 1/2 MILES] E Mod;



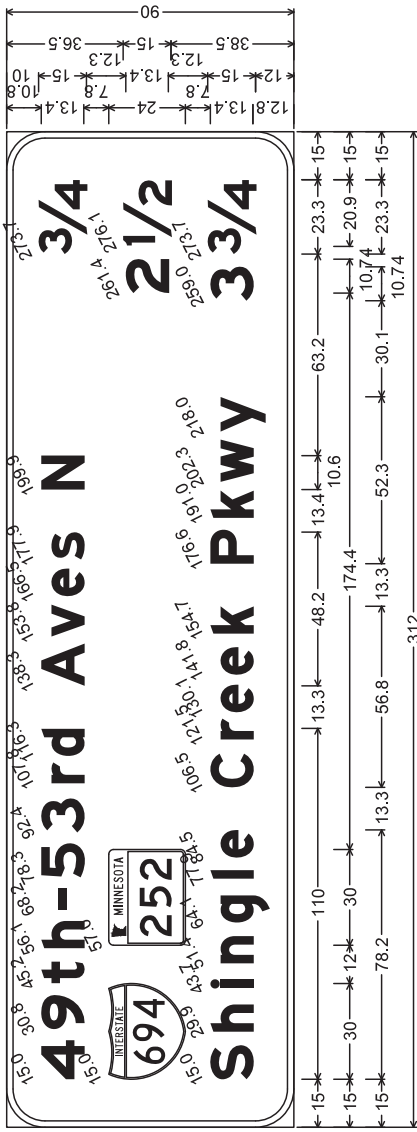
OH 194-311(R);
 12.0" Radius, 2.0" Border, White on Green;
 [Dowling] E Mod; [Ave N] E Mod; Arrow 17 - 36.0" 60°;



OH 194-20(L); 12.0" Radius, 2.0" Border, White on Green;
 [WEST] E Mod; [St Cloud] E Mod; Down Arrow 22.0" 270°;
 Rounded Rectangle 1.5" Radius Yellow;
 Down Arrow 22.0" 270°;

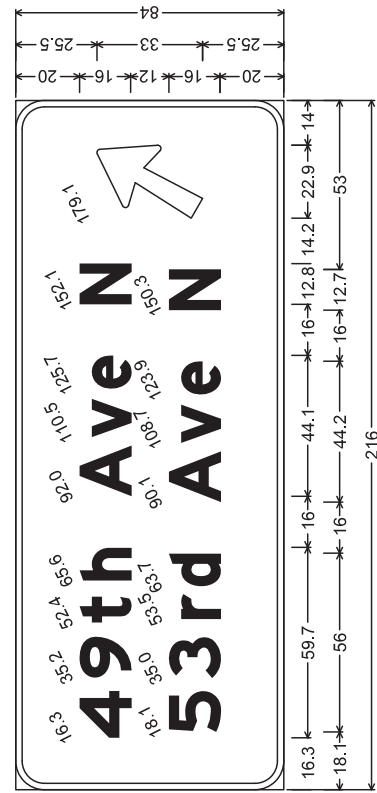
- NOTES:
 1. CORNERS OF THE SIGN PANEL EXTENDING BEYOND THE BORDER SHALL NOT BE TRIMMED.
 2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAIL.

DRAWN BY: LBJ	CHECKED BY: RFK	CERTIFIED BY: _____	LIC. NO. _____	DATE: 1/28/2016	STATE PROJ. NO. 2781-438 (TH 94)	SHEET NO. 32	OF 55 SHEETS
TYPE OH SIGN PANEL OVERLAYS							

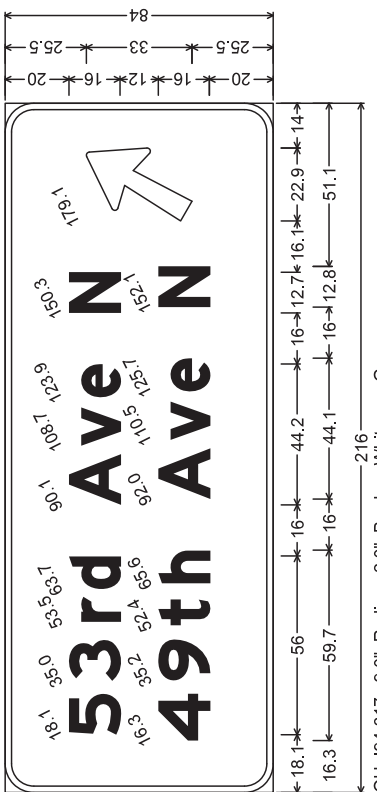


OH 194-312; 12.0" Radius, 2.0" Border, White on Green;
 [49th-53rd Aves N] E Mod; [2 1/4] E Mod; [Shingle Creek Pkwy] E Mod; [3 3/4] E Mod;

PLOTTED/REVISED: 1/28/2016



OH 194-314; 9.0" Radius, 2.0" Border, White on Green;
 [49th Ave N] E Mod; [53rd Ave N] E Mod; Arrow 17 - 36.0" 60°;

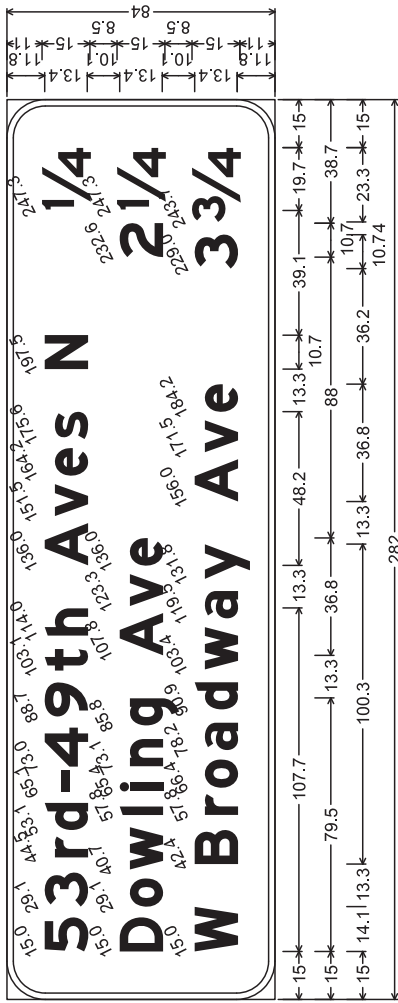


OH 194-317; 9.0" Radius, 2.0" Border, White on Green;
 [53rd Ave N] E Mod; [49th Ave N] E Mod; Arrow 17 - 36.0" 60°;

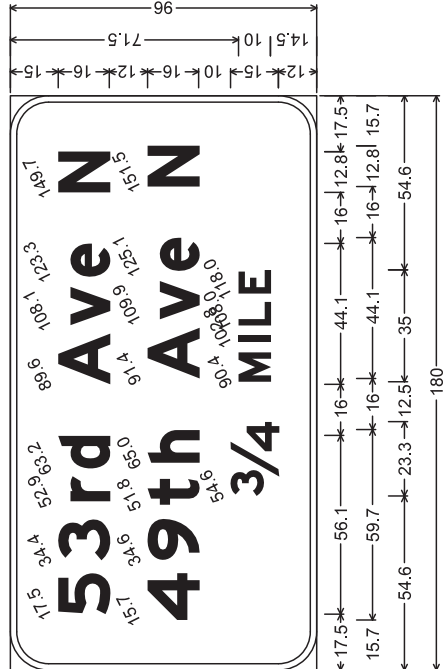
- NOTES:
1. CORNERS OF THE SIGN PANEL EXTENDING BEYOND THE BORDER SHALL NOT BE TRIMMED.
 2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAIL.

DRAWN BY: LBJ	CHECKED BY: RFK	CERTIFIED BY: _____	LIC. NO. _____	DATE: 1/28/2016	STATE PROJ. NO. 2781-438 (TH 94)	SHEET NO. 33	OF 55 SHEETS
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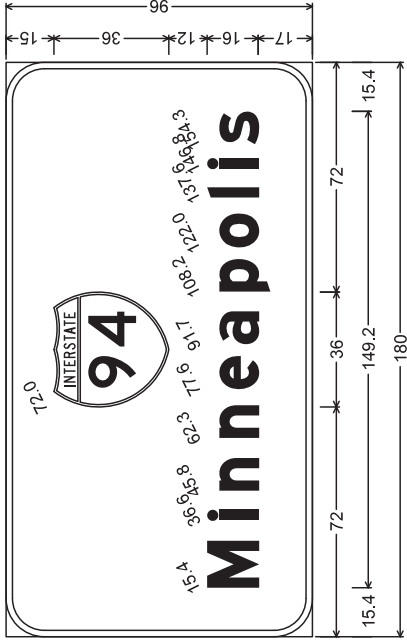
TYPE OH SIGN PANEL OVERLAYS



OH 194-319; 12.0" Radius, 2.0" Border, White on Green;
 [53rd-49th Aves N] E Mod; [1/4] E Mod; [Dowling Ave] E Mod; [2 1/4] E Mod;
 [W Broadway Ave] E Mod; [3 3/4] E Mod;



OH 194-331(R); 12.0" Radius, 2.0" Border, White on Green;
 [53rd Ave N] E Mod; [49th Ave N] E Mod; [3/4 MILE] E Mod;



OH 194-331(L); 12.0" Radius, 2.0" Border, White on Green;
 [Minneapolis] E Mod;

- NOTES:
- CORNERS OF THE SIGN PANEL EXTENDING BEYOND THE BORDER SHALL NOT BE TRIMMED.
 - SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAIL.

DRAWN BY: LBJ	CHECKED BY: RFK	CERTIFIED BY: _____ LIC. NO. _____	DATE: 1/28/2016	STATE PROJ. NO. 2781-438 (TH 94)	SHEET NO. 34	OF 55 SHEETS
				TYPE OH SIGN PANEL OVERLAYS		

REVISED:

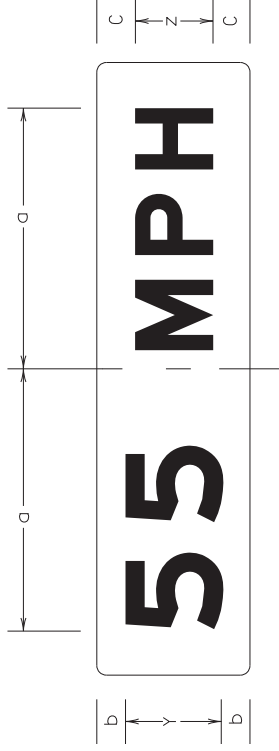
STATE PROJ. NO. 2781-438 (TH 94) SHEET NO. 35 OF 55 SHEETS

STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION
 STANDARD SIGN DRAWING
 SPEED PLAQUE

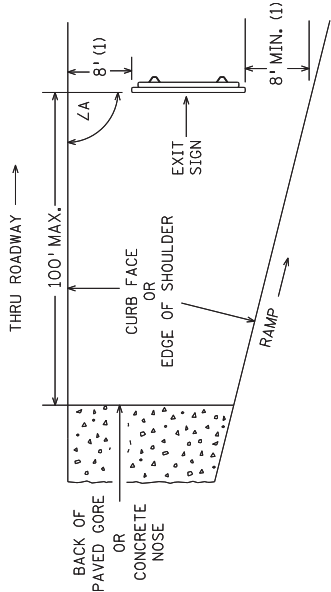
SIZE DIMENSION	96x24
RADIUS	1.5
MARGIN	
BORDER	
a	40.8
b	4.5
c	6.0
d	
e	
f	
g	
h	
i	
j	
k	
l	
m	
n	
o	
p	
q	
r	
s	
t	
u	
v	
w	
x	
y	15E MOD.
z	12E MOD.
PUNCH CODE	

NOTES:

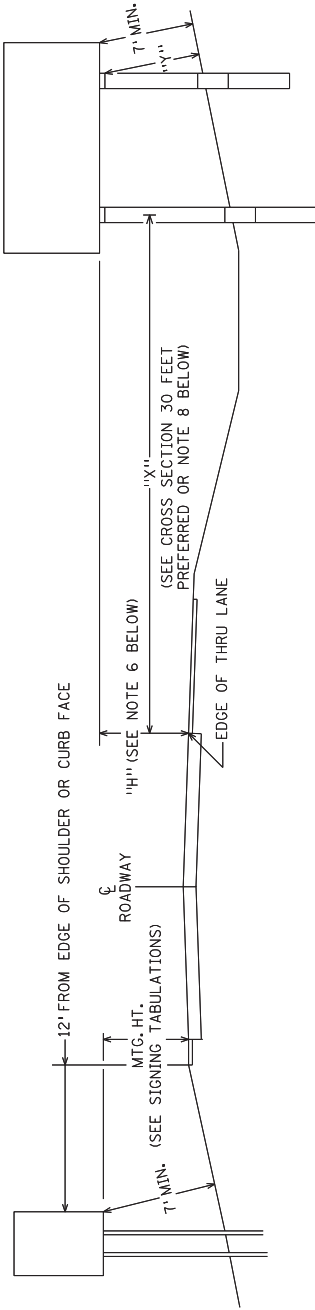
1. ALL DIMENSIONS ARE IN INCHES.
2. COLOR-BLACK LEGEND (NO BORDER) ON YELLOW REFLECTORIZED BACKGROUND.
3. APPROPRIATE NUMERALS TO BE SPECIFIED.



CORE PLACEMENT

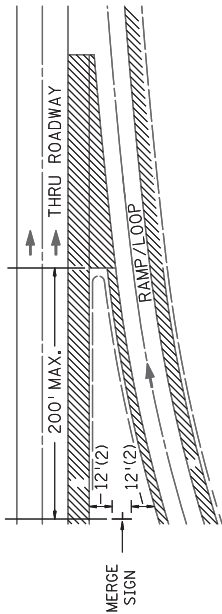


ROADSIDE PLACEMENT



ROUTE MARKER, REGULATORY & WARNING SIGNS - TYPE C
GUIDE SIGNS - TYPE D

GUIDE SIGN - TYPE A



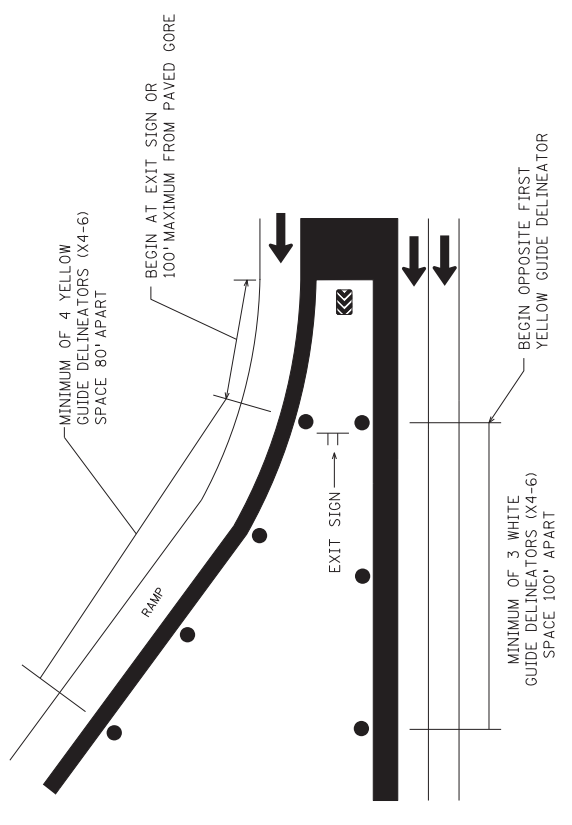
SPECIFIC NOTES:

- (1) EXIT SIGNS
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 SIGNS
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.

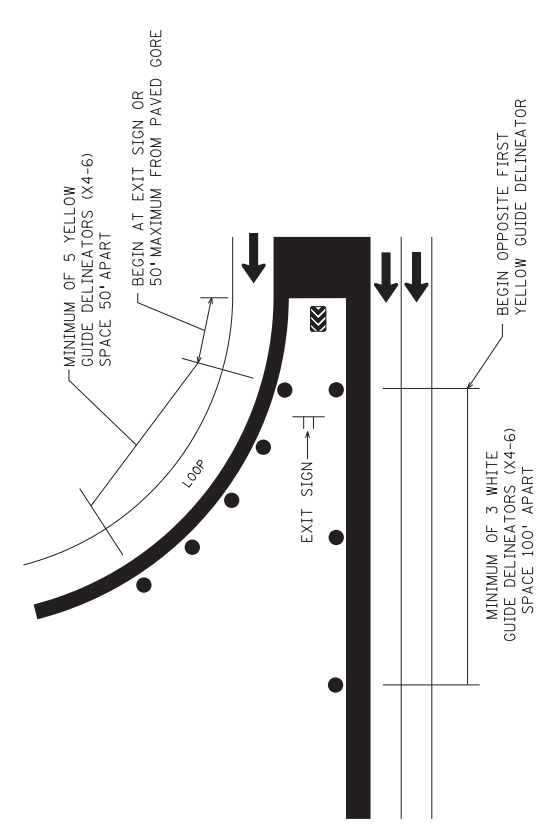
NOTES:

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 ABSENCE 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, LA 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.

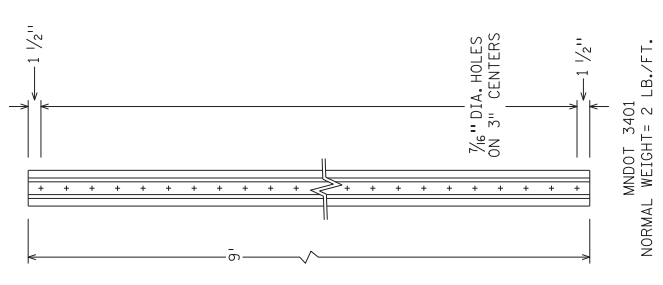
SIGN PLACEMENT



PLAN A
RAMP DELINEATION

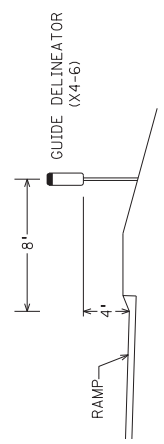
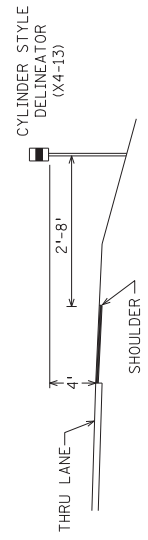
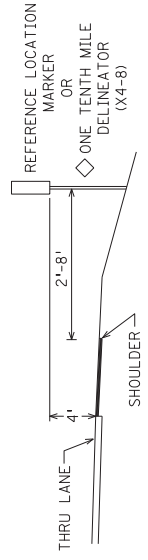
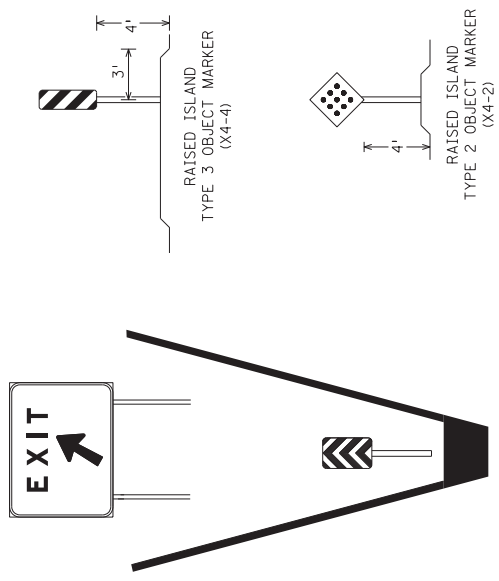


PLAN B
LOOP DELINEATION



MN DOT 3401
NORMAL WEIGHT = 2 LB./FT.

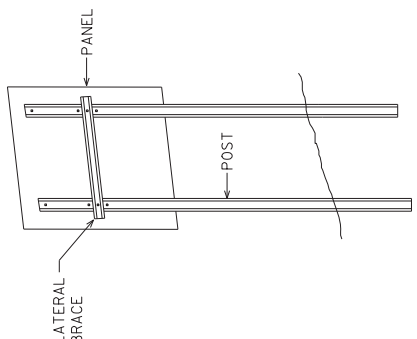
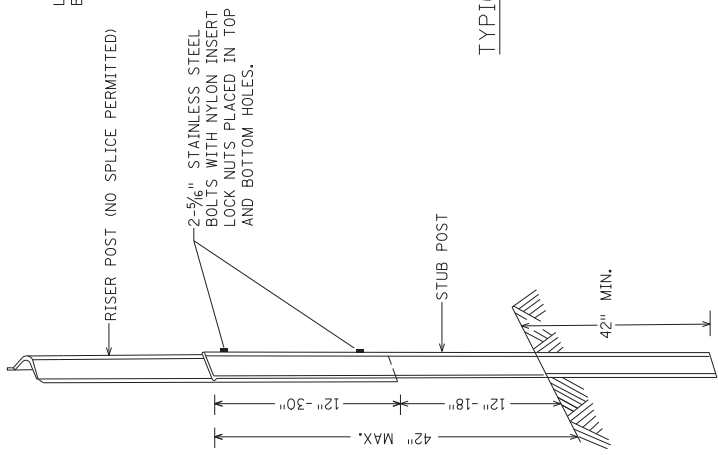
DELINEATOR POST



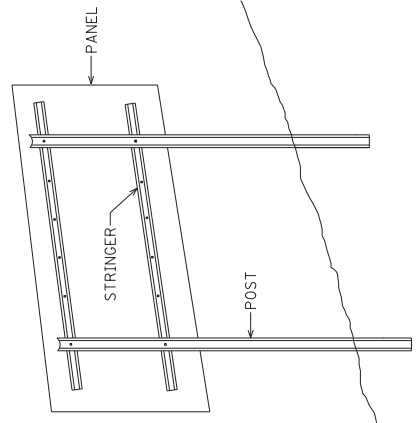
TYPICAL PLACEMENT

DELINEATORS AND MARKERS

TYPE C & D POST

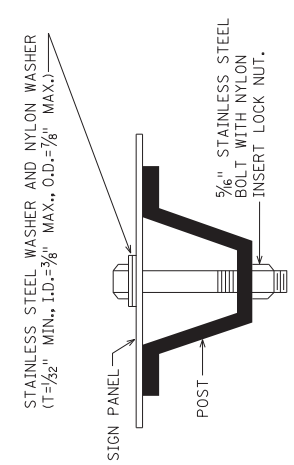


TYPICAL TYPE C INSTALLATION

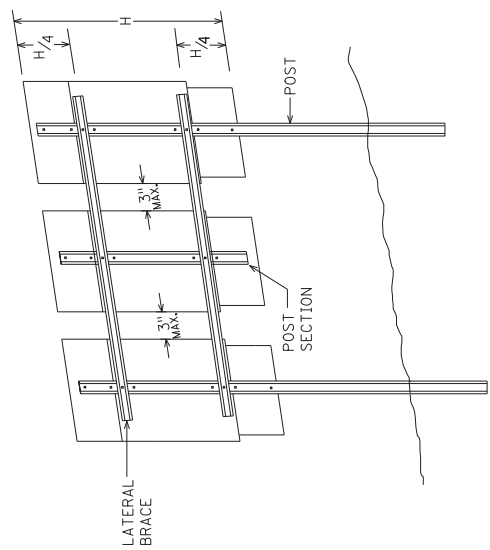


TYPICAL TYPE D INSTALLATION

U POST BREAKAWAY SPLICE



U POST MOUNTING
TYPE C SIGNS



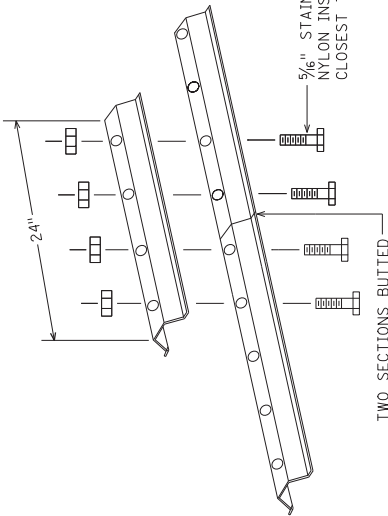
MODIFIED TYPE C INSTALLATION

NOTES:

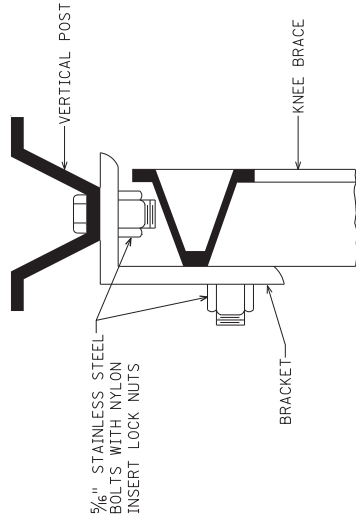
1. USE 3 LB/FT STUB POSTS. SHALL CONFORM TO MNDOT 3401.
2. USE 2.5 LB/FT RISER POSTS, STRINGERS, KNEE BRACES AND LATERAL BRACES. ALL SHALL CONFORM TO MNDOT 3401.
3. SEE SIGN DATA SHEETS FOR NUMBER OF POSTS, KNEE BRACES, POST LENGTHS AND SPACINGS, AS DETERMINED FROM TEM CHARTS 6.3 AND 6.4.
4. IF MORE 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 3352.246.
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 SECTION AND LOCATED APPROXIMATELY AT THE QUARTER POINTS AS SHOWN IN MODIFIED TYPE C INSTALLATION.

TYPE C & D SIGN

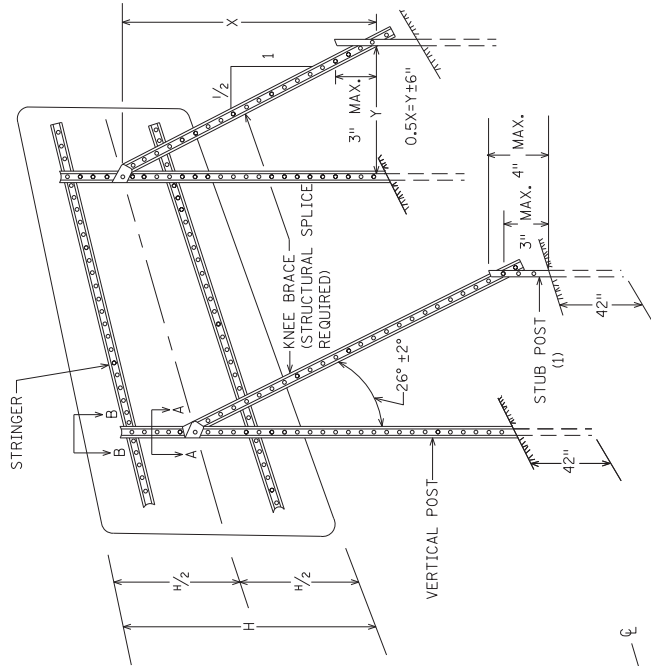
STRUCTURAL DETAILS



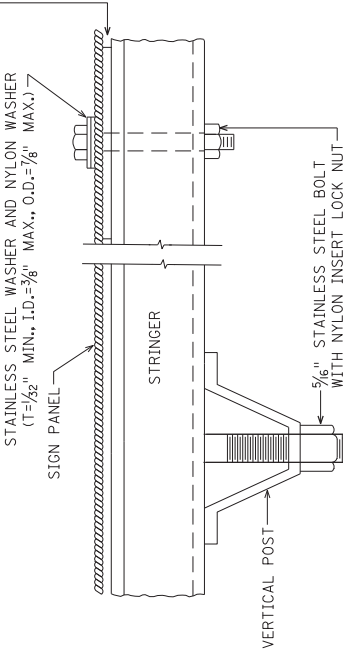
TWO SECTIONS BUTTED
LATERAL BRACE OR STRINGER
SPLICE DETAIL (EXPLODED VIEW)



SECTION A-A

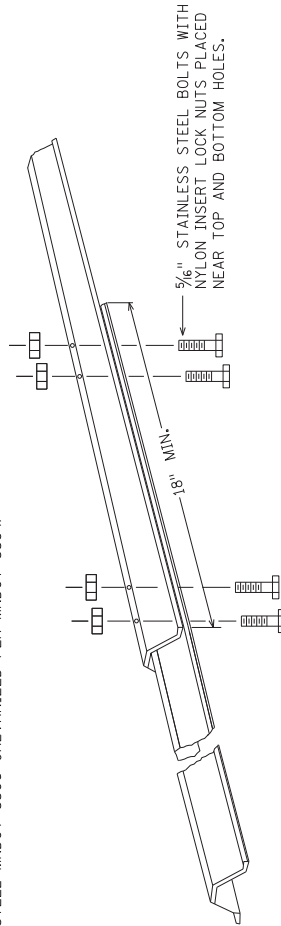


TYPICAL "A-FRAME" INSTALLATION
TYPE "D" SIGNS



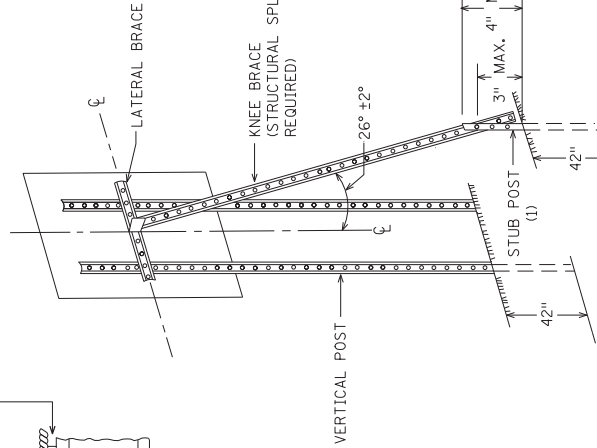
SECTION B-B

A-FRAME BRACKET
(STEEL MNDOT 3306 GALVANIZED PER MNDOT 3394)

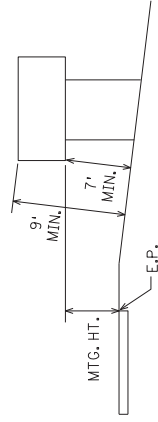


STRUCTURAL SPLICE

(USE WHEN IT IS NECESSARY TO FABRICATE THE CORRECT LENGTH OF POST FROM TWO PIECES)



TYPICAL "A-FRAME" INSTALLATION
TYPE "C" SIGNS

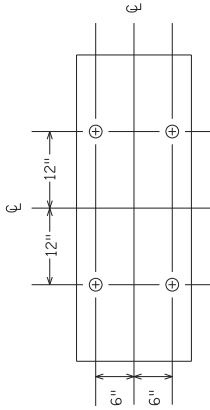
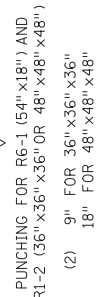
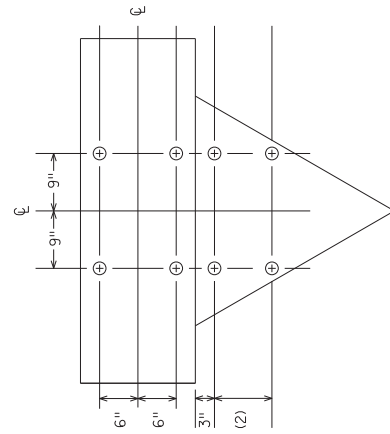
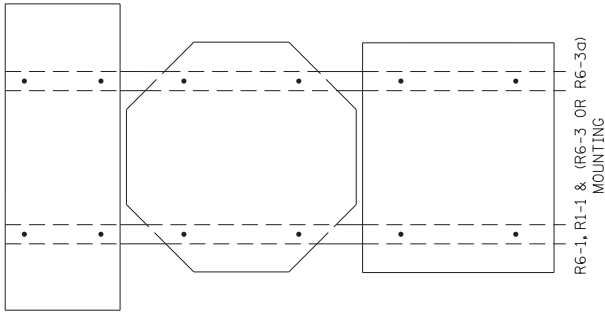


TYPICAL MOUNTING

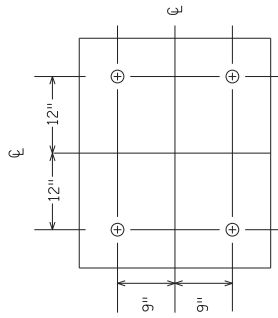
(1) OFFSET STUB POST 1' TOWARD ROADWAY
RELATIVE TO VERTICAL POST. ATTACH STUB
POST AND KNEE BRACE BACK TO BACK.

TYPE C & D SIGN
STRUCTURAL DETAILS

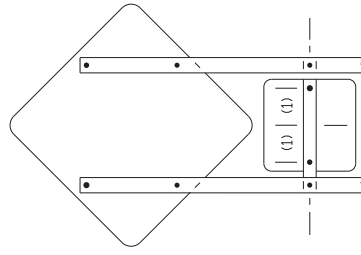
Sheet 2 of 3



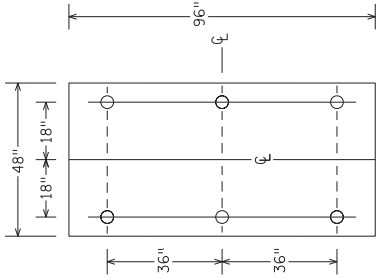
PUNCHING FOR R6-1 (54" x 18")



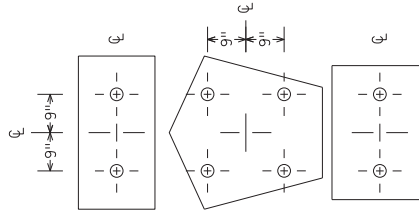
PUNCHING FOR R6-3 OR R6-3a (36" x 30")



WARNING SIGN [30" x 30 OR 48" x 48"] AND
WARNING PLAQUE [18" x 18" OR 30" x 30"]
PUNCHING AND MOUNTING
(1) 6" FOR WARNING PLAQUE (18" x 18")
12" FOR WARNING PLAQUE (30" x 30")



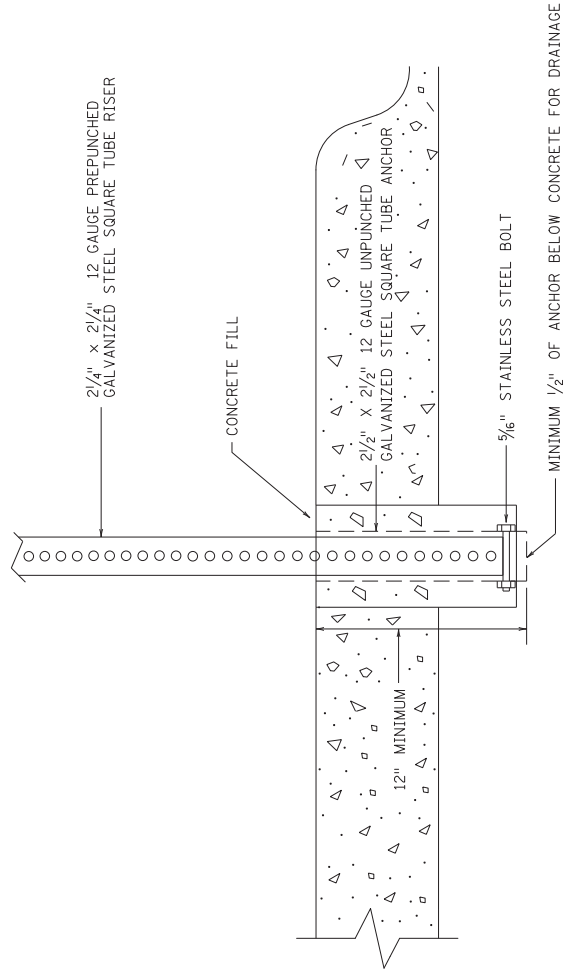
PUNCHING FOR R2-4b
SPEED LIMIT



(M3-1A, M3-2A, M3-3A OR M3-4A) [36" x 18"] J AND
M1-6 [36" x 36"] J AND
(M5-1A, M5-2A, M6-1A, M6-2A, M6-3A, M6-4A, M6-5A OR M6-6A) [30" x 24"] J
PUNCHING

TYPE C & D SIGN
STRUCTURAL DETAILS

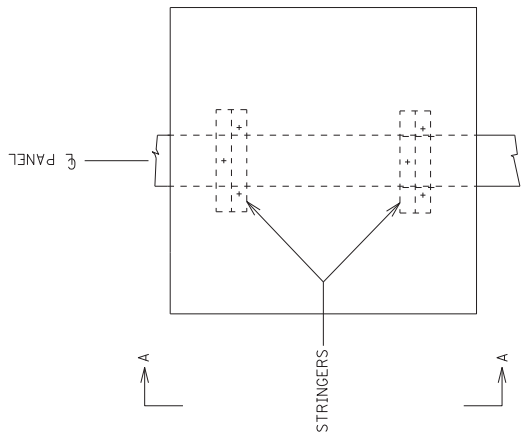
Sheet 3 of 3



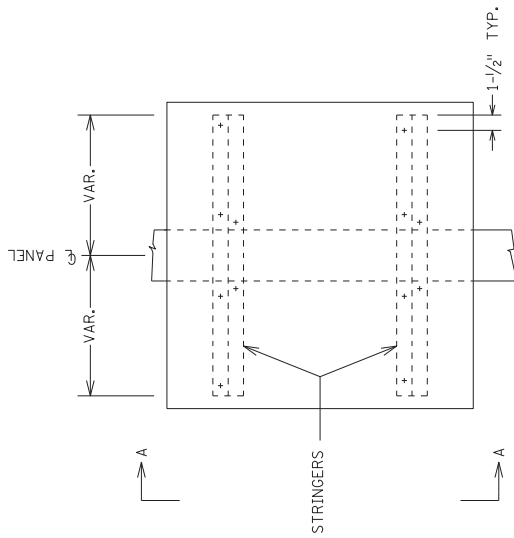
NOTES:

1. DRILL AN 8" DIAMETER HOLE THE FULL DEPTH OF THE ANCHOR.
2. DRILL 5/8" 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.

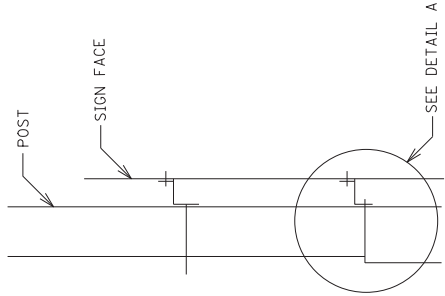
TYPE C SIGNS, DELINEATORS & MARKERS IN CONCRETE



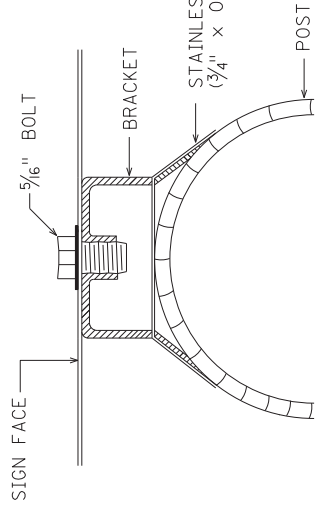
SINGLE POST PUNCHING
ELEVATION



2-POST PUNCHING
ELEVATION

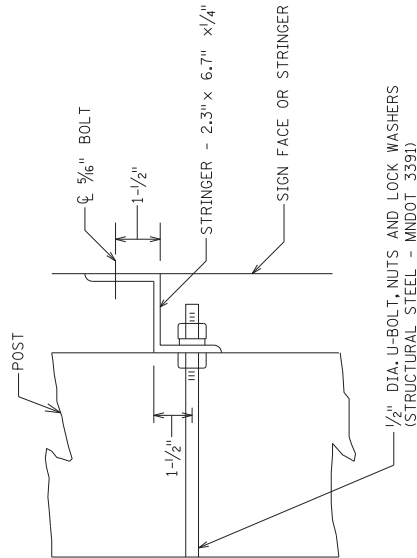


VIEW A-A

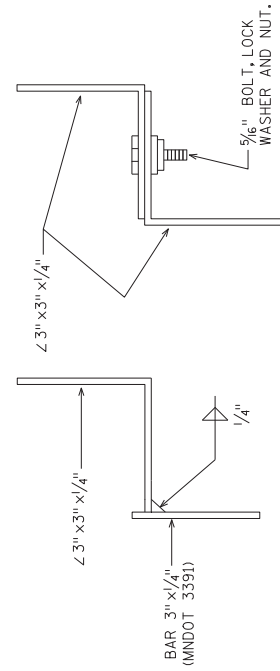


GALVANIZED OR STAINLESS
STEEL BRACKET, BOLT AND
WASHER.

STRAP MOUNTING DETAIL FOR
OVERHEAD IDENTIFICATION AND
LIGHTING SYSTEM IDENTIFICATION PLATES



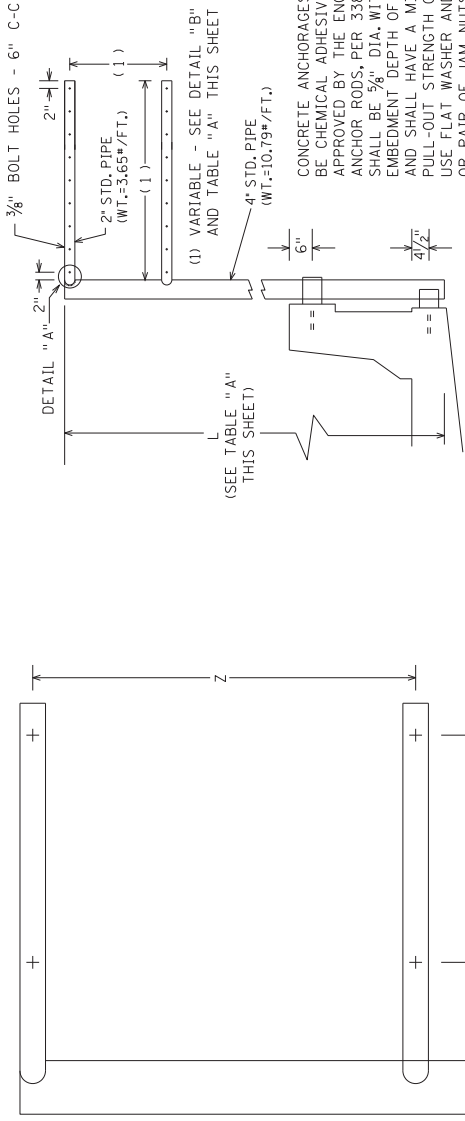
DETAIL A



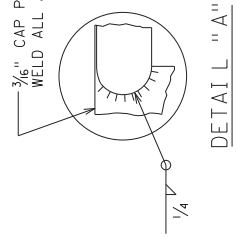
DETAIL A STRINGER ALTERNATES

- 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.

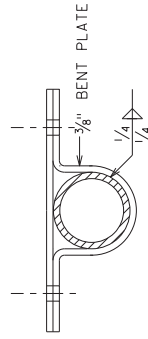
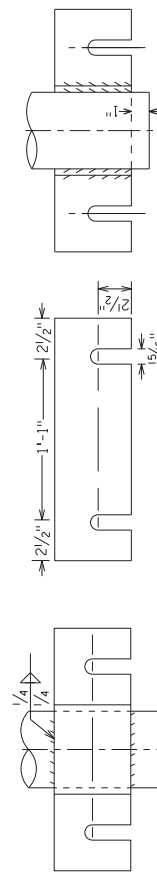
SIGN TYPE C AND D STRUCTURAL
STEEL MOUNTING SYSTEM
FOR ROUND SUPPORTS



ELEVATION



2" PIPE OFFSET ON 4" PIPE (OFFSET SHALL BE IN THE SAME DIRECTION AS THE SIGN IS FACING)



- NOTES:
1. ALL PIPE MATERIAL SHALL CONFORM TO ASTM DESIGNATION A53, GRADE B, SCHEDULE 40.
 2. ALL STEEL FOR STRUCTURAL ITEMS SHALL CONFORM TO MN/DOT 3306 (STRUCTURAL STEEL) UNLESS OTHERWISE NOTED.
 3. FOR NOTES AND DETAILS NOT SHOWN, SEE TYPE C AND D SIGN DETAILS.

END VIEW

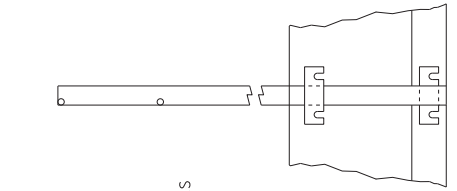
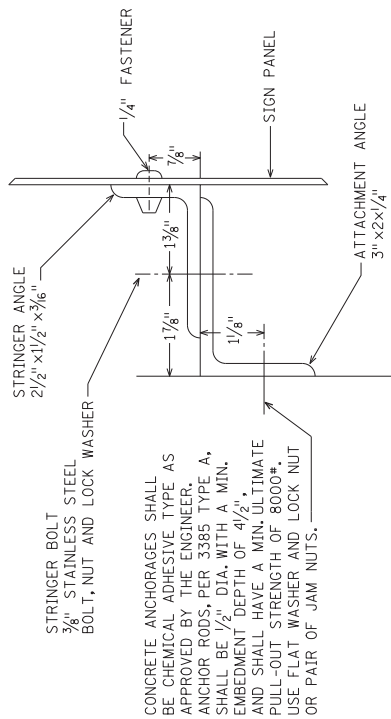


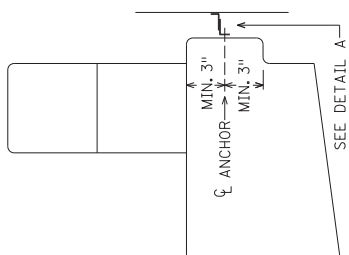
TABLE "A"

SIGN NO.	X (IN.)	Y (IN.)	Z (IN.)	L (FT.)
C-8	8	30	30	11

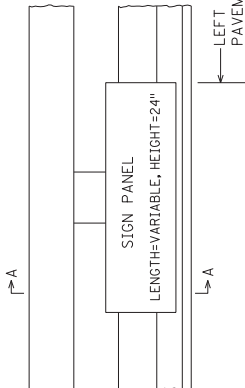
TYPE C & D SIGNS
MOUNTED ON BRIDGE RAIL
CONCRETE BARRIER
TYPE F, TL-4



DETAIL A



SECTION A-A

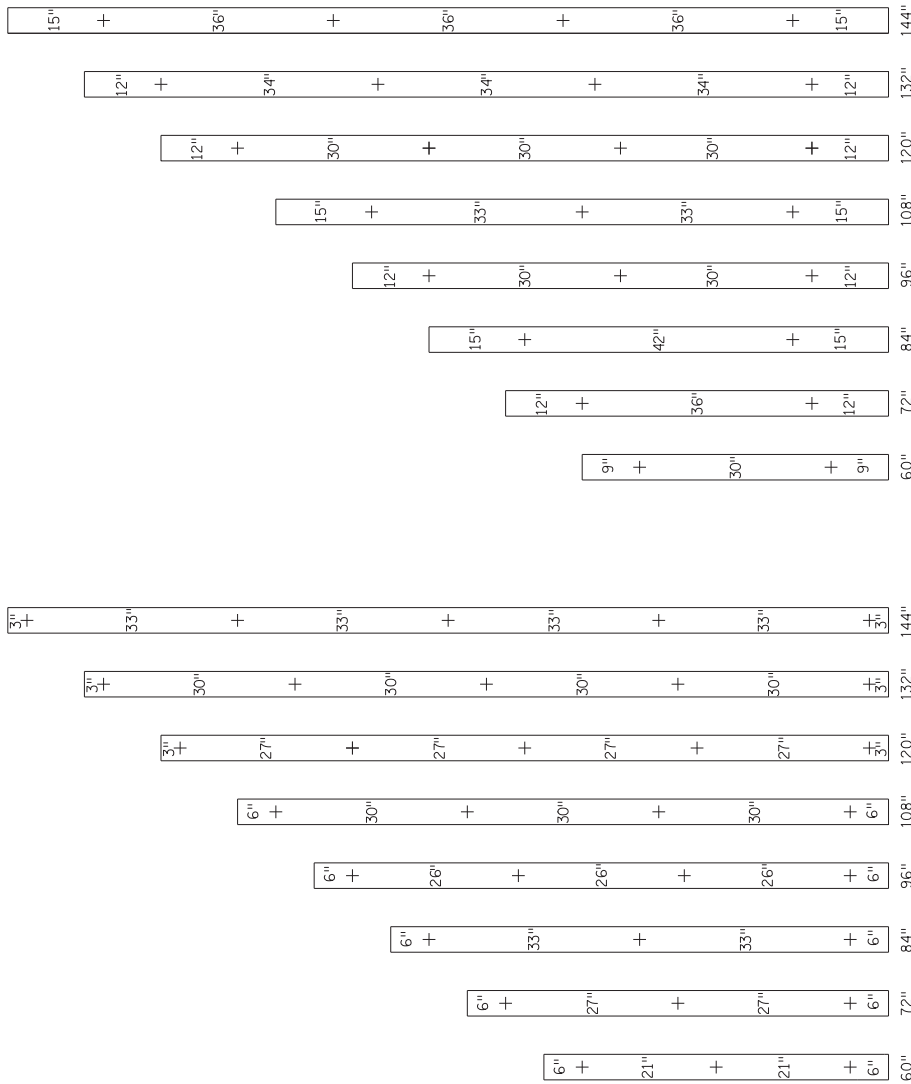


(1) SIGN PANEL MAY BE SHIFTED
 Laterally if necessary

ELEVATION

PANEL LENGTH	STRINGER ANGLE LENGTH	ATTACHMENT ANGLE
60"	54"	48°
72"	66"	60°
84"	78"	72°
96"	90"	84°
108"	102"	96°
120"	114"	108°
132"	126"	120°
144"	138"	132°

- NOTES:
1. STRUCTURAL STEEL SHALL CONFORM TO MNDOT 3306 AND SHALL BE GALVANIZED PER MNDOT 3394.
 2. SIGN PANEL SHALL BE FASTENED TO STRINGER AT 12" INTERVALS BEGINNING 6" FROM SIGN PANEL EDGE.



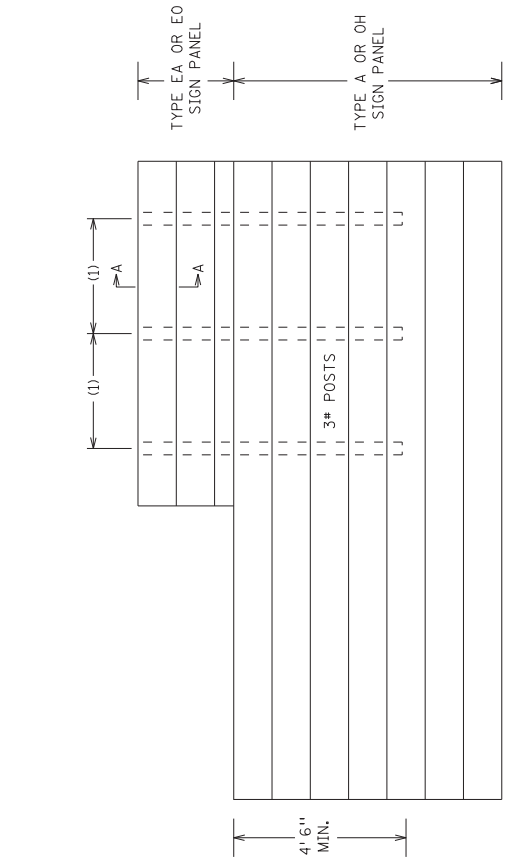
SIGN PANEL LENGTH

PUNCHING FOR STRINGER BOLT

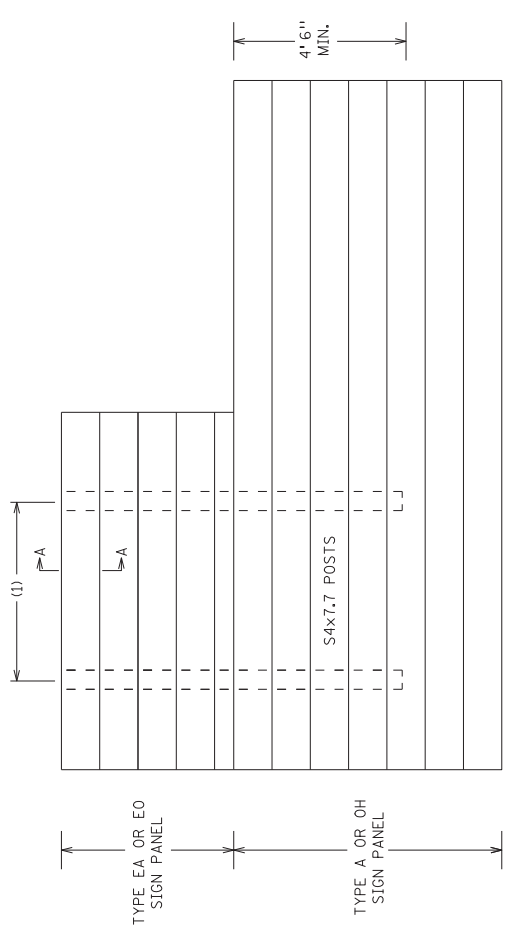
SIGN PANEL LENGTH

PUNCHING FOR CONCRETE ANCHOR

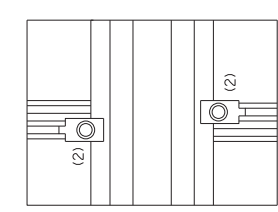
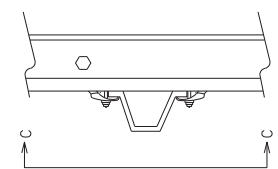
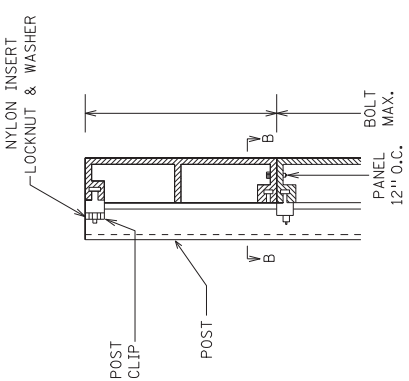
STRUCTURAL DETAILS
BRIDGE MOUNTED TYPE D SIGNS
DESIGN A1



RIGHT JUSTIFIED PANEL MOUNTING



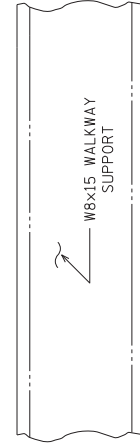
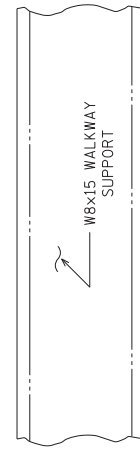
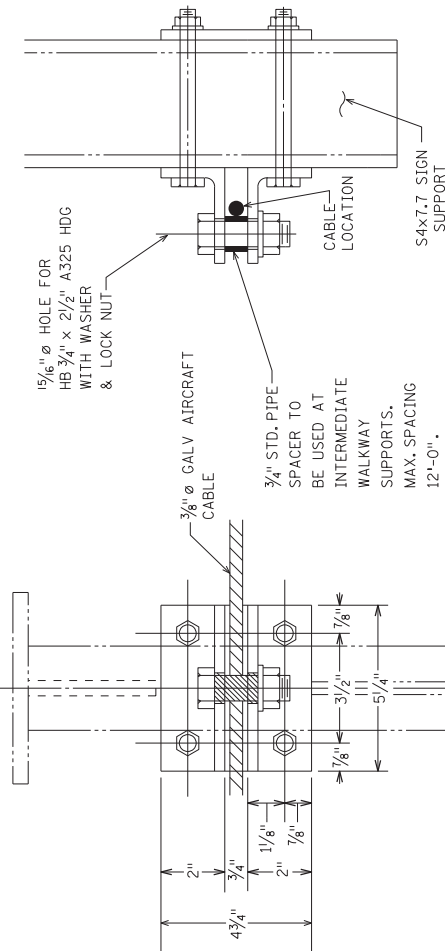
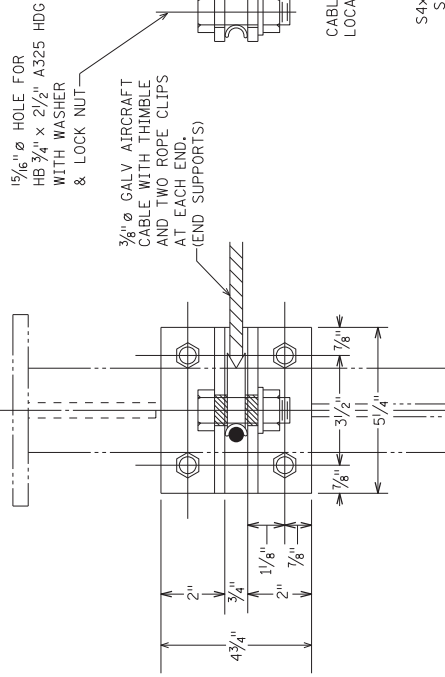
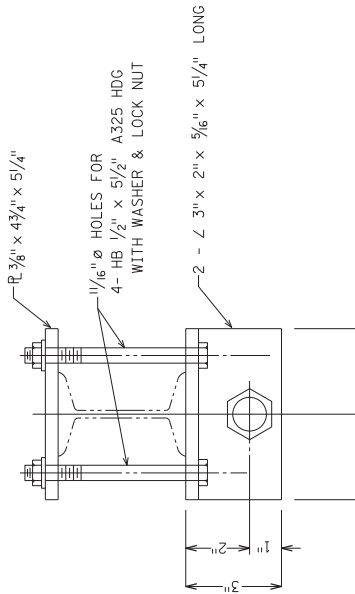
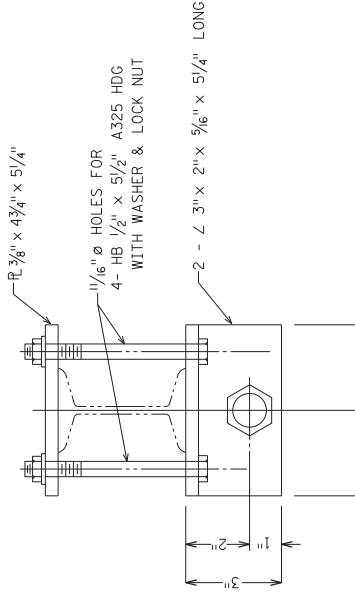
LEFT JUSTIFIED PANEL MOUNTING



SPECIFIC NOTES:
 (1) SEE TABULATION SHEET FOR NUMBER AND SPACING OF POSTS. SPACING AND LOCATION CAN BE ADJUSTED WHERE NECESSARY.
 (2) POST CLIPS SHALL BE ATTACHED ON BOTH SIDES OF EACH POST AT EACH PANEL JOINT AS INDICATED.

GENERAL NOTE:
 1. TYPE EA OR EO SIGN PANEL SHALL BE LEFT JUSTIFIED FOR LEFT EXITS AND RIGHT JUSTIFIED FOR RIGHT EXITS ON TYPE A OR OH SIGN PANEL.

TYPE EA & EO SIGN
 STRUCTURAL DETAILS

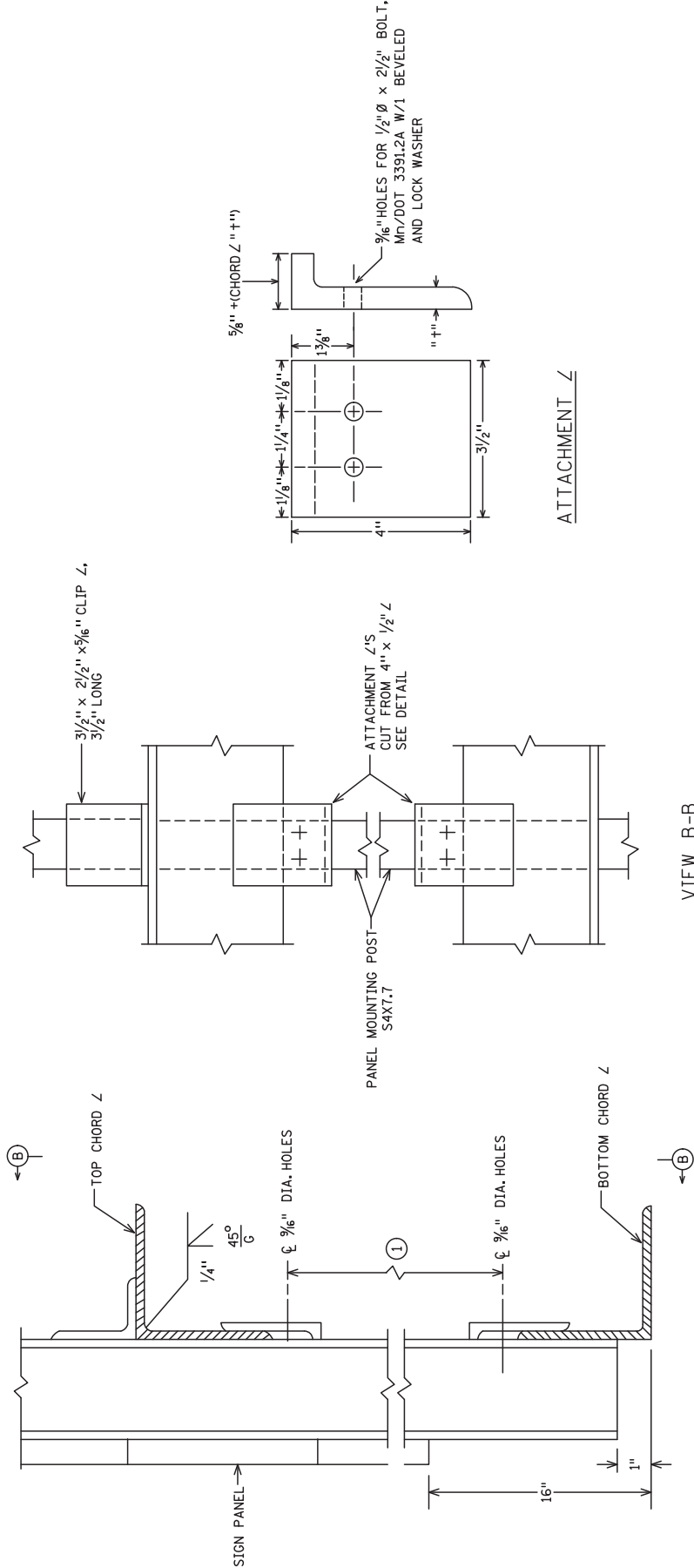


- NOTES:
1. ALL STRUCTURAL STEEL PER Mn/DOT 3306. GALVANIZED PER Mn/DOT 3394.
 2. ALL FASTENERS PER A325. GALVANIZED PER Mn/DOT 3392.
 3. HB-HEX BOLT.
 4. HDG-HOT DIP GALVANIZED.

END CONNECTION

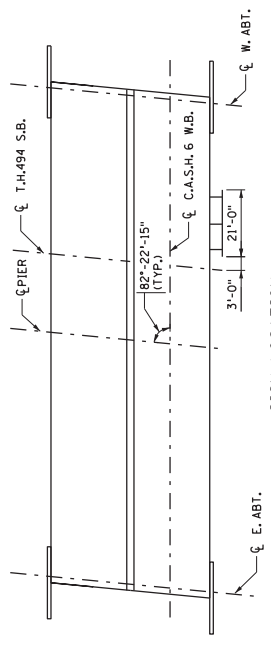
MIDDLE CONNECTION

SAFETY CABLE FOR OH SIGNS
BRIDGE MOUNT



NOTE:
① (TRUSS DEPTH)-(TOP & BOTTOM CHORD LEGS)-1/4"

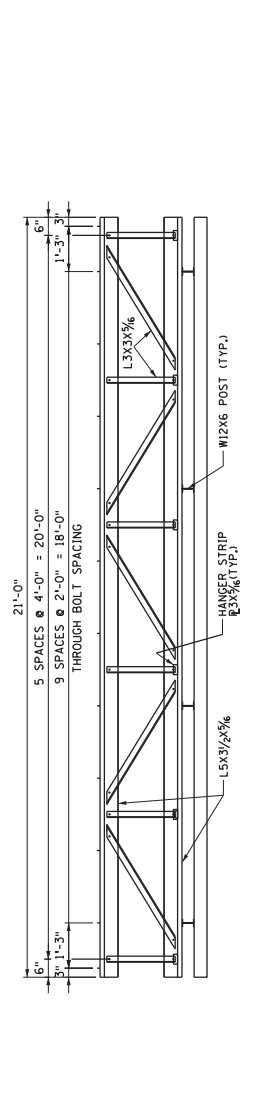
STANDARD OVERHEAD SIGNS
ATTACHMENT DETAILS FOR NEW SIGN PANELS ON EXISTING SIGN TRUSSES
DESIGN A



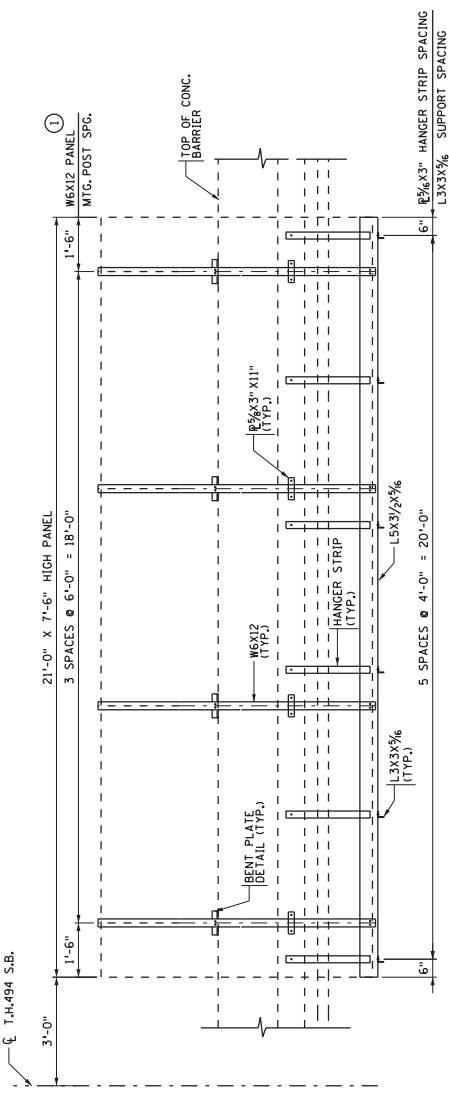
SIGN LOCATION
 BR. 27679 - T.H. 494 UNDER C.A.S.H. 6
 1.0 MILES S. OF JCT. OF T.H. 55 AND T.H. 494
 IN PLYMOUTH

SIGN NOTES

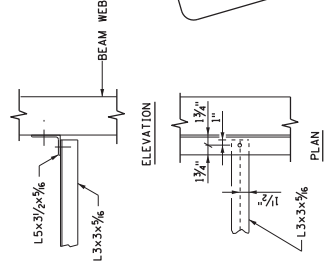
- 1 FIELD VERIFY METAL RAILING POST LOCATIONS AND, IF NECESSARY, ADJUST POST LOCATIONS TO MATCH EXISTING RAILING POSTS. CENTERLINES OF BENT PLATES AND RAILING POSTS. CONTRACTOR SHALL VERIFY DIMENSIONS BEFORE FABRICATION.
- SIGN FACE TO BE VERTICAL.
- SIGNS TO BE PLACED PARALLEL TO BEAM FLANGE.
- ALL CONNECTIONS TO BE 1/2" Ø BOLTS PER MVI/DOT 3391 (A325), EXCEPT AS NOTED. HOLES TO BE 3/16" Ø
- BOLT ANCHORAGES SHALL BE 1/2" Ø CHEMICAL ADHESIVE TYPE, APPROVED BY THE ENGINEER. HOLES TO BE 4/2" DEEP, MINIMUM, AND SHALL HAVE A MINIMUM ULTIMATE PULLOUT STRENGTH OF 8000#.
- FOR GENERAL NOTES AND DETAILS NOT SHOWN SEE STANDARD SHEETS.



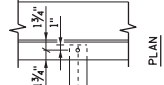
PLAN



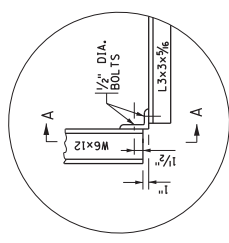
ELEVATION



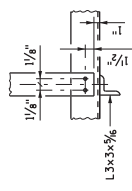
ELEVATION



PLAN



SECTION A-A

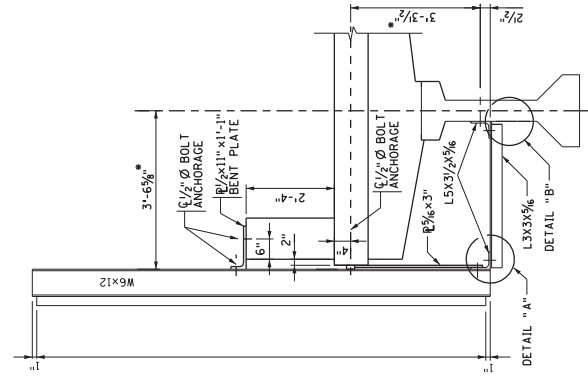


DETAIL "A"
 TYP. AT PANEL MOUNTING POST

BENT PLATE DETAIL
 TYP. AT PANEL MOUNTING POST

DETAIL "B"

SAMPLE SHEET ONLY
 THIS IS AN EXAMPLE OF THE REQUIRED MOUNTED OR SIGN STRUCTURE DETAILS FOR OH 94-595 IN THIS SAMPLE PLAN.
 IT DOES NOT MATCH THE BRIDGE OR SIGN STRUCTURE DETAILS



TYPICAL SECTION

• FIELD VERIFY

5/8" PRESTRESSED CONG. GIRDER

STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION	
TRUSS QUANTITY	1190
POUNDS	
CERTIFIED BY	JHISHVA J. LIN, P.E., S.E.
DES. J.J.L.L.	DR. H.Y.X.
CHK. J.J.L.L.	CHK. J.J.L.L.
REC. NO. 19115	DATE
DATE DRAWN: 08/11/14	

BRIDGE MOUNTED SIGN DETAILS
 OH 494-461

SPECIFIC NOTES:
 ① DIMENSION Y IS CONSTANT AND BASED ON THE DEEPEST SIGN PANEL ABOVE THAT WALKWAY. WHEN STANDARD SIGN PANELS AND CMS ARE MOUNTED ON THE SAME SPAN, DIMENSION Y SHALL BE GOVERNED BY THE CMS. ② ELEVATION OF SIGN SHALL BE MEASURED FROM THE HIGHEST ELEVATION OF PAVEMENT SHOULDERS AND MOUNTABLE CURBS, OR IF INSURMOUNTABLE CURBS ARE USED, THE HIGHEST ELEVATION BETWEEN CURB LINES.

GENERAL NOTES:

DESIGN SPECIFICATIONS:
 TRUSS, POST, & HARDWARE:
 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS DATED 1999.
LOADING:
 WIND LOAD 90 M.P.H. NORMAL TO SIGN FACE IN COMBINATION WITH OTHER LOADS OUTLINED IN THE DESIGN SPECIFICATIONS.
UNIT STRESSES:
 CONCRETE----- Fc = 1,600 PSI
 REINFORCEMENT STEEL----- Fs = 24,000 PSI
 FOOTING SOIL PRESSURE----- 1-1/4 TONS PER SQ. FT.
MATERIALS:
 STRUCTURAL STEEL (EXCEPT POST, TUBES)- MNDOT 3306
 POST STEEL----- VARIES
 HIGH STRENGTH BOLTS----- MNDOT 3391.2B
 ANCHOR RODS----- MNDOT 3385
 CASTINGS----- MNDOT 3322
 REINFORCEMENT BARS----- MNDOT 3301
 SPIRAL----- MNDOT 3305 NO SPLICES
 WALKWAY GRATING----- FEDERAL SPECIFICATIONS RR-G-661b, TYPE 1, STEEL
 CONCRETE----- MNDOT 2461 (MIX 3Y43)

FINISH:

ALL COMPONENTS SHALL BE GALVANIZED AFTER FABRICATION EXCEPT REINFORCEMENT BARS, LOWER PORTION OF ANCHOR RODS, ALUMINUM, AND OTHER NON FERROUS INCIDENTALS. GALVANIZING SHALL CONFORM TO MNDOT 3392 OR MNDOT 3394 AS APPLICABLE. BEARING SURFACES MUST BE SMOOTH.

FABRICATION:

FABRICATION OF STRUCTURAL METALS SHALL BE IN ACCORDANCE WITH MNDOT 2471, MNDOT 2564 AND THE APPLICABLE SPECIAL PROVISIONS. ALL WELDING TO BE CONTINUOUS. ALL CONTACT SURFACES MUST BE COMPLETELY SEALED.

INSPECTION:

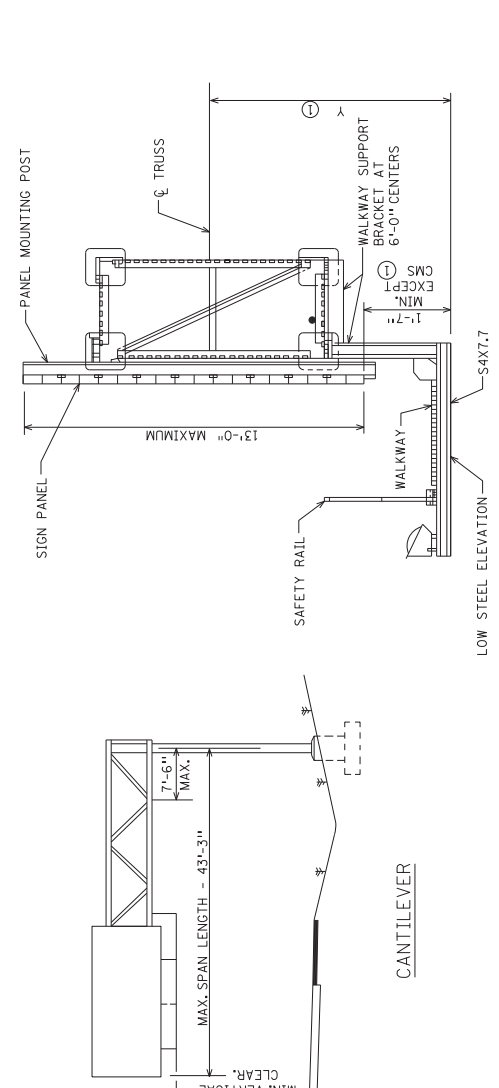
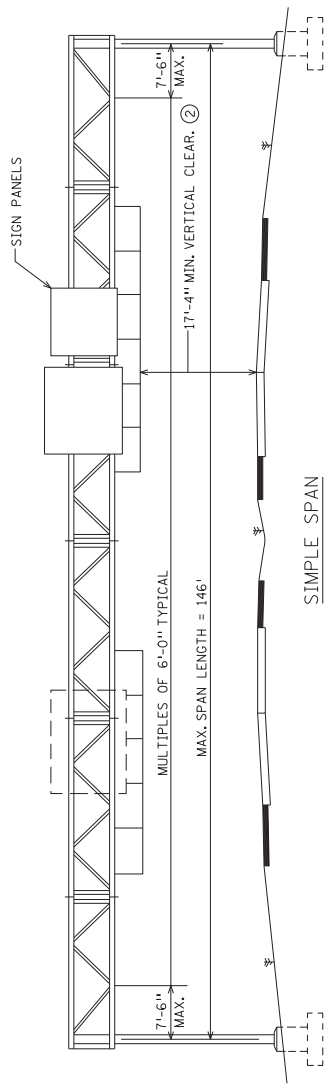
INSPECTION BEFORE AND AFTER GALVANIZING PER MNDOT 1511 AND MNDOT 2471.

STANDARD OVERHEAD SIGN SUPPORTS
 INTERIM DESIGN B

GENERAL ELEVATIONS
 AND NOTES

DRAWING ST-1

STATE PROJ. NO. 2781-438 (TH 94) SHEET NO. 48 OF 55 SHEETS



SECTION

SIGN HEIGHT	Y ①	CMS (NEW LED)
6'-6"	4'-4"	
7'-0"	4'-7"	
7'-6"	4'-10"	
8'-0"	5'-1"	CMS (LED)
8'-6"	5'-4"	
9'-0"	5'-7"	CMS (DRUM)
9'-6"	5'-10"	
10'-0"	6'-1"	
10'-6"	6'-4"	
11'-0"	6'-7"	
11'-6"	6'-10"	
12'-0"	7'-1"	
12'-6"	7'-4"	
13'-0"	7'-7"	

INDEX OF STANDARD SIGN DRAWINGS

DRAWING	TITLE
ST-1	GENERAL ELEVATION AND NOTES
ST-2	CAMBER, POST IDENTIFICATION AND ESTIMATED QUANTITIES
ST-3	FOUNDATIONS AND ANCHOR RODS
ST-4	TRUSS/POST CONNECTION & BASEPLATE
ST-5	SIGN TRUSS DETAILS - TYPE A
ST-6	SIGN TRUSS DETAILS - TYPE B
ST-7	SIGN TRUSS DETAILS - TYPE C
ST-8	WALKWAY DETAILS
ST-9	FOLDING HANDRAIL
ST-10	SIGN PANEL AND PANEL MOUNTING POST DETAILS
ST-11	ELECTRICAL DETAILS
ST-12	ELECTRICAL DETAILS
ST-13	ELECTRICAL DETAILS (CMS SIGNS)

SIMPLE SPAN

SPAN	SIMPLE SPAN TRUSS CAMBER											
	40	50	60	70	80	90	100	110	120	130	140	150
CAMBER	1/4	3/8	1/2	5/8	1 1/16	1 1/8	1 1/4	1 5/16	1 3/8	1 7/8	2 1/8	2 3/4
DL DEFLECTION	0	1/16	1/8	1/4	3/8	1/2	5/8	1 1/8	1 1/4	1 5/8	2 1/8	2 1/2
RESIDUAL CAMBER	1/4	3/8	1/2	5/8	1 1/16	1 1/8	1 1/4	1 5/16	1 3/8	1 7/8	2 1/8	2 1/2

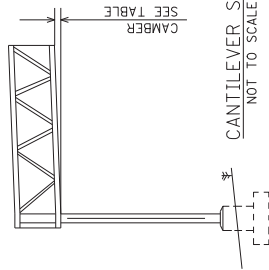
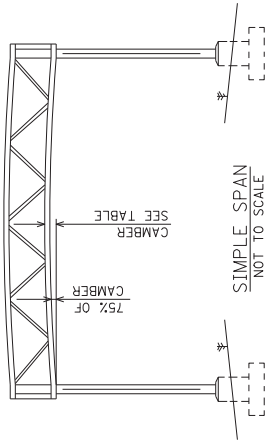
NOTE: CAMBER AND DEFLECTIONS SHOWN ARE AT $\frac{1}{4}$ SPAN. THE DEFLECTIONS AND CAMBER AT THE QUARTER POINTS SHALL BE APPROXIMATELY 75% OF THESE VALUES.

CANTILEVER SPAN

SPAN	CANTILEVER SPAN TRUSS CAMBER			
	15'	20'	30'	45'
CAMBER	1/8	1/4	3/8	1 1/8
DL DEFLECTION	0	0	1/16	3/8
RESIDUAL CAMBER	1/8	1/4	3/8	1 1/8

NOTE: CAMBER AND DEFLECTIONS SHOWN ARE SHOWN AT END OF CANTILEVER.

WHEN ERECTING CANTILEVER TRUSSES, THE POSTS SHALL BE SET 1/8" PER FOOT OUT OF PLUMB TO COMPENSATE FOR THE BENDING OF THE POSTS.



TRUSS QUANTITIES

USE LENGTH FROM $\frac{1}{4}$ POST WHEN CALCULATING TOTAL WEIGHTS.

TRUSS TYPE A	168 LBS./FT.
TRUSS TYPE B	196 LBS./FT.
TRUSS TYPE C	173 LBS./FT.

PANEL MOUNTING POST QUANTITIES

INCLUDES MOUNTING ANGLES

PANEL HEIGHT	WEIGHT/POST
6'-6"	74
7'-0"	78
7'-6"	82
8'-0"	86
8'-6"	90
9'-0"	93
9'-6"	97
10'-0"	101
11'-0"	105
11'-6"	160
12'-0"	166
12'-6"	172
13'-0"	178

WALKWAY SUPPORT QUANTITIES

USE MAXIMUM PANEL HEIGHT ON SPAN TO CALCULATE QUANTITIES. THE NUMBER OF PANELS SHALL BE COVERED BY THE CWS.

PANEL HEIGHT	A	B	C
6'-6"	99	105	113
7'-0"	101	107	115
7'-6"	103	109	117
8'-0"	105	111	119
8'-6"	107	113	121
9'-0"	109	115	123
9'-6"	111	117	125
10'-0"	113	119	127
10'-6"	115	121	129
11'-0"	135	142	151
11'-6"	138	144	153
12'-0"	141	147	156
12'-6"	143	150	159
13'-0"	146	153	162

FOR FOUNDATION QUANTITIES SEE DRAWING ST-3

- WALKWAY WEIGHTS:**
- USE 3'-4 1/4" WIDE GRATING @ 44 LBS./FT.
 - WEIGHT INCLUDES HANDRAIL (12 LBS./FT.) AND FIXTURE MOUNTING CHANNELS (4 LBS./FT.).

POST QUANTITIES

QUANTITIES INCLUDE ANCHORAGE ASSEMBLY AND TRUSS CONNECTION PLATES. PAY LENGTH OF POSTS FROM THE BOTTOM OF THE PLATE TO THE TOP OF THE TRUSS. POST QUANTITIES ARE BASED ON GRADE 45 STEEL. NO ADJUSTMENTS WILL BE MADE IN THE QUANTITIES FOR THE USE OF GRADE 35 STEEL POSTS.

POST TYPE	CANTILEVER			SIMPLE SPAN		
	TRUSS TYPE A	TRUSS TYPE B	TRUSS TYPE C	TRUSS TYPE A	TRUSS TYPE B	TRUSS TYPE C
1	1880+47 LBS/FT	1910+47 LBS/FT	1870+47 LBS/FT	1870+47 LBS/FT	1890+47 LBS/FT	1915+47 LBS/FT
2	1880+59 LBS/FT	1910+59 LBS/FT	1870+59 LBS/FT	1870+59 LBS/FT	1890+59 LBS/FT	1915+59 LBS/FT
3	1880+71 LBS/FT	1910+71 LBS/FT	1870+71 LBS/FT	1870+71 LBS/FT	1890+71 LBS/FT	1915+71 LBS/FT
4	1880+94 LBS/FT	1910+94 LBS/FT	1870+94 LBS/FT	1870+94 LBS/FT	1890+94 LBS/FT	1915+94 LBS/FT
5	2470+138 LBS/FT	2500+138 LBS/FT	2460+138 LBS/FT	N/A	2545+138 LBS/FT	2570+138 LBS/FT
6	N/A	2500+104 LBS/FT	N/A	N/A	2545+104 LBS/FT	2570+104 LBS/FT
7	N/A	2500+167 LBS/FT	N/A	N/A	2545+167 LBS/FT	2570+167 LBS/FT

POST IDENTIFICATION NOTES:

POST MATERIAL SHALL CONFORM TO ONE OF THE FOLLOWING SPECIFICATIONS:

ASTM A709, GRADE 36
 ASTM A53, GRADE B
 API 5L, GRADES B, X42, X46, X52, X56, X60, X65

CONTRACTOR SHALL DEMONSTRATE THAT THE POST MATERIAL MEETS THE REQUIREMENTS OF ONE OF THE ABOVE CITED SPECIFICATIONS AND THE MINIMUM YIELD STRENGTH.

NO SPLICES OF ANY KIND WILL BE PERMITTED IN POSTS INTENDED FOR USE IN CANTILEVER TYPE STRUCTURES (BRIDGE TYPE B/C).

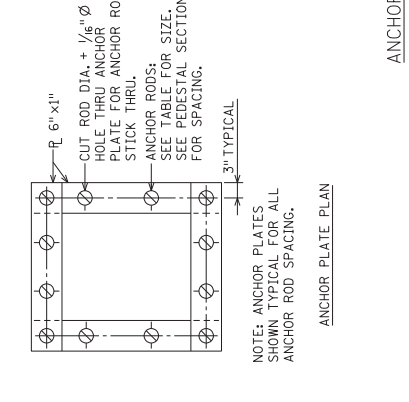
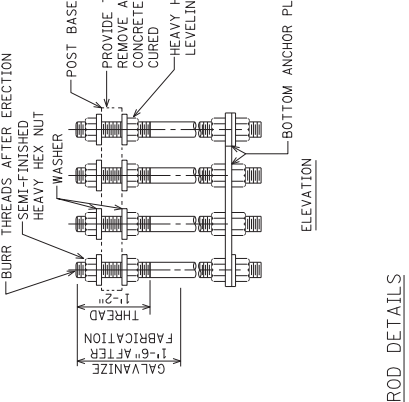
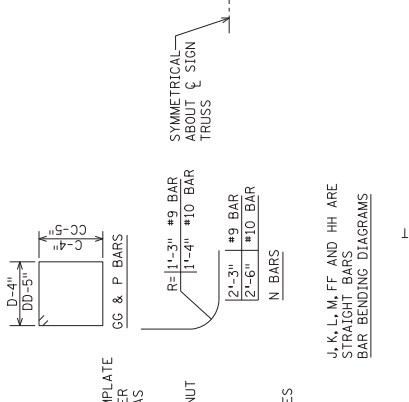
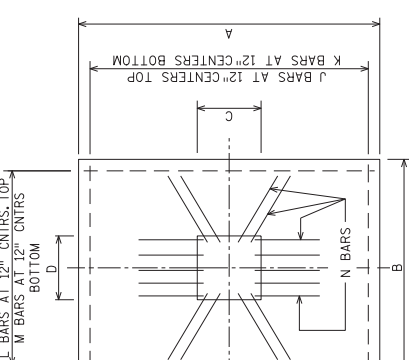
ONE OF TWO POSTS FOR SIMPLE SPAN STRUCTURES (BRIDGE TYPE S) MAY INCORPORATE ONE WELD PERMITTED AT THE SPlicing POINTS. ALL SPlicing POINTS SHALL BE WELDED PER THE UPPER 1/2 OF THE LENGTH. BACK UP BRACING FORMING WELDED SPLICES SHALL BE COMMERCIAL PRODUCTS. BUT WELDS REQUIRE RADIOGRAPHIC INSPECTION (MNDOT 2471.3).

ALL RADIOGRAPHIC INSPECTIONS AND MAGNETIC PARTICLE TESTING REPORTS AND RADIOGRAPHIC FILMS SHALL BECOME THE PROPERTY OF THE DEPARTMENT.

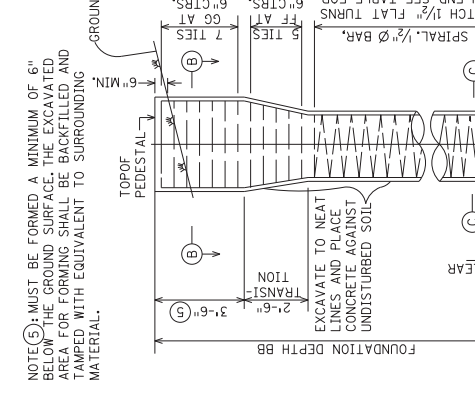
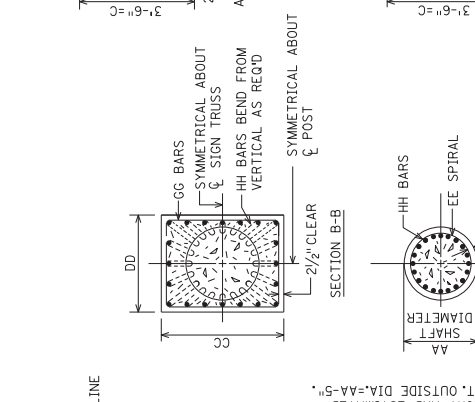
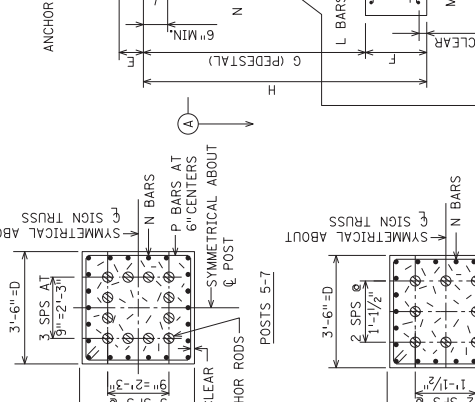
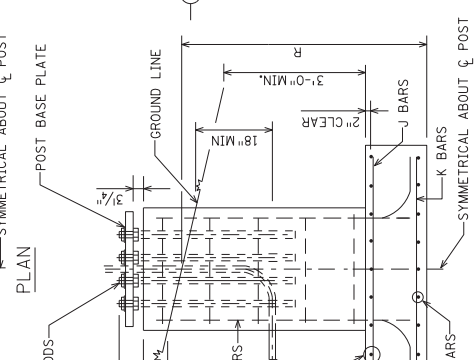
SEE DRAWING ST-4 FOR BASEPLATE DETAILS.

- SPECIFIC NOTES:**
1. G IS IN FEET. ROUND UP TO WHOLE NUMBER. E.G. G=4.10/20=8.2 NO. REQ'D=9.
 2. G AND R ARE IN FEET.
 3. BEND AS REQUIRED TO FORM A CLOSED LOOP.
 4. FOR STRUCTURE STEEL SEE SPREAD FOOTING.
 5. MUST BE FORMED A MIN. OF 6" BELOW THE GROUND SURFACE. THE SOIL EXCAVATED FOR FORMING SHALL BE BACKFILLED AND TAMPED TO EQUIVALENT COMPACTION AS SURROUNDING MATERIAL.
 6. SPECIAL LARGE RADIUS BARS ARE REQUIRED. SEE "BAR BENDING DIAGRAMS" FOR SIZES OF RADI.

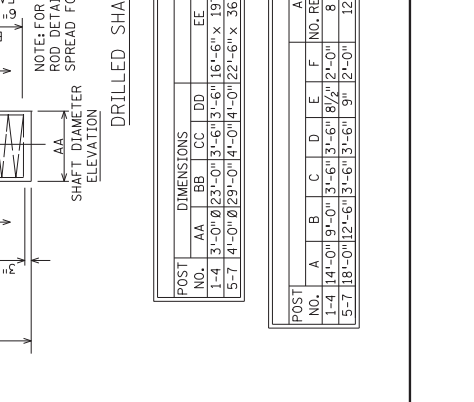
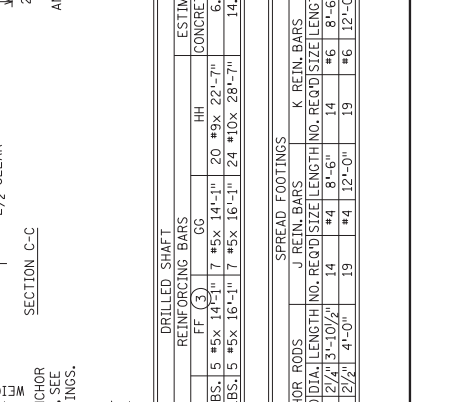
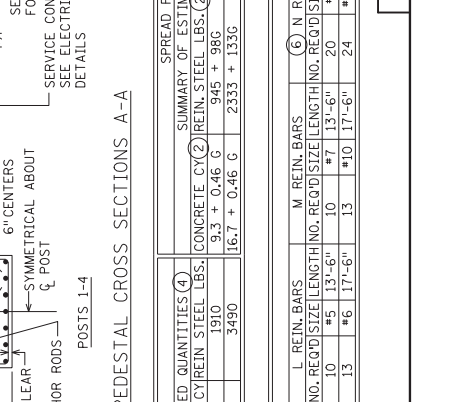
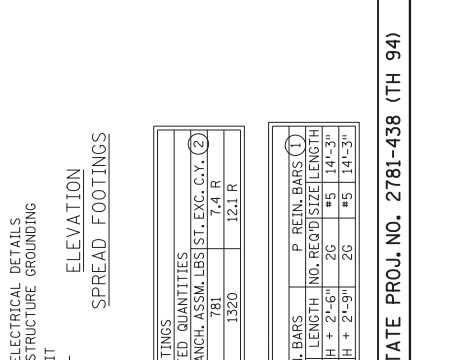
- GENERAL NOTES:**
1. SEE THE FORMAT SHEET FOR FOOTING LOCATIONS, POST DESIGNATIONS, TOP OF PEDESTAL ELEVATIONS AND BOTTOM OF FOOTING ELEVATIONS.
 2. ALL CONCRETE SHALL CONFORM TO CONCRETE MIX 3Y43 (MNDOT 246J).
 3. ALL BAR DIMENSIONS ARE OUT TO OUT OF BARS.
 4. ALL SPREAD FOOTINGS HAVE AN ALLOWABLE DESIGN BEARING PRESSURE OF 1 1/4 T PER SQUARE FOOT.
 5. DRILLED SHAFTS SHALL BE USED ONLY WHEN SPECIFIED IN THE CONTRACT PLANS.
 6. THE DRILLED SHAFTS HAVE AN ALLOWABLE DESIGN LATERAL BEARING PRESSURE OF 260 LBS. PER SQ. FT. PER FOOT OF DEPTH.
 7. UNLESS OTHERWISE NOTED, ALL REINFORCEMENT BARS SHALL BE EPOXY COATED IN ACCORDANCE WITH MNDOT3301. SPIRAL BARS AND J, K, L, & M BARS NEED NOT BE EPOXY COATED.
 8. THE FOLLOWING TORQUE VALUES SHALL BE USED WHEN INSTALLING ALL ANCHOR NUTS FOR OVERHEAD SIGN STRUCTURES:
ANCHOR BOLT DIAMETER TORQUE (FT./LBS.)
2 1/2" 375
2 3/4" 450
- THE CONTRACTOR SHALL BURR THE THREADS OF THE ANCHOR BOLTS IN ACCORDANCE WITH MNDOT 2402.5H AFTER TORQUING NUTS.



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- THE CONTRACTOR SHALL BURR THE THREADS OF THE ANCHOR BOLTS IN ACCORDANCE WITH MNDOT 2402.5H AFTER TORQUING NUTS.



SPREAD FOOTINGS		SUMMARY OF ESTIMATED QUANTITIES	
CONCRETE	CY (2)	REIN. STEEL LBS.	(2) ANCH. ASSM. LBS (ST. EXC. C.Y.)
9.3 + 0.46 G	945 + 98G	781	7.4 R
16.7 + 0.46 G	2333 + 133G	1320	12.1 R

SPREAD FOOTINGS		SUMMARY OF ESTIMATED QUANTITIES	
CONCRETE	CY (2)	REIN. STEEL LBS.	(2) ANCH. ASSM. LBS (ST. EXC. C.Y.)
9.3 + 0.46 G	945 + 98G	781	7.4 R
16.7 + 0.46 G	2333 + 133G	1320	12.1 R

PEDESTAL CROSS SECTIONS A-A		PEDESTAL CROSS SECTIONS I-I						
L REIN. BARS	M REIN. BARS	N REIN. BARS	P REIN. BARS					
NO. REQ'D	SIZE	LENGTH	NO. REQ'D	SIZE	LENGTH	NO. REQ'D	SIZE	LENGTH
10	#5	13'-6"	10	#5	13'-6"	20	#9	H + 2'-6"
13	#6	17'-6"	13	#6	17'-6"	24	#10	H + 2'-9"
19	#6	12'-0"	19	#6	12'-0"	19	#6	12'-0"
14	#4	8'-6"	14	#4	8'-6"	14	#4	8'-6"
20	#7	13'-6"	20	#7	13'-6"	20	#5	14'-3"
10	#5	13'-6"	10	#5	13'-6"	20	#5	14'-3"
13	#6	17'-6"	13	#6	17'-6"	24	#5	14'-3"

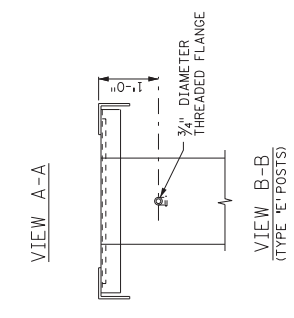
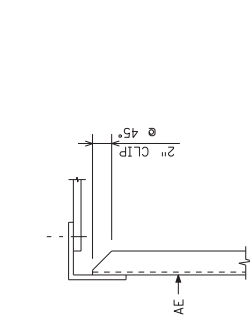
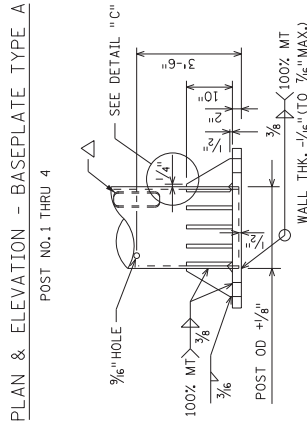
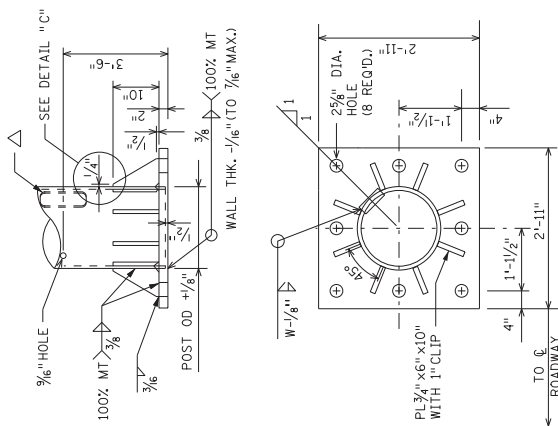
DRILLED SHAFT		ESTIMATED QUANTITIES	
CONCRETE	CY REIN. STEEL LBS.	CONCRETE	CY REIN. STEEL LBS.
6.9	1910	6.9	1910
14.1	3490	14.1	3490

STATE PROJ. NO. 2781-438 (TH 94) SHEET NO. 50 OF 55 SHEETS

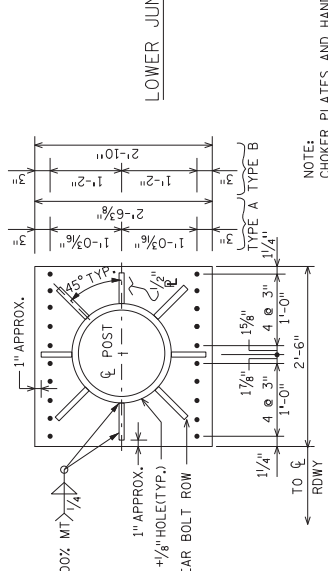
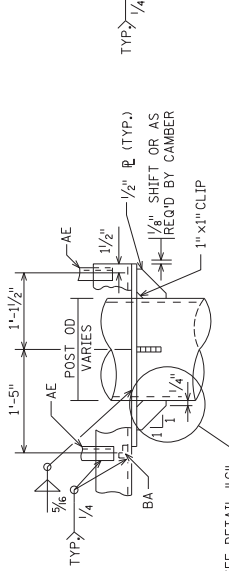
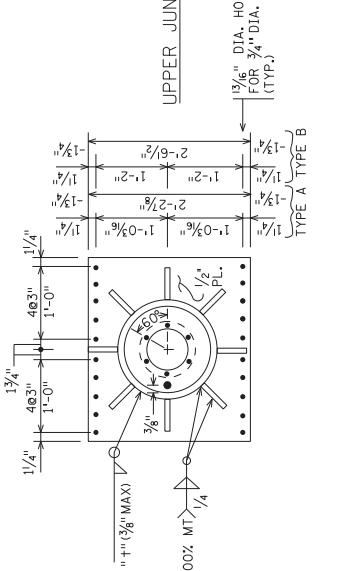
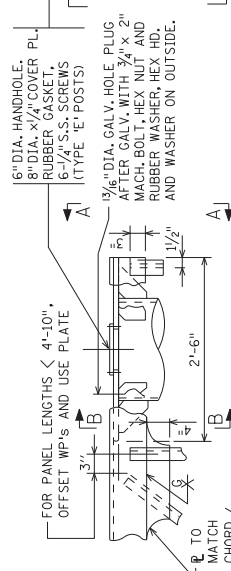
FOUNDATIONS AND ANCHOR RODS DRAWING ST-3

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B

REV. 10-2-2013



△ = FOR TYPE "E" POST ONLY; LOCATE 45° AWAY FROM TRAFFIC, 10" x 6" x 1/4" x 0'-2" STRUCTURAL TUBE OR EQUAL W/1/4" RUBBER GASKET.



NOTE: CHOKER PLATES AND HANDHOLE COVERS SHALL BE GALVANIZED SEPARATELY.

CANTILEVER TRUSS

NOTES:

TRUSS SECTIONS SHALL BE MADE IN MULTIPLES OF 6'-0", EXCEPT THAT THE BRACING PANEL NEAREST EACH POST MAY VARY TO MAKE UP THE NEAREST 6'-0" TO THE CENTERLINE OF THE POST. THE PERMITTED EXCEPT IN CANTILEVER TRUSSES AS NOTED BELOW.

CANTILEVER TRUSSES SHALL BE SUPPLIED AS A SINGLE UNIT WHENEVER POSSIBLE. WHEN CANTILEVER TRUSS LENGTH EXCEEDS 40'-0" CHORDS MAY BE SPLICED, AS SHOWN, IN THE END BRACING PANEL ONLY. CHORD SPLICES WELD SHALL BE COVERED BY PENETRATION, UNLESS OTHERWISE SHOWN. ALL WELDS SHALL BE 1/4" FILLET WELDS ALL AROUND.

CMS SIGNS.

PROVIDE 2-1/8" BRASS, STAINLESS STEEL OR GALVANIZED STEEL SHIMS AT EACH FLANGE TO BRING TRUSSES TO CORRECT CAMBER AND ALIGNMENT. TRUSSES SHALL BE SHIP ASSEMBLED AND MATCH MARKED.

ALL VIEWS OF THE TRUSSES ARE DRAWN FROM THE INSIDE OF THE TRUSS LOOKING OUT.

SEE DRAWING ST-4 FOR POST CONNECTION DETAILS.

WELDED BUTT SPLICE PERMITTED ON CANTILEVER END OF CHORDS LONGER THAN 40'-0".

DRILL 5/16" DIA. PUNCHED OR DRILLED HOLE FOR WALKWAY ATTACHMENT. PROVIDE 1/2" DIA. PUNCHED OR DRILLED HOLE FOR WALKWAY ATTACHMENT EXCEPT AT ENDS OF CANTILEVERS.

NOTE: THE BOTTOM VIEW IS DETAILED TO PROVIDE FOR WALKWAY ATTACHMENT. WHERE THE WALKWAY IS OMITTED, PROVIDE STRUT BA AS INDICATED IN THE TOP VIEW.

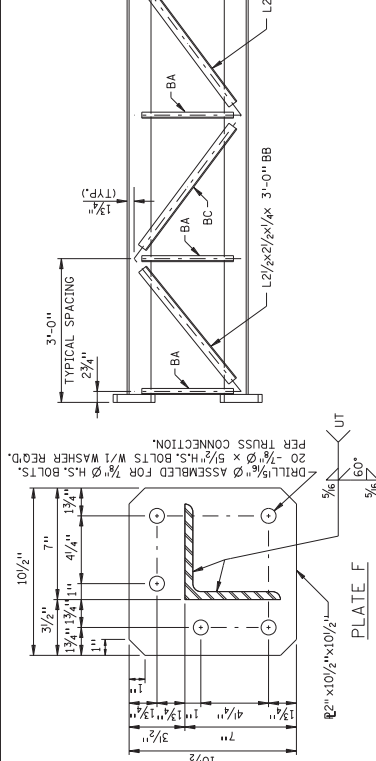
STATE PROJ. NO. 2781-438 (TH 94)

SHEET NO. 52 OF 55 SHEETS

DRAWING ST-5

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B

SIGN TRUSS DETAILS TRUSS TYPE A



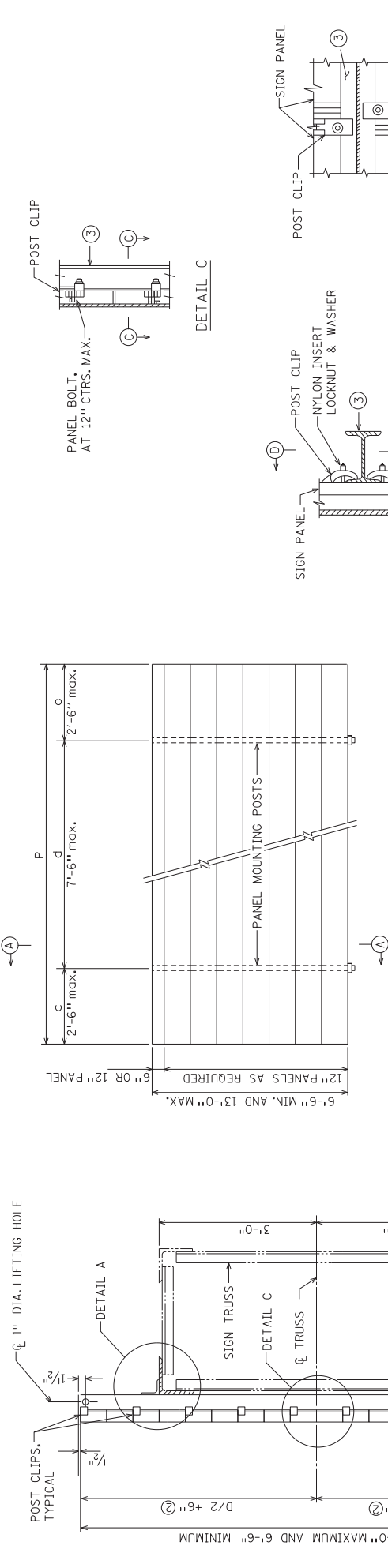
PLATTED/REVISED: 1/28/2016

PLOT NAME: URBAN FREEWAY PLAN TRPICALSD8

PLOT NAME: URBAN FREEWAY PLAN TRPICALSD8

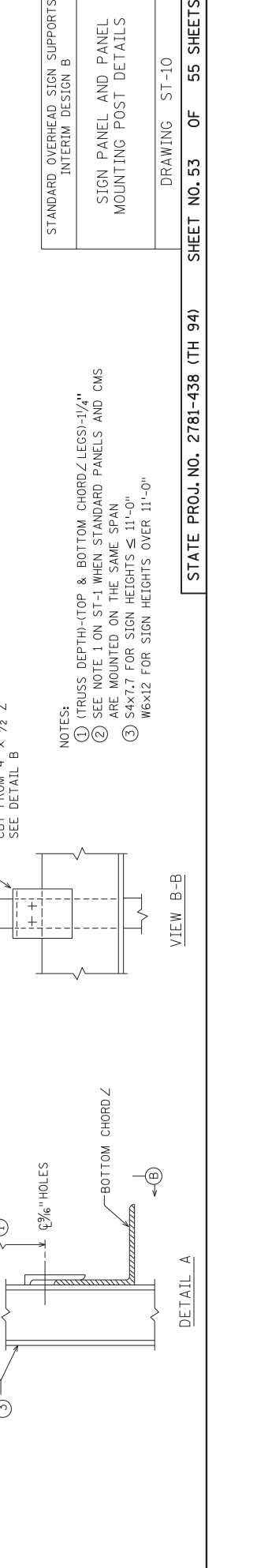
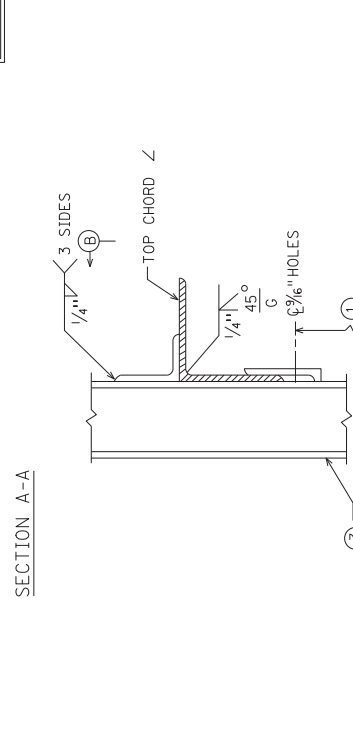
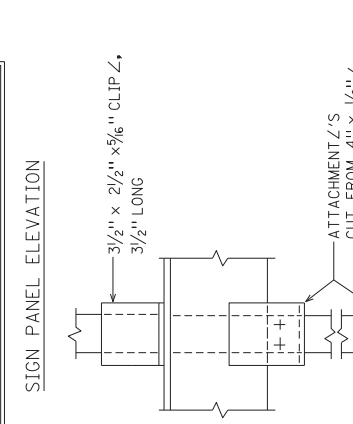
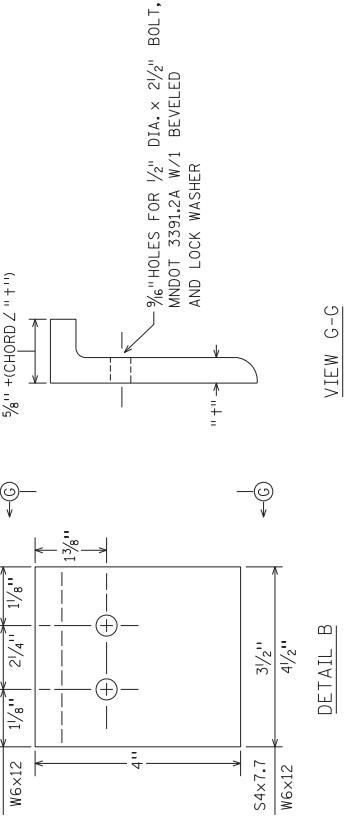
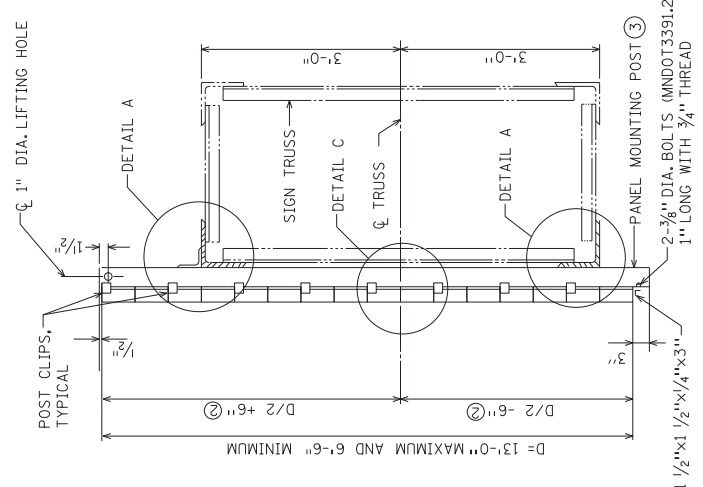
FILE NAME: IP-PMP-PTT21848-URBAN FREEWAY PLAN TRPICALSD8

REV. 10-2-2013



PANEL MOUNTING POST	
NO. OF POSTS	2
	P=144" OR LESS, C=207P, d=586P
	P=150" THRU 204", C=149P, d=355P
	P=210" THRU 276", C=107P, d=262P
	P=282" THRU 348", C=084P, d=208P
	P=354" THRU 420", C=070P, d=172P
	P=426" THRU 492", C=059P, d=147P

POST SPACING MAY BE ADJUSTED AS REQUIRED IF CONFLICT WITH TRUSS DETAILS IS ENCOUNTERED.



STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

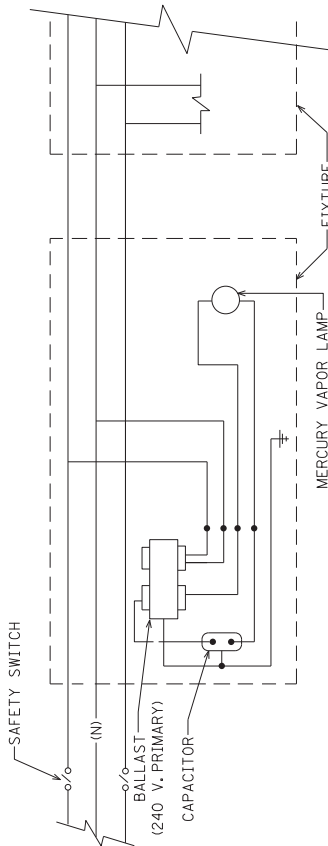
SIGN PANEL AND PANEL
MOUNTING POST DETAILS

DRAWING ST-10

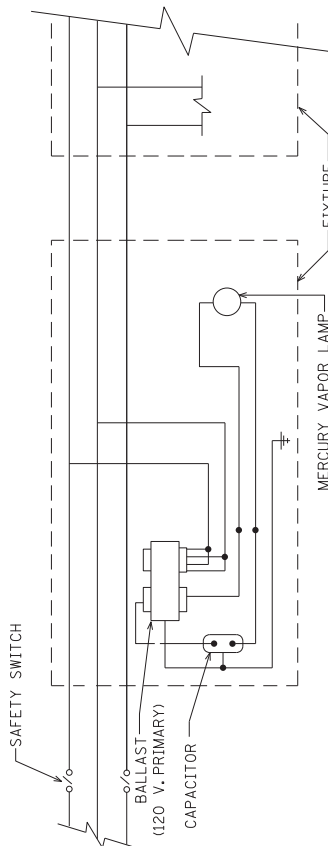
STATE PROJ. NO. 2781-438 (TH 94)

SHEET NO. 53 OF 55 SHEETS

NOTES:
 ① TRUSS DEPTH-(TOP & BOTTOM CHORD) LEGS=1/4"
 ② SEE NOTE 1 ON ST-1 WHEN STANDARD PANELS AND CMS ARE MOUNTED ON THE SAME SPAN
 ③ S4x7.7 FOR SIGN HEIGHTS ≤ 11'-0"
 W6x12 FOR SIGN HEIGHTS OVER 11'-0"



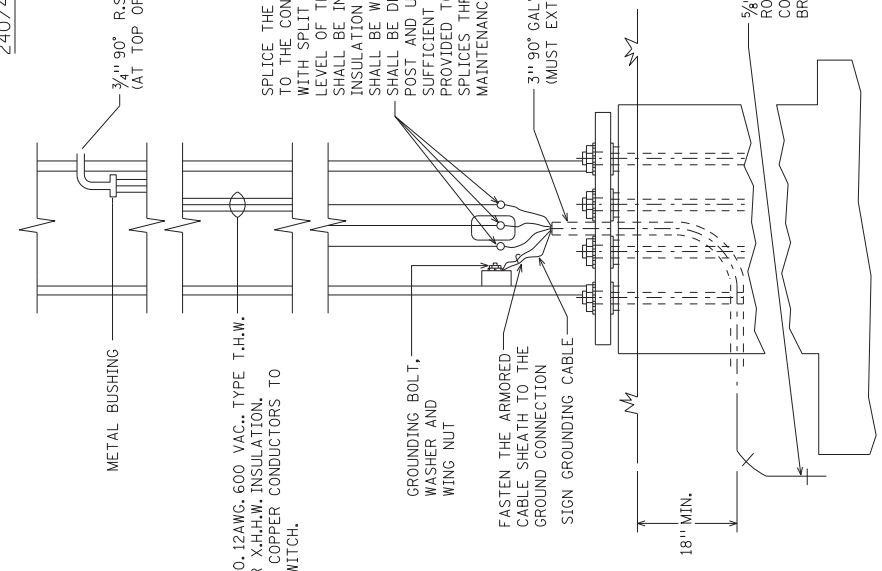
240/480 V. CIRCUIT



120/240 V. CIRCUIT

TYPICAL CIRCUIT DIAGRAMS

3/4" 90° R.S.C. ELBOW WITH COUPLING WELDED INTO POST.
(AT TOP OF CHORD ANGLE ON LOWER JUNCTION)



SIGN BASE DETAIL

- ELECTRICAL NOTES:
1. WHEN SIGN LIGHTING SYSTEMS HAVE BEEN COMPLETED, THE CONTRACTOR SHALL, WITHOUT FURTHER COMPENSATION, CONDUCT BURNING AND RESISTANCE TESTS FOR FINAL ACCEPTANCE. THE RESISTANCE TO GROUND OF EACH UNGROUNDED CONDUCTOR SHALL BE NOT LESS THAN 8 MEGOHMS.
 2. ALL FITTINGS, HUBS, UNIONS, BUSHINGS, ETC. SHALL BE SUPPLIED AS PART OF CONDUIT. CONDUIT ENTERING SIGN POSTS SHALL HAVE INSULATED GROUNDING BUSHINGS INSTALLED BEFORE PULLING WIRE.
 3. CONDUIT ON STRUCTURE SHALL BE SURFACED MOUNTED, STRAPPED AT EVERY ANGLE BRACE WITH U-BOLT TYPE CLAMPS.
 4. SUCCESSIVE LIGHTING FIXTURES SHALL BE CONNECTED ON ALTERNATE SIDES OF THE 3-WIRE CIRCUIT.
 5. THE CABLE SHEATH SHALL EXTEND AT LEAST 4" ABOVE THE TOP OF THE CONDUIT END AND THE TAPE ARMOR OF ARMORED CABLE SHALL BE CONNECTED TO THE GROUNDING BOLT IN THE SIGN POSTS.
 6. WIRING FROM THE SAFETY SWITCH TO LIGHTING FIXTURES SHALL BE 1/2 NO. 12 AWG AND SHALL BE RUN IN 3/4" R.S.C. ALL SPLICING SHALL BE ACCOMPLISHED WITH A WIRE NUT AND WATERPROOF COATING. ALL CONDUIT CONNECTIONS SHALL BE RAIN TIGHT.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
ELECTRICAL DETAILS
DRAWING ST-12
STATE PROJ. NO. 2781-438 (TH 94) SHEET NO. 54 OF 55 SHEETS

OH 94-629 (OLD OH 94-352)

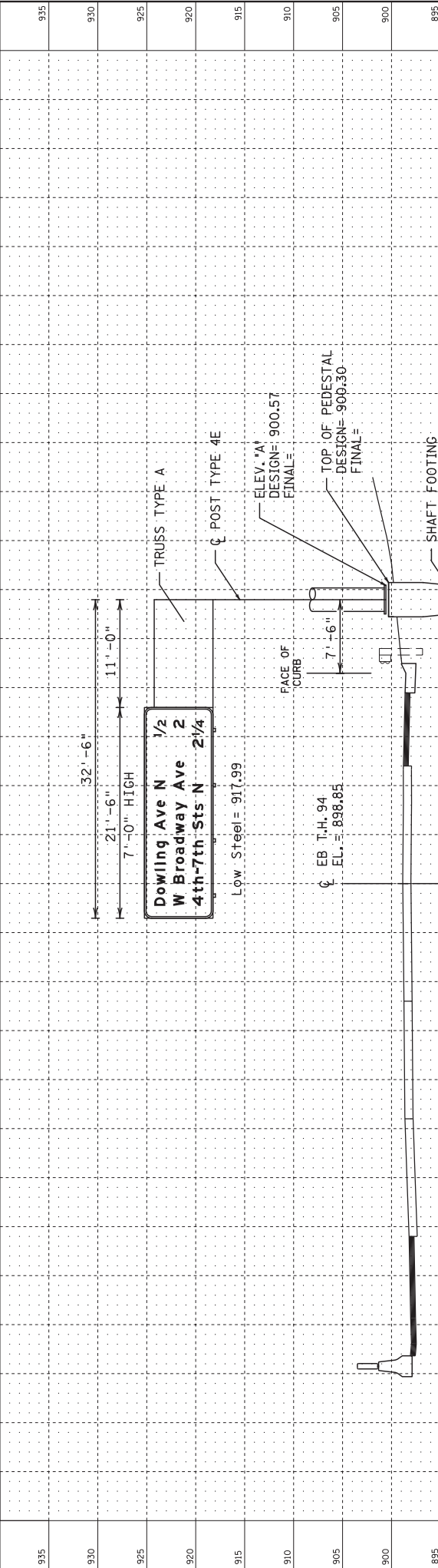
E.B. T.H. 94

STA. 317+75

QUANTITIES

	DESIGN	FINAL
POST STEEL (ANCHORAGE ASSEMBLY)	781 POUNDS	_____
TRUSS STEEL	POUNDS	_____
WALKWAY SUPPORT STEEL	POUNDS	_____
WALKWAY GRATING STEEL	POUNDS	_____
PANEL MOUNTING POST STEEL	296 POUNDS	_____
CONCRETE (SHAFT) FOOTINGS	6.9 CU YDS	_____
SIGN PANELS TYPE OH	150.5 SQ FT	_____

- NOTES: 1. LOW STEEL IS BOTTOM OF PANEL MOUNTING POSTS ON TALLEST PANEL.
 2. STRUCTURE IS DESIGNED FOR FUTURE WALKWAY.



OH 94-629

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10. FREEWAY SAMPLE PLAN (RURAL)

The following is a handout of a freeway sample plan (Rural). This sample plan can be downloaded from the OTST Signing website, <http://www.dot.state.mn.us/trafficeng/signing/plans.html>.

INDEX

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
ST1	QUANTITIES
ST2-ST11	TABULATIONS
ST12-ST24	ROADWAY LAYOUTS
ST25-ST33	SIGN PANEL LAYOUTS
ST34-ST50	DETAILS
ST51-ST63	CROSS SECTIONS

TABULATION OF QUANTITIES			ST	
TAB	SHEET NO	ITEM	UNIT	TOTAL SIGNING QUANTITIES
		REMOVE DELINEATOR	EACH	14
		REMOVE MARKER	EACH	4
STA	ST2	REMOVE SIGN TYPE A	EACH	3
		REMOVE SIGN TYPE C	EACH	30
STE	ST6	REMOVE SIGN TYPE D	EACH	14
STM	ST8	REMOVE SIGN TYPE EA	EACH	1
STG	ST6	SALVAGE SIGN TYPE D	EACH	1
STJ	ST8	SALVAGE SIGN TYPE EA	EACH	1
STR	ST11	CONCRETE FOOTINGS (TYPE OH SPREAD)	CU YD	18.7
STR	ST11	CONCRETE FOOTINGS (TYPE OH SHAFT)	CU YD	14.1
STB	ST3	STRUCT STEEL-POSTS FOR TYPE A SIGNS	(P) POUND	1904
STR	ST11	STRUCT STEEL-POSTS FOR OH SIGNS (B)	(P) POUND	12645
STR	ST11	STRUCT STEEL-TRUSSES FOR OH SIGNS (B)	(P) POUND	8057
STR	ST11	STR STEEL-PANEL MT PST FOR OH SIGNS (B)	(P) POUND	1032
STB	ST3	SIGN PANELS TYPE A	SQ FT	231
STD,STH	ST4,ST5	SIGN PANELS TYPE C	SQ FT	405
STI,STF	ST5,ST7	SIGN PANELS TYPE D	SQ FT	576
STK,STN	ST8	SIGN PANELS TYPE EA	(P) SQ FT	50
STO	ST8	SIGN PANELS TYPE EO	(P) SQ FT	45
STU	ST2	SIGN PANELS TYPE OVERLAY	SQ FT	97
STC	ST2	SIGN PANELS TYPE OH	(P) SQ FT	338
STQ	ST10	SIGN PANEL OVERLAY TYPE A	(P) SQ FT	538
STL	ST8	SIGN PANEL OVERLAY TYPE OH	(P) SQ FT	105
STG	ST6	SIGN PANEL OVERLAY TYPE EA	(P) SQ FT	23
STJ	ST8	INSTALL SIGN TYPE D	EACH	1
STP	ST10	INSTALL SIGN TYPE EA	EACH	1
STV	ST9	OVERHEAD SIGN IDENTIFICATION PLATE	EACH	1
STT	ST9	DELINEATOR	EACH	14
STW	ST9	REFERENCE LOCATION SIGN	EACH	2
		CLEARANCE MARKER X4-4	EACH	2

(P) DENOTES PLAN QUANTITY

I HEREBY CERTIFY THAT SHEETS ST1-ST63 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: ROBERT HEENAN LICENSE # 1982
 DATE: 1/28/2016 SIGNATURE: _____
 DESIGN SQUAD N. BOCKWINKEL, K. PETERA

QUANTITIES

REMOVE SIGN TYPE A										STA	
SIGN NO	QTY EACH	LOCATION	PANEL SIZE (1)		FLAT SHEET	SIZE (1)		POSTS		L1 FEET	L2 FEET
			EXTRUDED TYPE	INCH		BREAK-AWAY	NON BREAK-AWAY				
A 194-122	1	878+50 EB	198 x 168			W 8 x 24				21.5	22.5
A 194-123	1	915+50 WB	198 x 162			W 8 x 24				24.0	23.5
A 194-125	1	965+25 WB	198 x 156			W 8 x 24				20.0	21.0
TOTAL	3										

SPECIFIC NOTE:
(1) SIZES ARE APPROXIMATE

SIGN PANEL OVERLAY TYPE A				STC	
SIGN NO	LOCATION	OVERLAY		AREA SQ FT	
		INCH	SQ FT		
A 194-120	780+00 EB	192 x 150	200.00		
A 194-121	834+00 EB	192 x 150	200.00		
A 194-124	941+25 WB	144 x 138	138.00		
TOTAL			538.00		

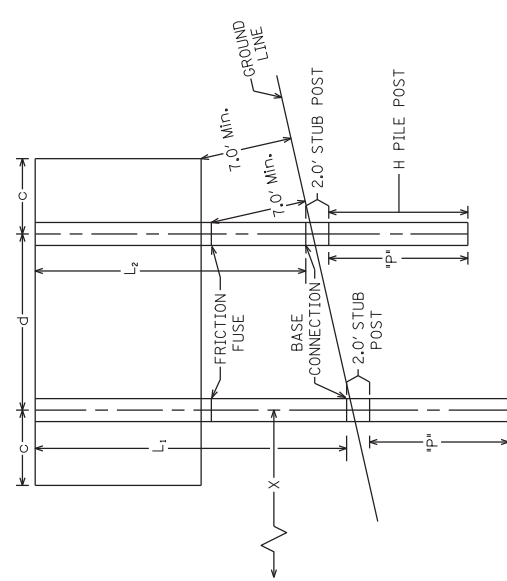
GENERAL NOTE:
1. SEE SHEET ST26 FOR SIGN PANEL OVERLAYS.

SIGN PANELS TYPE OVERLAY						STU	
CODE NO.	QTY	SIZE INCH	AREA SQ FT	TOTAL SQ FT	LEGEND		
M1-1	10	24 x 24	4.00	40.00	INTERSTATE 94		
M1-SB	5	36 x 36	9.00	45.00	MINNESOTA 25		
M1-SB	2	24 x 24	4.00	8.00	MINNESOTA 25		
M1-6A	1	24 x 24	4.00	4.00	COUNTY 8		
TOTAL			4.00	97.00			

DRAWN BY: LBJ CHECKED BY: RFK CERTIFIED BY: _____ LIC. NO. _____ DATE: 1/28/2016 STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST2 OF ST53 SHEETS

TABULATIONS-TYPE A AND OVERLAYS

SIGN TYPE A (H PILE FOOTINGS)		PANEL		POST		PILE		TOTAL	
SIGN NO	LOCATION	SIZE	AREA	QTY	WEIGHT	c	d	"P"	"X"
		INCH	SQ. FT.						
A 194-504	878+50 EB	198 X 168	231.00	2	1328.00	41	116	12	30
		TOTAL			118				
		TOTAL			1904.00				



BREAKAWAY POSTS-H-PILE FOOTING
(L1 IS POST NEAREST ROADWAY)

TYPE A SIGNS

POST QUANTITIES			
POST SIZE	QUANTITY (1)	POST SIZE	QUANTITY (1)
W4X13	59+13 LBS/FT	W8X28	143+28 LBS/FT
W5X16	67+16 LBS/FT	W8X31	173+31 LBS/FT
W6X20	104+20 LBS/FT	W10X39	195+39 LBS/FT
W8X24	118+24 LBS/FT		

SPECIFIC NOTE:
(1) CONSTANT INCLUDES STUB POST WEIGHT.

- GENERAL NOTES:
- PILE SHALL BE THE SAME SIZE AS THE SIGN POST AND IS TO BE DRIVEN TO A 12 TO 14 TON BEARING CAPACITY.
 - SEE SHEETS ST36 AND ST37 FOR STRUCTURAL DETAILS.
 - POST LENGTHS ARE APPROXIMATE.
 - "X" IS THE DISTANCE FROM THE EDGE OF THE THRU LANE TO THE FIRST POST.
 - "H" IS THE HEIGHT ABOVE THE THRU LANE EDGE TO THE BOTTOM OF SIGN PANEL.
 - "P" IS THE LENGTH OF THE H PILE POST.
 - SEE SHEET ST51 FOR CROSS SECTION.
 - SEE SHEET ST25 FOR SIGN PANELS.

SIGN NO	QTY	NO & TYPE	POSTS		MTG HT (1) FEET	PANEL			CODE NO	PANEL LEGEND	STD
			KNEE BRACES QTY	LENGTH FEET		SIZE INCH	AREA SQ FT	TOTAL AREA SQ FT			
C-1	1	2-U	1	17	7	36 x 18	4.50	4.50	M3-4A	WEST (BLUE)	
C-2	3	2-U	2	21	7	36 x 36	9.00	9.00	M1-1	94	
C-3	3	2-U	1	17	7	48 x 96	32.00	96.00	R2-4B	SPEED LIMIT TO MINIMUM 40	
C-4	1	2-U	1	17	7	48 x 48	16.00	48.00	W4-1R	MERGE RIGHT	
C-5	1	2-U	1	17	7	36 x 18	4.50	4.50	M3-2A	EAST (BLUE)	
C-6	2	2-U	1	19	7	36 x 36	9.00	9.00	M1-1	94	
C-7	1	2-U	1	17	7	36 x 36	9.00	9.00	R3-4	NO U-TURN	(3)
C-8	1	(5)			7	48 x 48	16.00	32.00	W3-3	SIGNAL AHEAD	
C-9	2	2-U	1	16	7	48 x 12	4.00	4.00	E10-9R	CAMPING	
C-10	3	1-ST	1	11	7	54 x 18	6.75	6.75	R6-1R	ONE WAY RIGHT	(3)
C-11	1	2-U	1	16	7	54 x 18	6.75	6.75	R6-1L	ONE WAY LEFT	
C-12	3	2-U	1	17	7	48 x 48	16.00	48.00	R5-1	DO NOT ENTER	
C-13	2	2-U	1	15	7	18 x 24	3.00	6.00	R5-10D	PEDS PROHIBITED	
C-14	2	2-U	1	15	7	42 x 30	8.75	17.50	R5-1A	WRONG WAY	
C-15	1	2-U	1	14	7	48 x 12	4.00	4.00	E10-9L	CAMPING	
C-16	1	2-U	1	15	7	54 x 30	11.25	11.25	R3-30ACA	L-T-R	
C-17	1	(5)			7	54 x 18	6.75	6.75	R6-1L	ONE WAY LEFT	(3)
C-18	1	1-ST		11	7	24 x 30	5.00	5.00	R4-7	KEEP RIGHT	(3)
						24 x 24	4.00	4.00	R3-2	NO LEFT TURN	(3)
						TOTAL		392.75			

SPECIFIC NOTES:

- (1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET ST39 FOR TYPICAL MOUNTING.
- (2) FOR PUNCHING DETAILS, SEE SHEET ST40.
- (3) MOUNT BACK TO BACK.
- (4) MOUNT IN CONCRETE, SEE SHEET ST41.
- (5) MOUNT ON SIGNAL POLE

GENERAL NOTES:

- POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
- SEE SHEETS ST38 TO ST40 FOR STRUCTURAL DETAILS.
- SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS OF TYPE C SIGN PANELS.

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY: _____

LIC. NO. _____

DATE: 1/28/2016

SHEET NO. ST4

OF ST53 SHEETS

TABLATIONS-TYPE C

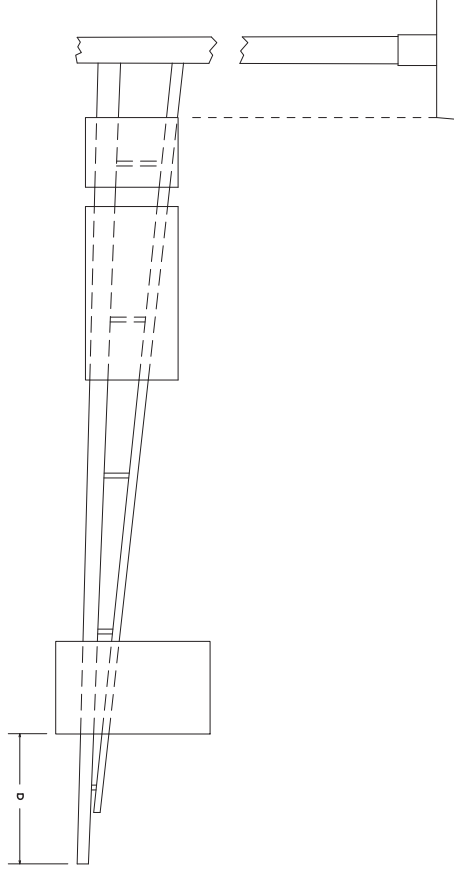
SIGN PANELS TYPE C (MAST ARM MOUNTED)										STH
SIGN NO	SIGNAL SYSTEM	POLE NO	QTY	PANEL		MOUNTING BRACKET		PANEL LEGEND		
				SIZE INCH	AREA SQ FT	CODE	NUMBER			SPACING (1)
C-19	TH 25/94		1	36	48	12.00	R10-12	2	24	LEFT TURN YIELD ON GREEN
					TOTAL SQ FT		12.00			

SPECIFIC NOTES:

- SPACING BETWEEN STIFFENERS SHALL NOT EXCEED 36 INCHES AND SHALL BE UNIFORMLY SPACED. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL, PAGE 105A FOR BRACKET SPACING REQUIREMENTS.
- SPACE SIGNS EVENLY BETWEEN SIGNAL HEADS, EVP DEVICES, SIGNAL POLE AND OTHER SIGNS. WHEN POSSIBLE ALIGN LANE USAGE SIGNS IN THE CENTER OF APPROACHING LANES.

GENERAL NOTES:

- FOR STRUCTURAL DETAILS OF MAST ARM MOUNTED SIGNS SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL, PAGE 105A.
- FOR TYPE D STRINGER AND PANEL JOINT DETAILS SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL, PAGE 105.



SIGN PANELS TYPE D (MAST ARM MOUNTED)										STI
SIGN NO	SIGNAL SYSTEM	POLE NO	QTY	PANEL		MOUNTING BRACKET		PANEL LEGEND		
				SIZE INCH	AREA SQ FT	NUMBER	SPACING (1)			
D-5	TH 25/94		1	42	60	17.50		2	30	WEST 94 LEFT ARROW
D-8	TH 25/94		2	42	54	15.75		2	30	25 DOUBLE ARROW
D-9	TH 25/94		1	42	66	19.25		2	30	EAST 94 NEXT RIGHT
D-10	TH 25/94		1	42	60	17.50		2	30	WEST 94 RIGHT ARROW
					TOTAL SQ FT		85.75			

SPECIFIC NOTES:

- SPACING BETWEEN STIFFENERS SHALL NOT EXCEED 36 INCHES AND SHALL BE UNIFORMLY SPACED. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL, PAGE 105A FOR BRACKET SPACING REQUIREMENTS.
- SPACE SIGNS EVENLY BETWEEN SIGNAL HEADS, EVP DEVICES, SIGNAL POLE AND OTHER SIGNS. WHEN POSSIBLE ALIGN LANE USAGE SIGNS IN THE CENTER OF APPROACHING LANES.

GENERAL NOTES:

- FOR STRUCTURAL DETAILS OF MAST ARM MOUNTED SIGNS SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL, PAGE 105A.
- FOR TYPE D STRINGER AND PANEL JOINT DETAILS SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL, PAGE 105.
- SEE SHEETS ST27 TO ST29 FOR SIGN PANELS.

REMOVE SIGN TYPE D					STE
SIGN NO	QTY EACH	POSTS NO & TYPE	PANEL SIZE (1) INCH		PANEL LEGEND
			KNEE & BRACES QTY	HT	
D-101	1	2-U	2	108 x 60	BIG LAKE EXIT 193
D-102	1	2-U	2	132 x 54	MONTICELLO NEXT 2 EXITS
D-103	2	2-U	2	72 x 84	EXIT 193
D-104	1	2-U	2	102 x 54	BUFFALO-MONTICELLO-BIG LAKE
D-105	1	(2)	48 x 66		WEST 94 LEFT ARROW
D-106	1	2-U	2	78 x 78	UP ARROW EAST/ 94 /WEST RIGHT ARROW
D-107	2	(2)	42 x 54		25 DOUBLE ARROW
D-108	1	(2)	42 x 66		EAST 94 NEXT RIGHT
D-109	1	(2)	1	42 x 60	WEST 94 RIGHT ARROW
D-110	1	2-U	2	102 x 66	EAST 94 MINNEAPOLIS ST PAUL
D-111	1	2-U	2	102 x 54	MONTICELLO BIG LAKE BUFFALO
D-112	1	3-U	3	108 x 66	UP ARROW WEST/94/EAST RIGHT ARROW
TOTAL	14				

SPECIFIC NOTE:
 (1) SIZES ARE APPROXIMATE.
 (2) MAST ARM MOUNTED.

SALVAGE & INSTALL SIGN TYPE D					STG		
SIGN NO	QTY EACH	POSTS NO & TYPE	MTG HT (1) FEET		PANEL SIZE INCH	PANEL LEGEND	
			KNEE & BRACES QTY	SPACING LENGTH			
D-201	1	2-U	2	72	17	120 x 48	HOSPITAL EXIT 194
TOTAL	1						

SPECIFIC NOTE:
 (1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET ST39 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 ST38 TO ST40 FOR STRUCTURAL DETAILS.
3. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR TYPE D STRINGER AND PANEL JOINT DETAILS.

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY:

LIC. NO. _____

DATE 1/28/2016

STATE PROJ. NO. 8680-515 (TH 94)

SHEET NO. ST6

OF ST53 SHEETS

TABULATIONS-TYPE D

SIGN NO	QTY EACH	POSTS			MTG HT (1)	PANEL			PANEL LEGEND	
		NO & TYPE	KNEE BRACES QTY	LENGTH FEET		SPACING INCH	SIZE INCH	AREA SQ FT		TOTAL AREA SQ FT
D-1	1	2-U	2	18	66	7	108 x 60	45.00	45.00	Big Lake EXIT 193
D-2	1	3-U	3	18	45	7	132 x 60	55.00	55.00	Monticello NEXT 2 EXITS
D-3	2	2-U	2	20	42	7	72 x 84	42.00	84.00	EXIT 193
D-4	1	2-U	2	17	60	7	102 x 54	38.25	38.25	Buffalo Monticello Big Lake
D-6	2	2-U	2	17	30	7	42 x 54	15.75	31.50	JCT 94
D-7	1	2-U	2	18	54	7	84 x 66	38.50	38.50	WEST 94 St Cloud
D-11	1	3-U	3	18	45	7	108 x 66	49.50	49.50	EAST 94 Minneapolis St Paul
D-12	1	2-U	2	17	60	7	102 x 54	38.25	38.25	Monticello Big Lake Buffalo
D-13	1	2-U	2	18	30	7	48 x 66	22.00	22.00	EAST 94
D-14	1	3-U	3	18	45	7	108 x 66	49.50	49.50	EAST 94 Minneapolis St Paul
D-15	1	2-U	2	18	54	7	84 x 66	38.50	38.50	WEST 94 St Cloud
TOTAL									490.00	

SPECIFIC NOTES:
 (1) MOUNTING HEIGHT IS MINIMUM (WITH A +6 INCH TOLERANCE) SEE SHEET ST39 FOR TYPICAL MOUNTING.
 (2) SEE STANDARD SIGNS AND MARKINGS MANUAL (E5-1).

GENERAL NOTES:
 1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
 2. SEE SHEETS ST38 TO ST40 FOR STRUCTURAL DETAILS.
 3. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR TYPE D STRINGER AND PANEL JOINT DETAILS.
 4. SEE SHEETS ST27 TO ST29 FOR SIGN PANELS.

DRAWN BY: LBJ

CHECKED BY: RFK

LIC. NO. _____

DATE 1/28/2016

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST7

TABULATIONS-TYPE D

OF ST53 SHEETS

SALVAGE & INSTALL SIGN TYPE EA						STJ				
SIGN NO	QTY EACH	INSTALL LOCATION	PANEL SIZE		POSTS					
			SALVAGE INCH	INSTALL INCH	NO. & TYPE	SPACING				
EA-201	1	A94-001	108	x	24	108	x	30	3-U	36
TOTAL	1									EXIT 193

- GENERAL NOTES:
 1. SEE SHEET ST42 FOR TYPE EA STRUCTURAL DETAIL.
 2. TYPE EA POST SPACING MAY BE VARIED TO MISS MEMBERS OF A SIGN STRUCTURES.

SIGN PANELS TYPE EA (EXTRUDED PANEL SECTIONS)						STK				
SIGN NO	QTY	LOCATION	PANEL		REQUIRED PANEL SIZE					
			SIZE INCH	AREA SQ.FT	INCH	AREA SQ.FT				
EA-201	1	A194-001	108	x	6	4.50	108	x	30	4.50
TOTAL						4.50				4.50

SIGN PANEL OVERLAY TYPE EA						STL	
SIGN NO	QTY	LOCATION	PANEL OVERLAY		TOTAL		
			SIZE INCH	AREA SQ.FT	NO	SPACING	
EA-201	1	A194-001	108	x	30	22.50	22.50
TOTAL						22.50	22.50

REMOVE SIGN TYPE EA						STM	
SIGN NO	QTY EACH	LOCATION	POSTS NO & TYPE	PANEL		LEGEND	
				SIZE (IN)	AREA (SQ.FT)	NO	SPACING
EA-101	1	A194-002	3-U	108	x	30	EXIT 193
TOTAL	1						

SIGN PANELS TYPE EA						STN	
SIGN NO	QTY	LOCATION	PANEL		POSTS		
			SIZE (IN)	AREA (SQ.FT)	NO	SPACING	
EA-1	2	A194-002, A194-257	108	x	30	22.50	45.00
TOTAL						22.50	45.00

- GENERAL NOTES:
 1. SEE SHEET ST43 FOR STRUCTURAL DETAIL.
 2. POST SPACING MAY BE VARIED TO MISS MEMBERS OF A SIGN STRUCTURES.
 3. SEE SHEET ST30 FOR SIGN PANELS.

SIGN PANELS TYPE EO						STO	
SIGN NO	QTY	LOCATION	PANEL SIZE		TOTAL AREA (SQ.FT)		
			SIZE (IN)	AREA (SQ.FT)	NO	SPACING	
EO-1	2	OH 194-627, OH 194-628	108	x	30	22.50	45.00
TOTAL						22.50	45.00

- GENERAL NOTES:
 1. SEE SHEET ST43 FOR STRUCTURAL DETAIL.
 2. POST SPACING MAY BE VARIED TO MISS MEMBERS OF OH SIGN STRUCTURES.
 3. SEE SHEET ST30 FOR SIGN PANELS.

DELINEATOR				STV
CODE NO	QUANTITY			TOTAL
	WHITE	6	YELLOW	
X4-6	6	8	8	14

(1)

SPECIFIC NOTE:

(1) PLACE ON 3LB/FT POST (MNDOT 3401).

GENERAL NOTES:

1. FOR DELINEATOR PLACEMENT, SEE SHEET ST35.
2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR DELINEATOR DESIGN.

REFERENCE LOCATION SIGN (1)				STT
CODE NO	QTY EACH	SIZE		LEGEND
		12	x 48	
D10-3	2	12	x	48

SPECIFIC NOTE:

(1) PLACE ON 3 LB/FT POST (MNDOT 3401).

GENERAL NOTE:

1. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR REFERENCE LOCATION SIGN.

OBJECT MARKER				STW
CODE NO	X4-4(C)	SIZE		QUANTITY EACH
		12	x 24	
X4-4	2	12	x	24

(1)

TOTAL QUANTITIES

CODE NO	X4-4	QUANTITY EACH	2
---------	------	---------------	---

SPECIFIC NOTE:

(1) PLACE ON 3LB/FT POST (MNDOT 3401).

GENERAL NOTES:

1. FOR MARKER PLACEMENT, SEE SHEET ST35.
2. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR MARKER DESIGN.

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY

LIC. NO.

DATE 1/28/2016

TABULATIONS

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST9 OF ST53 SHEETS

SIGN PANELS TYPE OH						STS
SIGN NO	LOCATION	PANEL		PANEL SIZE (IN.)	PANEL AREA (SQ. FT.)	TOTAL AREA (SQ. FT.)
		SIZE (IN.)	AREA (SQ. FT.)			
OH I94-627	914+00 WB	156 x 144	156.00			156.00
OH I94-628	966+00 WB	168 x 156	182.00			182.00
TOTAL						338.00

GENERAL NOTE:
1. SEE SHEET ST32 FOR SIGN PANELS.

OH SIGN IDENTIFICATION PLATE			STP
SIGN NO	QTY EACH	LOCATION	IDENTIFICATION PLATE NO
OH I94-503	1	BR.86082	94-503
TOTAL			1

GENERAL NOTES:
1. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR OH SIGN IDENTIFICATION PLATE (X5-1).
2. SEE SHEET SEE SHEET ST42 FOR MOUNTING DETAILS DETAILS.

SIGN PANEL OVERLAY TYPE OH						STQ
SIGN NO	LOCATION	PANEL OVERLAY		PANEL OVERLAY SIZE (IN.)	PANEL OVERLAY AREA (SQ. FT.)	TOTAL AREA (SQ. FT.)
		SIZE (IN.)	AREA (SQ. FT.)			
OH I94-503	BR.86082	168 x 90	105.00			105.00
TOTAL						105.00

GENERAL NOTE:
1. SEE SHEET ST33 FOR SIGN PANEL OVERLAYS.

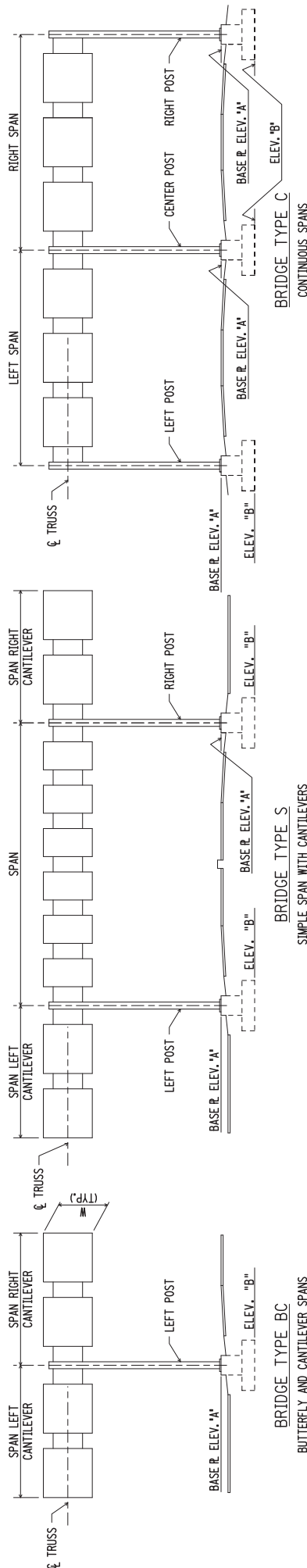
DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY: _____ LIC. NO. _____ DATE: 1/28/2016

TABLATIONS-TYPE OH

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST10 OF ST53 SHEETS



OVERHEAD SIGN STRUCTURES

SIGN NO	STATION	BRIDGE TYPE	TRUSS TYPE	SPAN LENGTHS			LOW STEEL ELEVATION (1)	LEFT POST		CENTER POST		RIGHT POST	
				LEFT CANT.	RIGHT CANT.	SPAN OR LEFT SPAN		RIGHT SPAN	ELEVATION (1)	TYPE	ELEVATION (1)	TYPE	ELEVATION (1)
OH 194-627	914+00 WB	BC	A	35'-0"			926.71	A	B	A	B	A	B
OH 194-628	966+00 WB	BC	A	30'-6"			920.10	907.70	900.99				
								901.27	(4)				

TABLATION OF OVERHEAD SIGN STRUCTURE QUANTITIES (2)

SIGN NO	OH 194-627	OH 194-628	TOTALS
STRUCT. STEEL POSTS (3)	6300	6345	12645
STRUCT. STEEL TRUSSES	4305	3752	8057
STRUCT. STEEL WALKWAY SUPPORTS			
STRUCT. STEEL WALKWAY GRATING			
STRUCT. STEEL PANEL MTG. POSTS	498	534	1032
CONCRETE FOOTINGS (SPREAD)	CU YD	18.7	18.7
CONCRETE FOOTINGS (SHAFT)	CU YD	14.1	14.1

OH SIGN IDENTIFICATION PLATE (5)

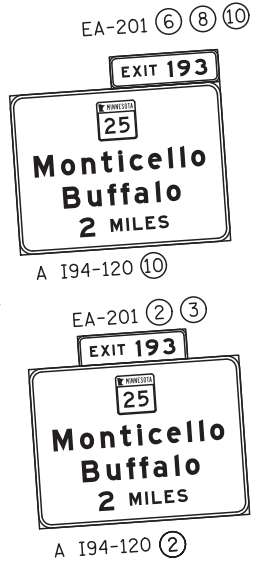
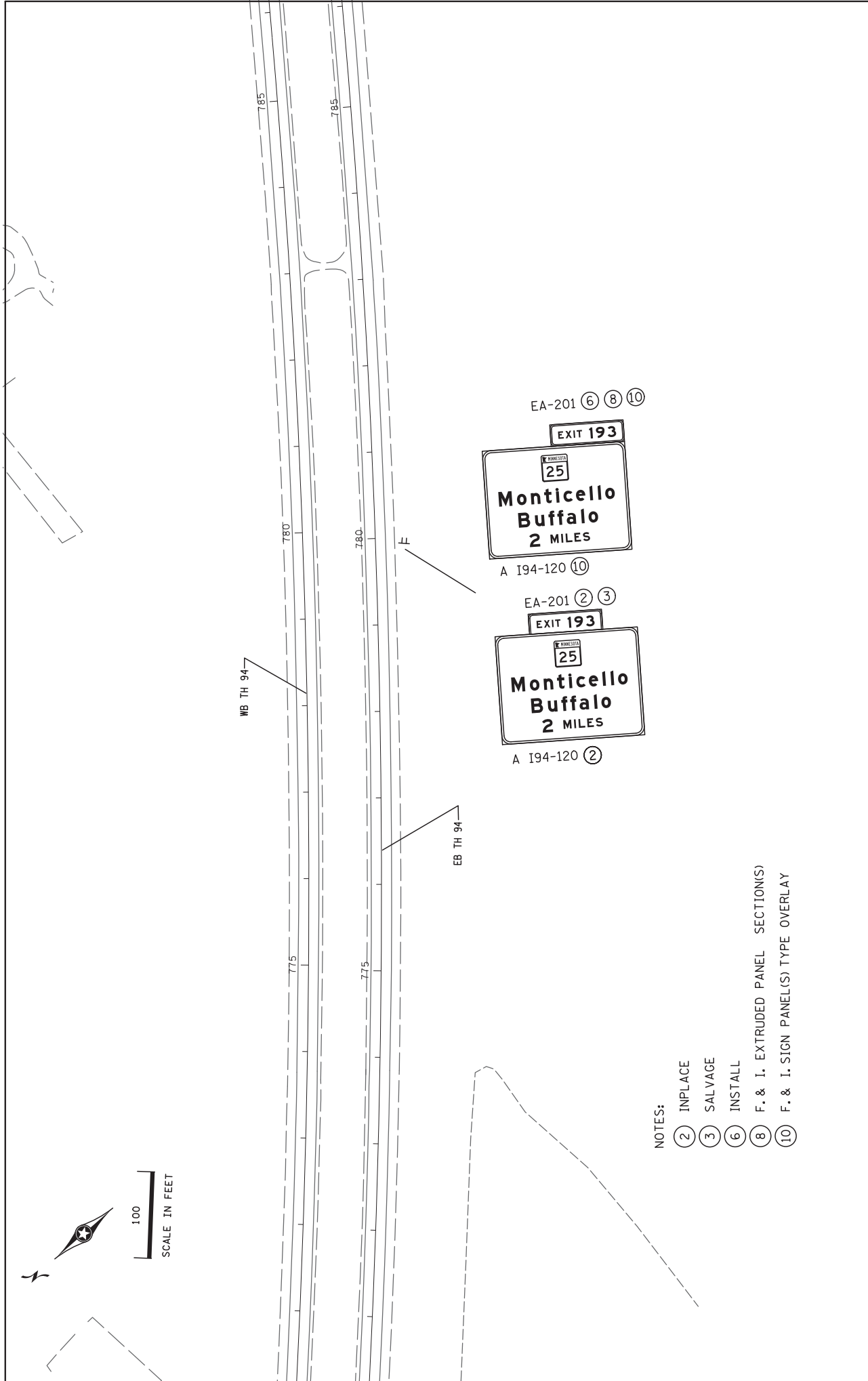
SIGN NO	QTY	LOCATION	IDENTIFICATION PLATE NO
OH 194-627	1	914+00 WB	94-627
OH 194-628	1	966+00 WB	94-628

GENERAL NOTES:

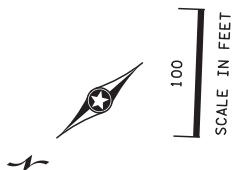
- THE SUBSCRIPTION E ON THE POST TYPE DENOTES THE POST WHICH HAS THE HAND HOLE AND PROVISIONS FOR GROUNDING, I.E. POST TYPE 3E.
- TABLATED ELEVATIONS AND DIMENSIONS ARE APPROXIMATE ONLY. FABRICATION DEPENDENT ON THESE ELEVATIONS AND DIMENSIONS SHALL NOT BE STARTED UNTIL THE ENGINEER HAS MADE FINAL DETERMINATION OF THEM IN THE FIELD.
- LEFT AND RIGHT DESIGNATIONS ARE SHOWN LOOKING IN DIRECTION OF TRAFFIC FLOW. WHEN TWO DIRECTIONS OF TRAFFIC ARE SPANNED THE DESIGNATIONS ARE SHOWN LOOKING UP STATIONING.
- SEE SHEETS ST44--ST50 FOR DETAILS.
- SEE SHEETS ST52--ST53 FOR CROSS SECTIONS.

SPECIFIC NOTES:

- CENTER LINE ELEVATION IS FIELD ELEVATION.
- BASED ON TABULATED ELEVATIONS AND DIMENSIONS. REVISE IF NECESSARY USING QUANTITY TABLES ON SHEET ST45.
- INCLUDES F. & I. OH SIGN IDENTIFICATION PLATE, SEE SHEET ST42.
- DRILLED SHAFT FOOTING.
- SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR X5-1 SIGN.

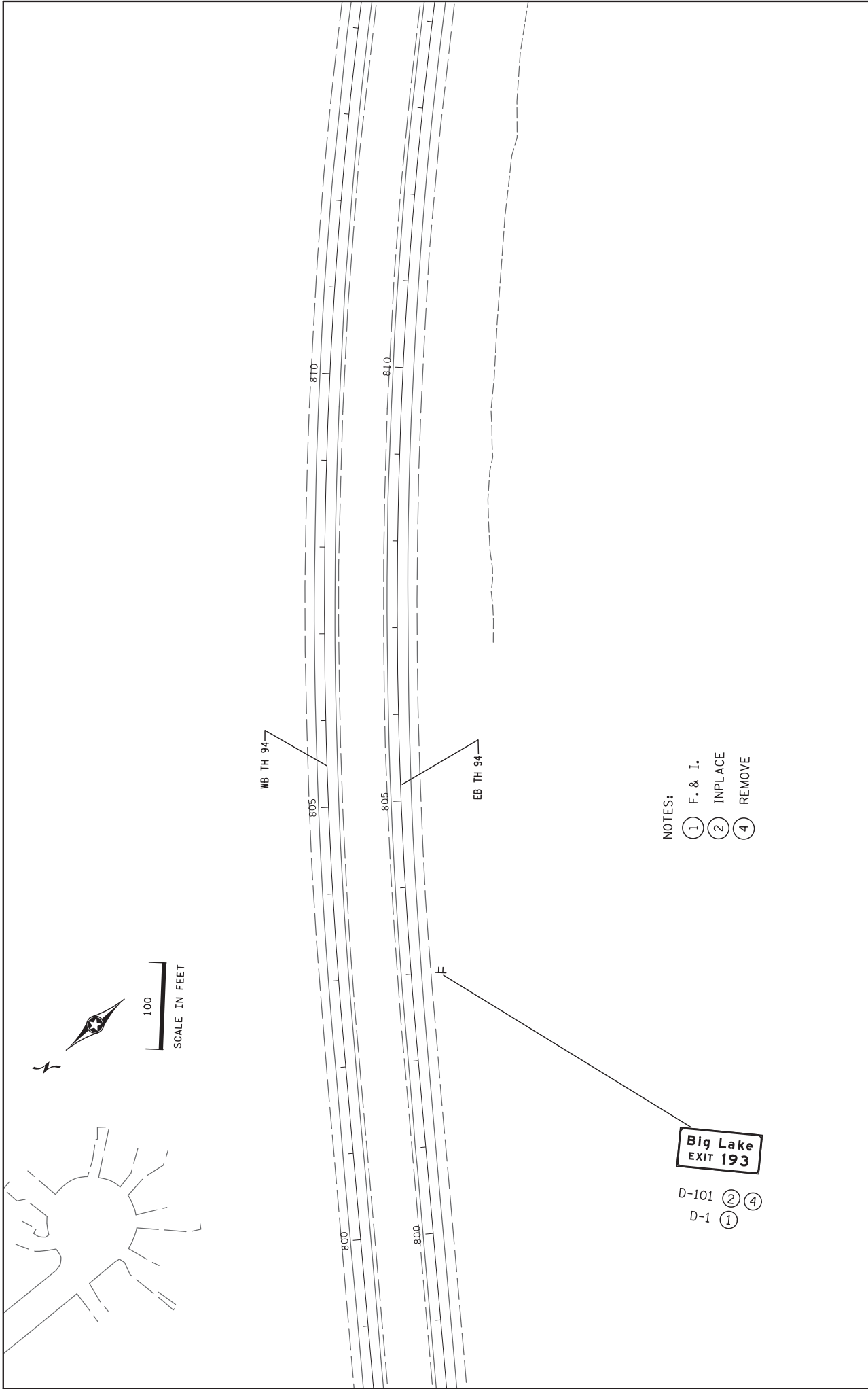


- NOTES:
- (2) INPLACE
 - (3) SALVAGE
 - (6) INSTALL
 - (8) F. & I. EXTRUDED PANEL SECTION(S)
 - (10) F. & I. SIGN PANEL(S) TYPE OVERLAY



PLOTTED/REVISED: 1/28/2016

DISTRICT #: METRO
 I/PLOT NAME: Rural Sample Plan_ROADWAY.psll
 PATH & FILENAME: I:\PWP\16133825\Rural Sample Plan_ROADWAY.psdgn



- NOTES:
- ① F. & I.
 - ② INPLACE
 - ④ REMOVE

**Big Lake
EXIT 193**

- D-101 ② ④
- D-1 ①



100
SCALE IN FEET

WB TH 94

EB TH 94

815

815

820

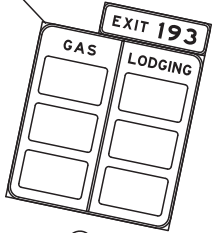
820

825

825

Monticello
NEXT 2 EXITS

D-102 (2) (4)
D-2 (1)



- NOTES:
- (1) F. & I.
 - (2) INPLACE
 - (4) REMOVE

ROADWAY LAYOUT

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST14 OF ST53 SHEETS

DATE 1/28/2016

LIC. NO.

LICENSED PROFESSIONAL ENGINEER

CERTIFIED BY

CHECKED BY: RFK

DRAWN BY: LBU

ROADWAY LAYOUT

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST15 OF ST53 SHEETS

DATE 1/28/2016

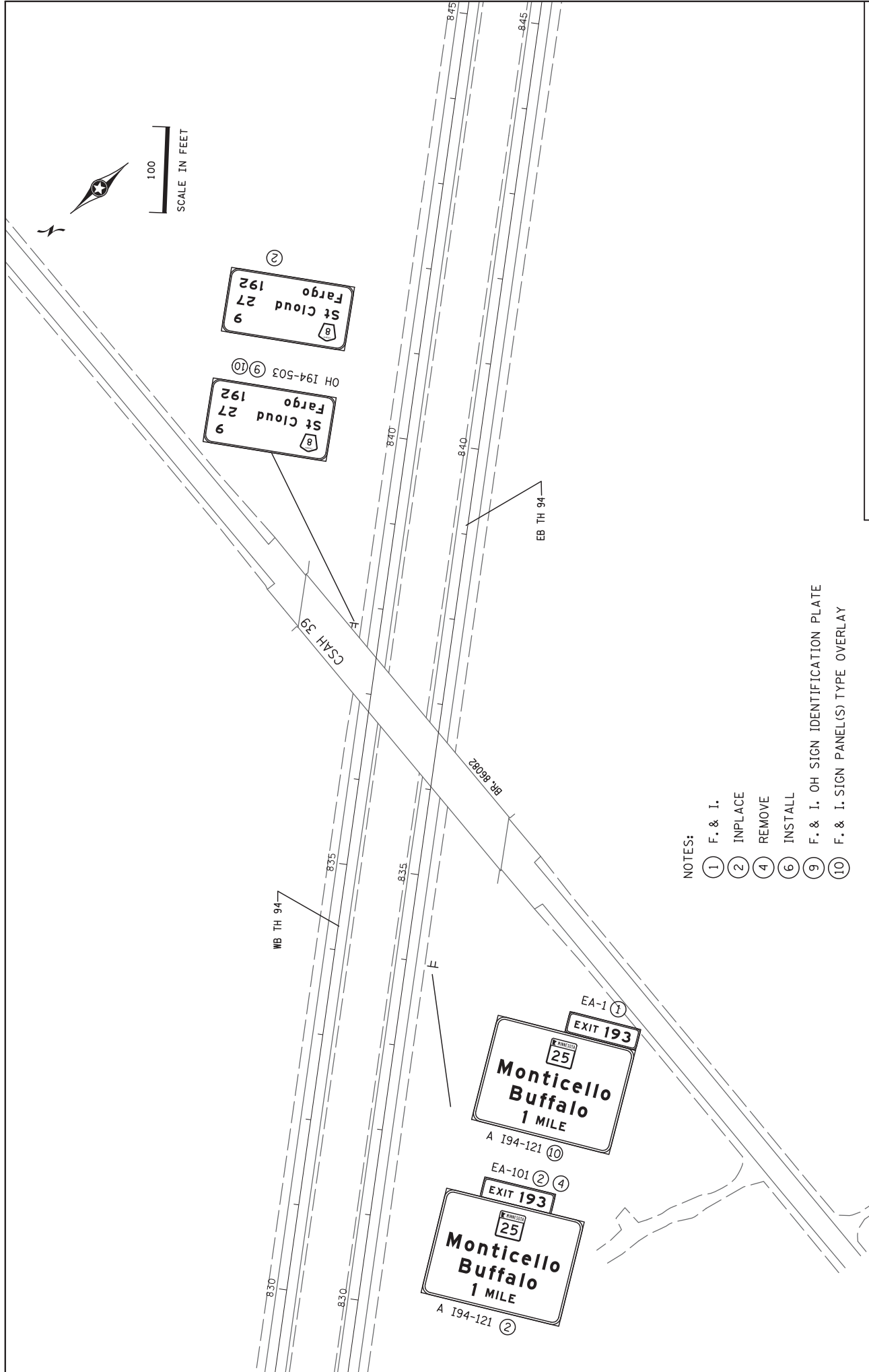
LIC. NO.

RELEASED PROFESSIONAL ENGINEER

CERTIFIED BY

CHECKED BY: RFK

DRAWN BY: LBJ

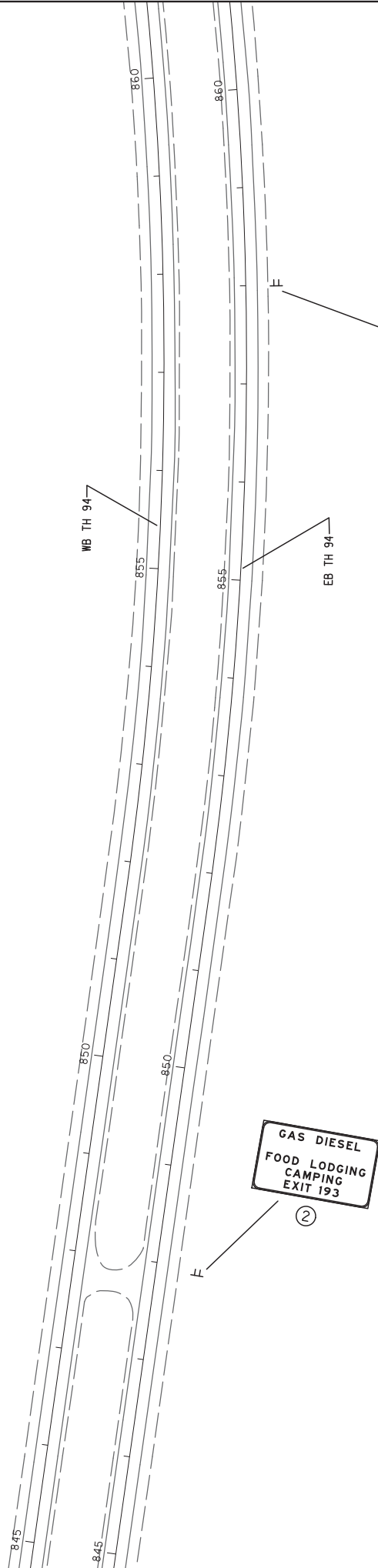


NOTES:

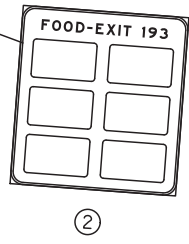
- ① F. & I.
- ② INPLACE
- ④ REMOVE
- ⑥ INSTALL
- ⑨ F. & I. OH SIGN IDENTIFICATION PLATE
- ⑩ F. & I. SIGN PANEL(S) TYPE OVERLAY



100
SCALE IN FEET

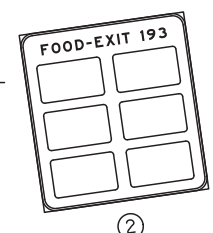
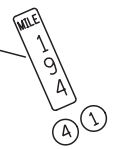
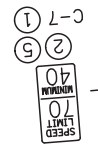
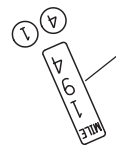
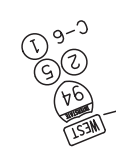
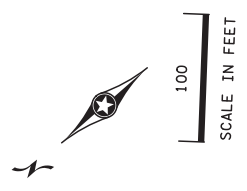


NOTE:
② INPLACE



ROADWAY LAYOUT

DRAWN BY: LBJ	CHECKED BY: RFK	CERTIFIED BY: _____ <small>LICENSED PROFESSIONAL ENGINEER</small>	LIC. NO. _____	DATE: 1/28/2016	STATE PROJ. NO. 8680-515 (TH 94)	SHEET NO. ST16	OF ST53 SHEETS
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- NOTES:
- ① F. & I.
 - ② INPLACE
 - ④ REMOVE
 - ⑤ REMOVE SIGN TYPE C

ROADWAY LAYOUT

DISTRICT #: METRO
 I/PLOT NAME: Rural Sample Plan_ROADWAY.psis
 PATH & FILENAME: I:\PWP\16133825\Rural Sample Plan_ROADWAY.psdgn
 PLOTTED/REVISED: 1/28/2016

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY: _____

LIC. NO. _____

DATE: 1/28/2016

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST17 OF ST53 SHEETS



WB TH 94

EB TH 94

885

885

880

880

875

875

REMOVE 7 GUIDE BELINEATORS
AND 1 HAZARD MARKER
AT THIS LOCATION
SEE SHEET ST35 (PLAN A)

100

SEE SHEET ST35 FOR
SIGN PLACEMENT



D-103 (2) (4)
D-3 (1)

NOTES:

- 1 F. & I.
- 2 INPLACE
- 4 REMOVE
- 5 REMOVE SIGN TYPE C

EA-1 (1)

EXIT 193

MINNESOTA
25

Monticello
Buffalo



A I94-504 (1)

EXIT 193

MINNESOTA
25

Monticello
Buffalo



A I94-122 (2) (4)

ROADWAY LAYOUT

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST19 OF ST53 SHEETS

DATE 1/28/2016

LIC. NO.

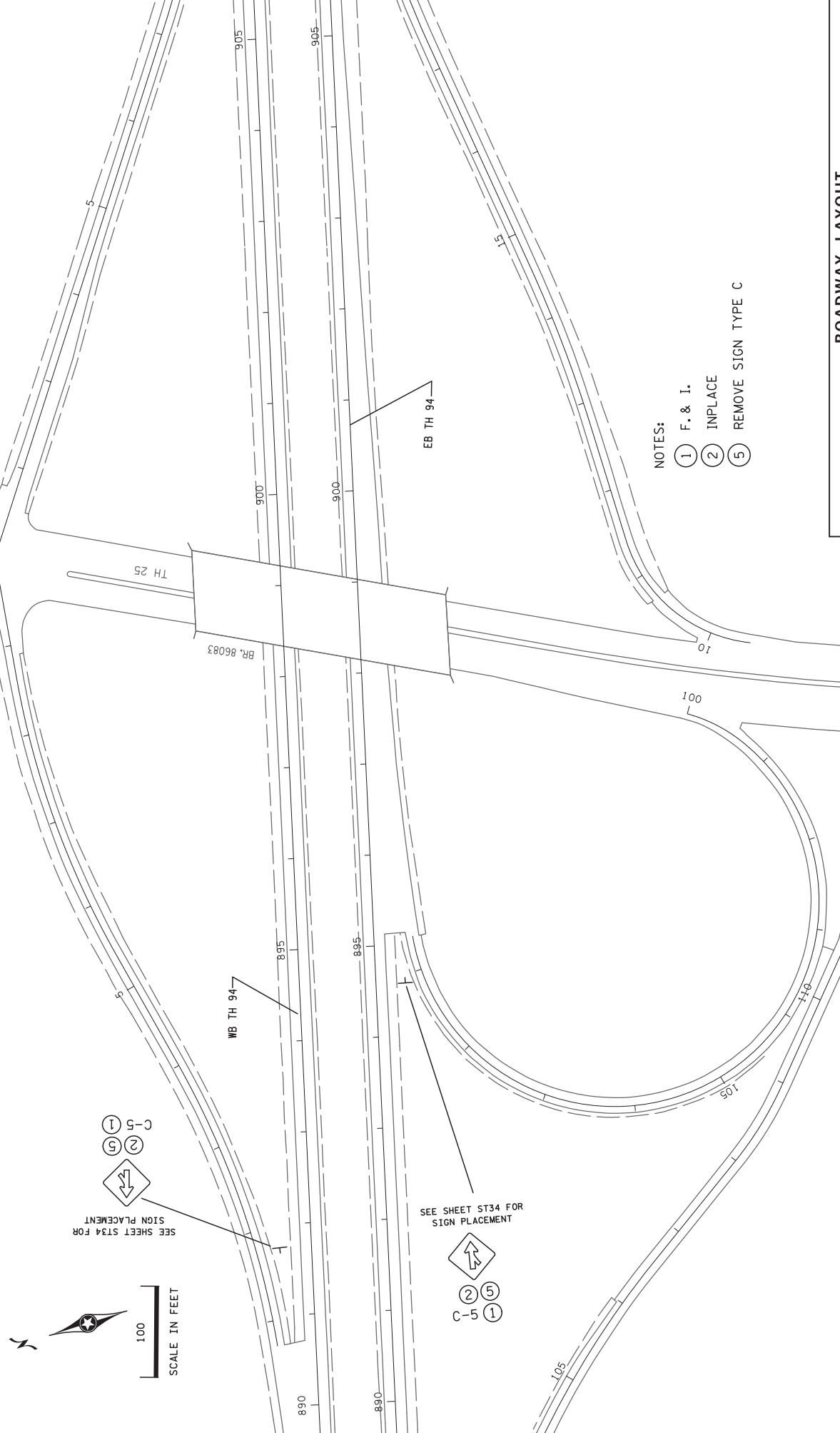
LICENSED PROFESSIONAL ENGINEER

CERTIFIED BY

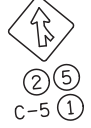
CHECKED BY: RFK

DRAWN BY: LBJ

- NOTES:
- ① F. & I.
 - ② INPLACE
 - ⑤ REMOVE SIGN TYPE C



SEE SHEET ST34 FOR SIGN PLACEMENT



SEE SHEET ST34 FOR SIGN PLACEMENT



PLOTTED/REVISED: 1/28/2016

DISTRICT #: METRO
 I/PLOT NAME: Rural Sample Plan_ROADWAY.psl8
 I/PATH & FILENAME: IP_PWP\F1633825\Rural Sample Plan_ROADWAY.psdgn

ROADWAY LAYOUT

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST20 OF ST53 SHEETS

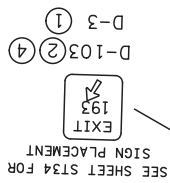
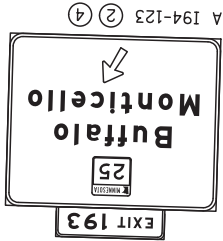
DATE 1/28/2016

LIC. NO.

CERTIFIED BY

CHECKED BY: RFK

DRAWN BY: LBJ



WB TH 94

EB TH 94

920

920

915

915

910

910

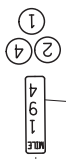
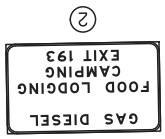
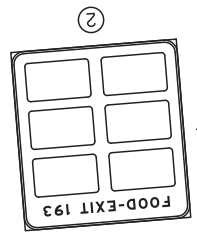
REMOVE - OUTSIDE DELINEATORS
REMOVE - OUTSIDE MARKER
SEE SHEET ST34 FOR DELINEATION
(PLAN VIEW)

SEE SHEET ST34 FOR
SIGN PLACEMENT

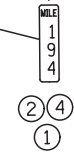
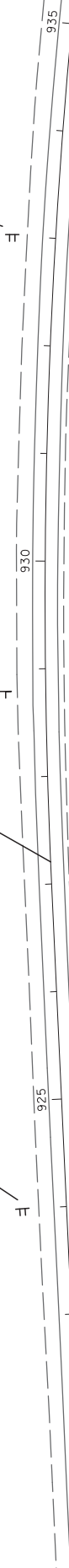


NOTES:

- 1 F. & I.
- 2 INPLACE
- 4 REMOVE
- 5 REMOVE SIGN TYPE C



WB TH 94



EB TH 94

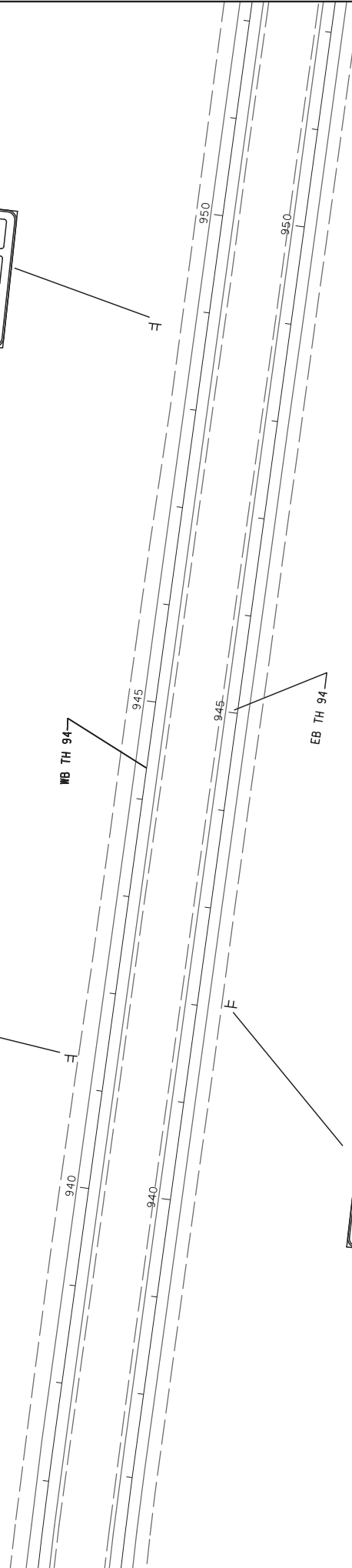
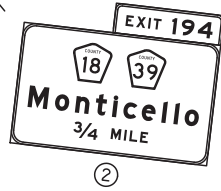
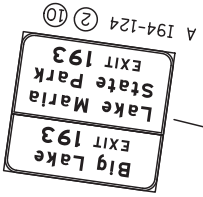
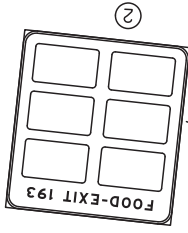


- NOTES:
- 1 F. & I.
 - 2 INPLACE
 - 3 REMOVE
 - 4 REMOVE SIGN TYPE C
 - 5 REMOVE SIGN TYPE C

ROADWAY LAYOUT



100
SCALE IN FEET



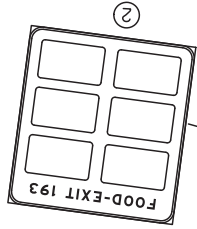
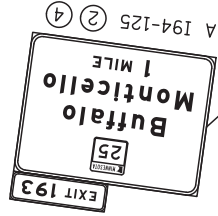
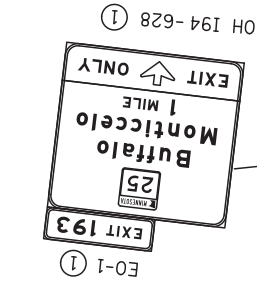
NOTES:

- ② INPLACE
- ⑩ F. & I. SIGN PANEL(S) TYPE OVERLAY

ROADWAY LAYOUT



100
SCALE IN FEET



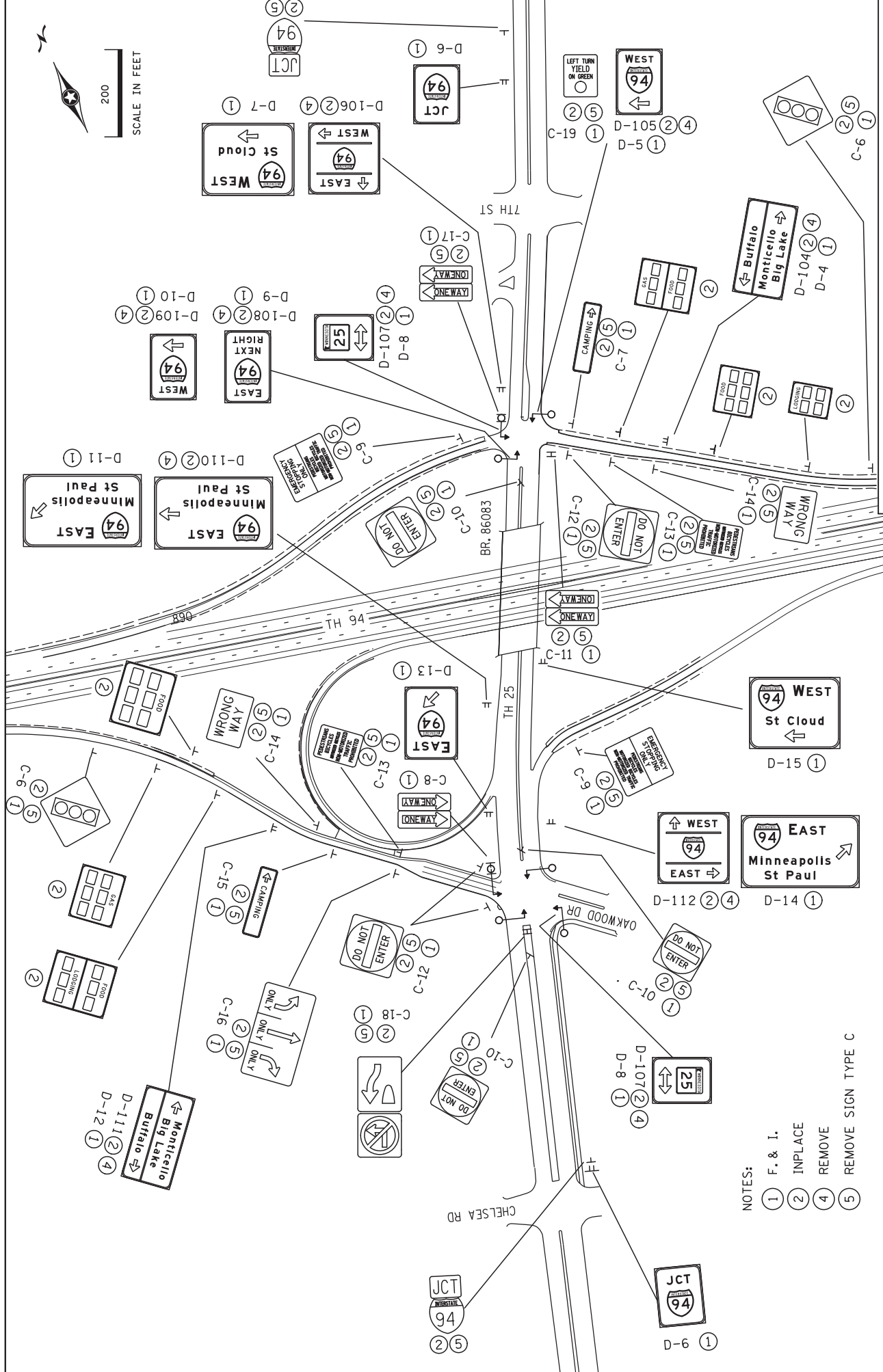
NOTES:

- ① F. & I.
- ② INPLACE
- ③ SALVAGE
- ④ REMOVE
- ⑤ REMOVE SIGN TYPE C
- ⑥ INSTALL

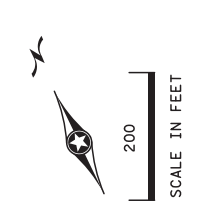
ROADWAY LAYOUT

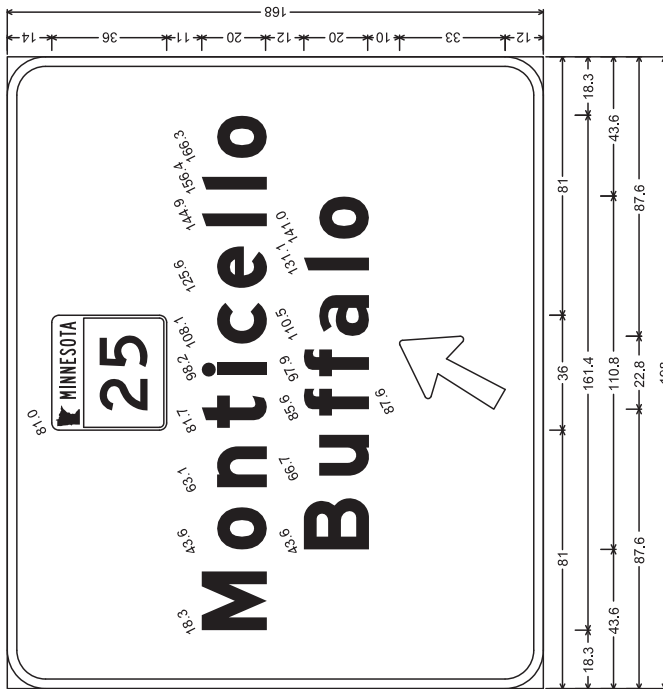
DRAWN BY: LBJ CHECKED BY: RFK CERTIFIED BY: _____ LIC. NO. _____ DATE: 1/28/2016 STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST23 OF ST53 SHEETS

ROADWAY LAYOUT



- NOTES:
- 1 F. & I.
 - 2 INPLACE
 - 4 REMOVE
 - 5 REMOVE SIGN TYPE C



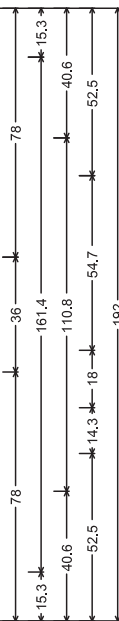


A 184-504; 12.0" Radius, 3.0" Border, White on Green; [Monticello] E Mod; [Buffalo] E Mod; Arrow 17 - 36.0" 60";

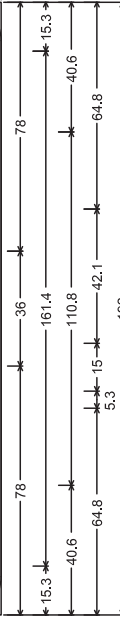
SEE SHEET ST33 FOR NOTES

DRAWN BY: LBJ	CHECKED BY: RFK	CERTIFIED BY: _____	LIC. NO. _____	DATE: 1/28/2016	STATE PROJ. NO. 8680-515 (TH 94)	SHEET NO. ST25	OF ST53 SHEETS
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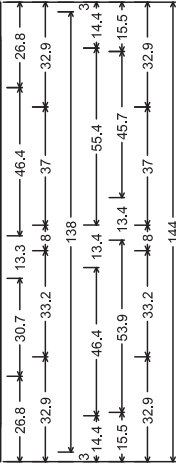
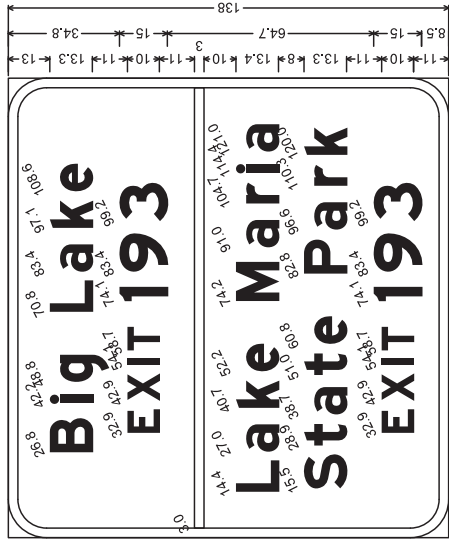
TYPE A SIGN PANELS



A 194-120; 12.0" Radius, 3.0" Border, White on Green;
 [Monticello] E Mod; [Buffalo] E Mod; [2 MILES] E Mod;



A 194-121; 12.0" Radius, 3.0" Border, White on Green;
 [Monticello] E Mod; [Buffalo] E Mod; [1 MILE] E Mod;



A 194-124; 12.0" Radius, 3.0" Border, White on Green;
 [Big Lake] E Mod; [EXIT 193] E Mod;
 12.0" Radius, 3.0" Border, White on Brown;
 [Lake Maria] E Mod; [State Park] E Mod;
 [EXIT 193] E Mod;

SEE SHEET ST33 FOR NOTES

DRAWN BY: LBJ

CHECKED BY: RFK

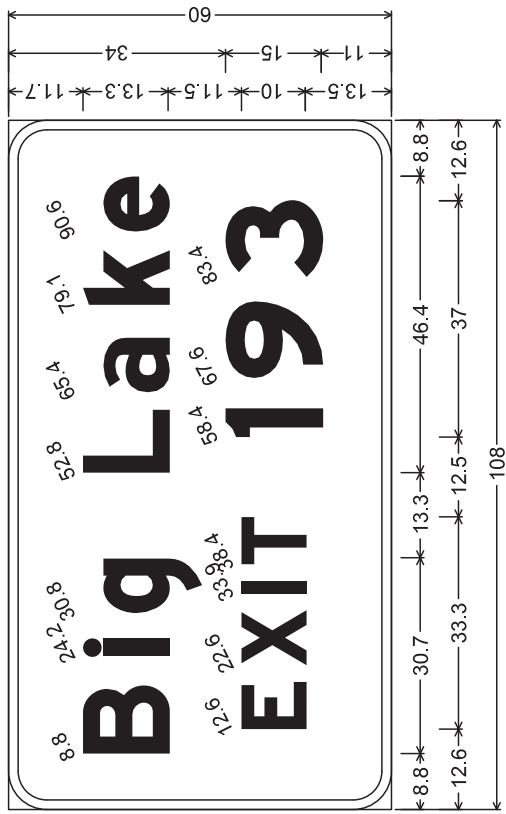
CERTIFIED BY:

LIC. NO.:

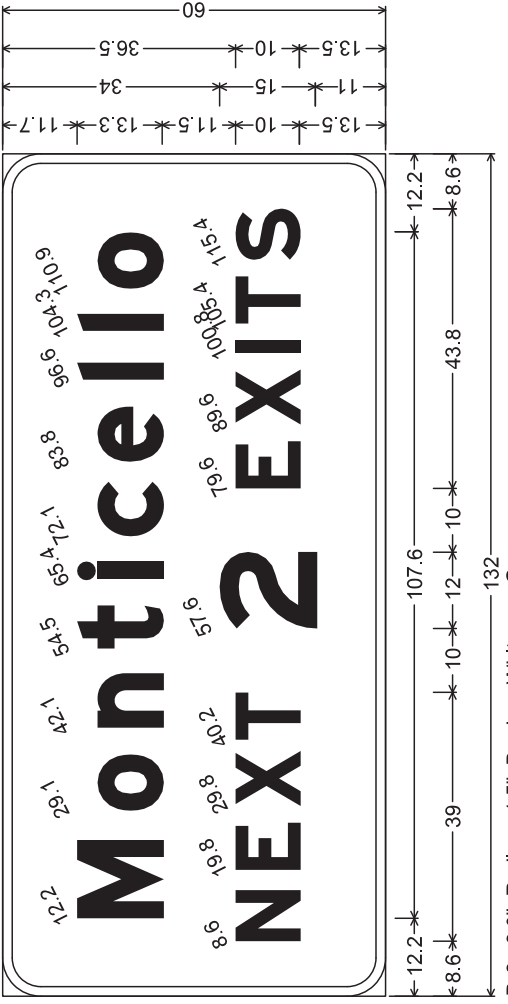
DATE 1/28/2016

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST26 OF ST53 SHEETS

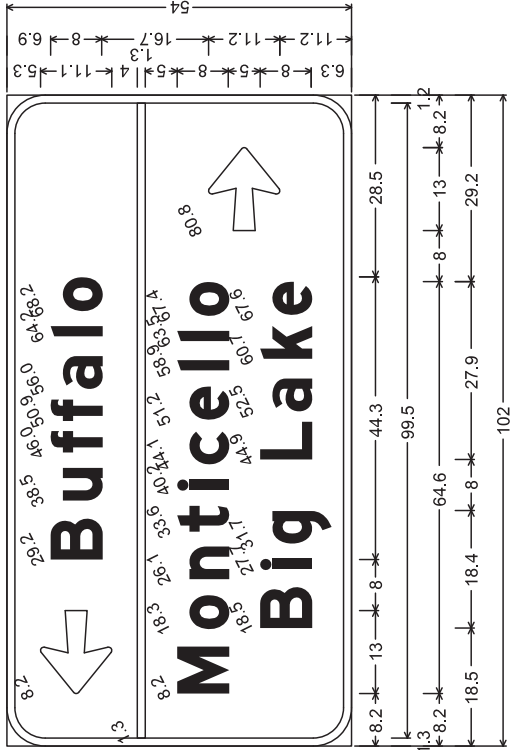
TYPE A SIGN PANEL OVERLAYS



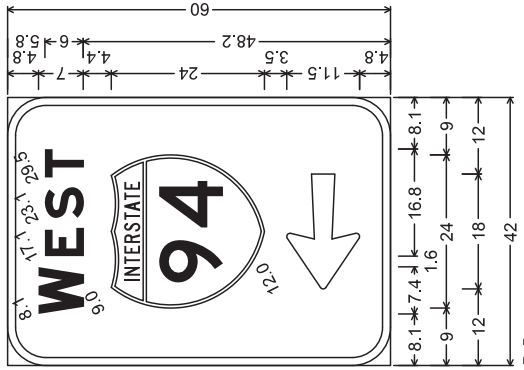
D-1; 6.0" Radius, 1.5" Border, White on Green;
 [Big Lake] E Mod; [EXIT 193] E Mod;



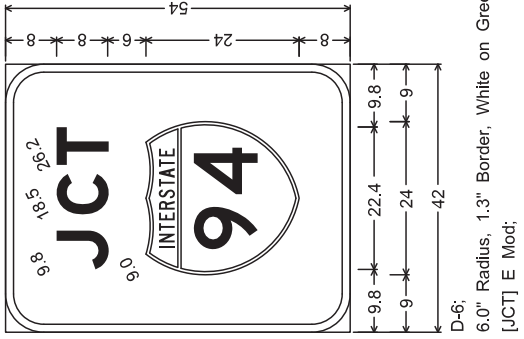
D-2; 6.0" Radius, 1.5" Border, White on Green;
 [Monticello] E Mod; [NEXT 2 EXITS] E Mod;



D-4; 6.0" Radius, 1.3" Border, White on Green;
 Arrow 5 - 13.0" 180°; [Buffalo] E Mod; [Monticello] E Mod;
 [Big Lake] E Mod; Arrow 5 - 13.0" 0°;



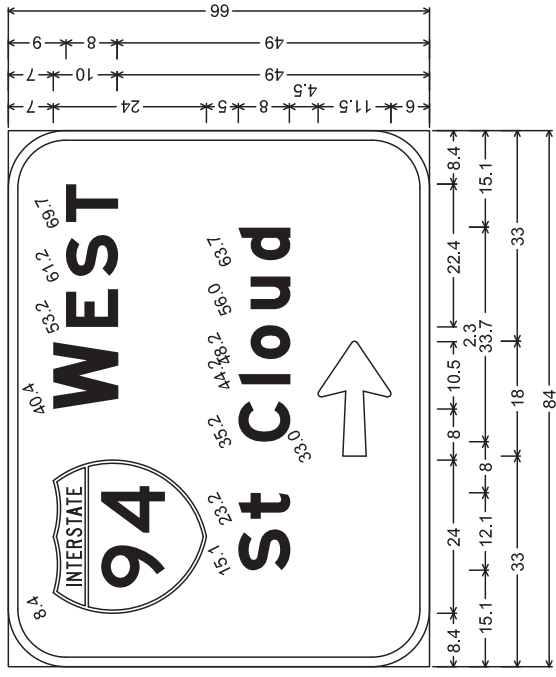
D-5;
 6.0" Radius, 1.3" Border, White on Green;
 [WEST] E Mod;
 Arrow 14 - 18.0" 180°;



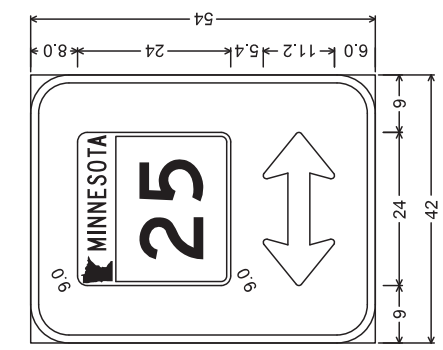
D-6;
 6.0" Radius, 1.3" Border, White on Green;
 [JCT] E Mod;

SEE SHEET ST33 FOR NOTES

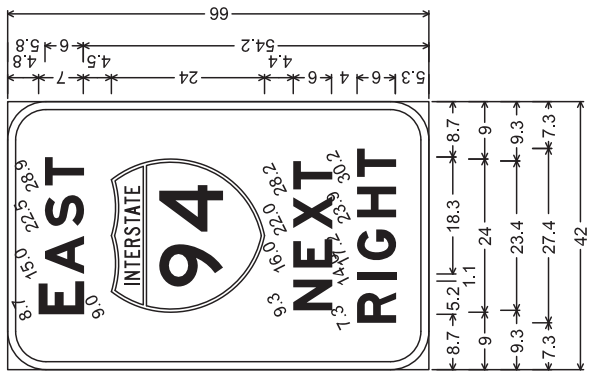
DRAWN BY: LBJ	CHECKED BY: RFK	CERTIFIED BY: _____	DATE: 1/28/2016	LIC. NO. _____	STATE PROJ. NO. 8680-515 (TH 94)	SHEET NO. ST27	OF ST53 SHEETS
TYPE D SIGN PANELS							



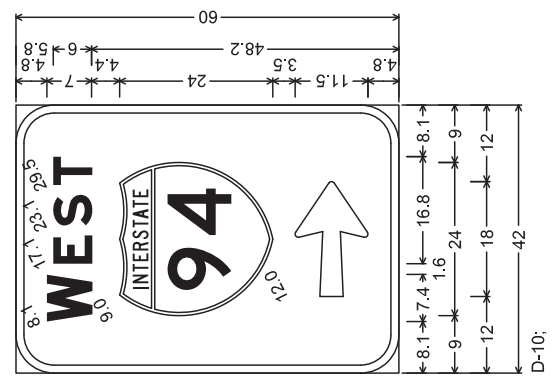
D-7: 9.0" Radius, 1.5" Border, White on Green;
 [WEST] E Mod; [St Cloud] E Mod;
 Arrow 14 - 18.0° 0°;



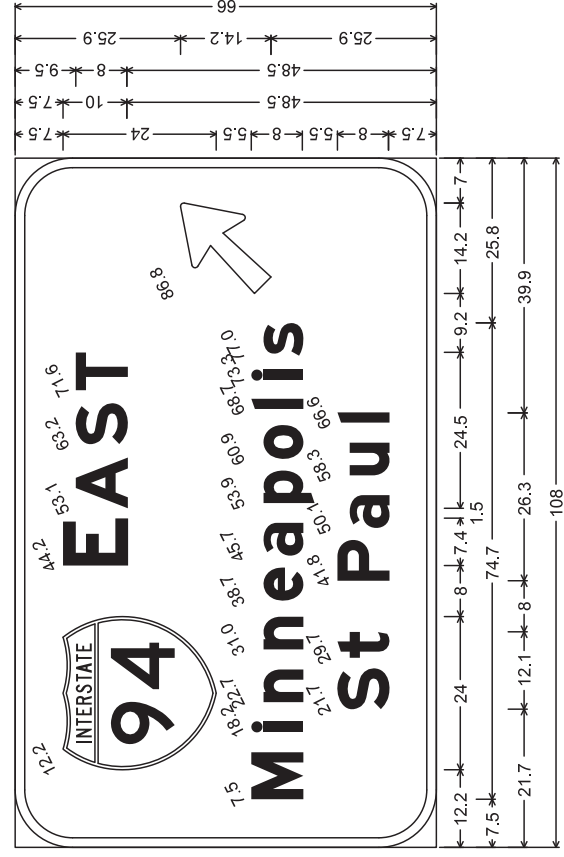
D-8:
 6.0" Radius, 1.3" Border, White on Green;
 Double Headed Arrow 5 - 24.0° 0°;



D-9:
 6.0" Radius, 1.3" Border, White on Green;
 [EAST] E Mod;
 [NEXT] E Mod;
 [RIGHT] E Mod;



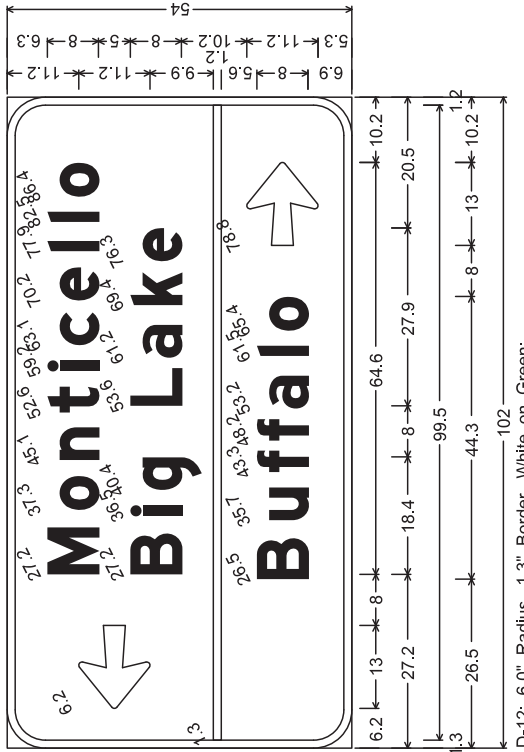
D-10:
 6.0" Radius, 1.3" Border, White on Green;
 [WEST] E Mod;
 Arrow 14 - 18.0° 180°;



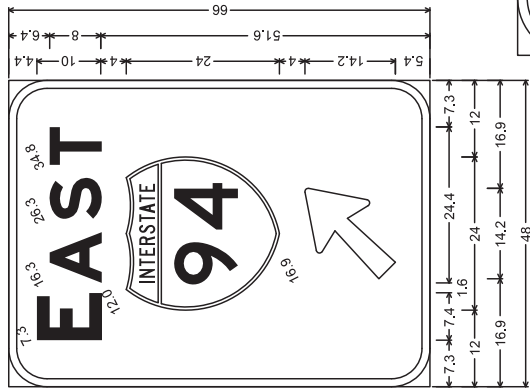
D-11: 9.0" Radius, 1.5" Border, White on Green;
 [EAST] E Mod; [Minneapolis] E Mod; [St Paul] E Mod;
 Arrow 14 - 18.0° 45°;

SEE SHEET ST33 FOR NOTES

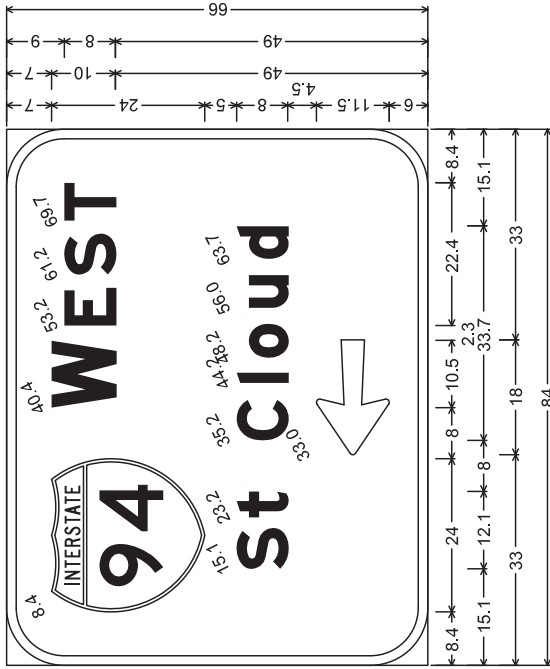
TYPE D SIGN PANELS



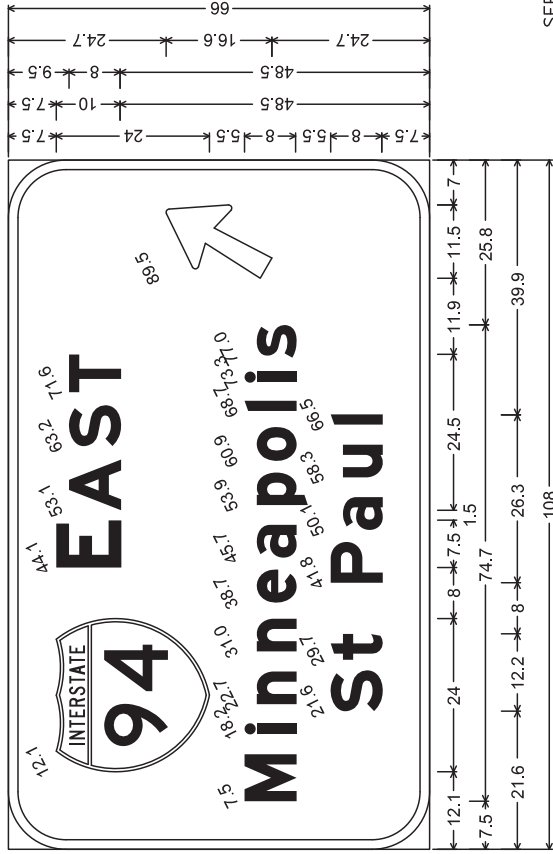
D-12; 6.0" Radius, 1.3" Border, White on Green;
 Arrow 5 - 13.0" 180°; [Monticello] E Mod; [Big Lake] E Mod;
 [Buffalo] E Mod; Arrow 5 - 13.0" 0°;



D-13;
 6.0" Radius, 1.3" Border, White on Green;
 [EAST] E Mod; Arrow 14 - 18.0" 45°;

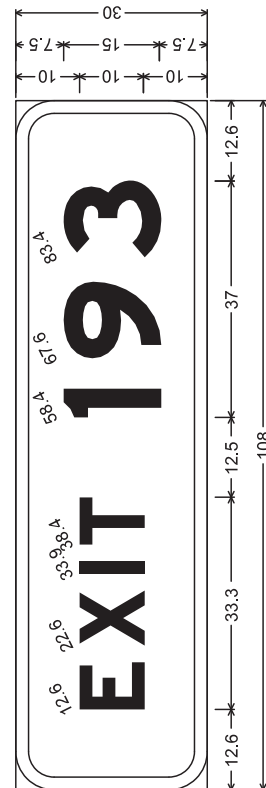


D-15; 9.0" Radius, 1.5" Border, White on Green;
 [WEST] E Mod; [St Cloud] E Mod;
 Arrow 14 - 18.0" 180°;

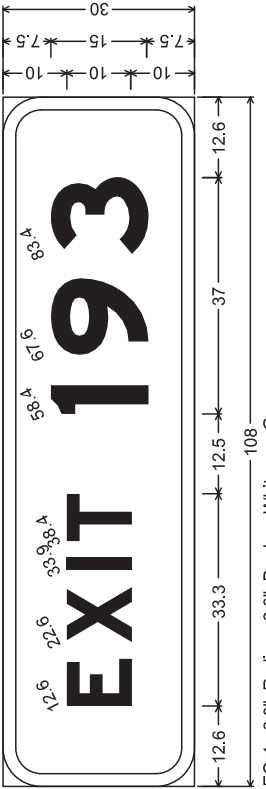


D-14; 9.0" Radius, 1.5" Border, White on Green;
 [EAST] E Mod; [Minneapolis] E Mod; [St Paul] E Mod;
 Arrow 14 - 18.0" 60°;

SEE SHEET ST33 FOR NOTES



EA-1: 6.0" Radius, 2.0" Border, White on Green;
[EXIT 193] E Mod;



EO-1: 6.0" Radius, 2.0" Border, White on Green;
[EXIT 193] E Mod;

SEE SHEET ST33 FOR NOTES

DRAWN BY: LBJ

CHECKED BY: RFK

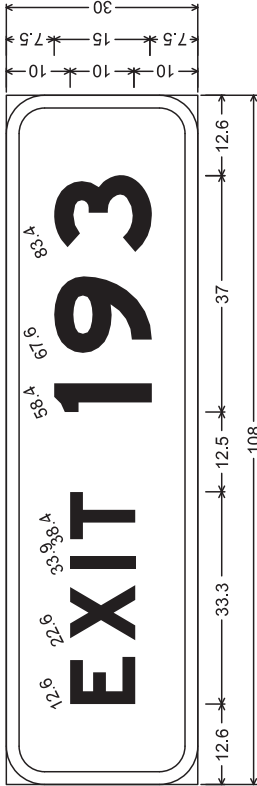
CERTIFIED BY

LIC. NO.

DATE 1/28/2016

TYPE EA AND EO SIGN PANELS

STATE PROJ. NO. 8680-515 (TH 94) SHEET NO. ST30 OF ST53 SHEETS



EA-201: 6.0" Radius, 2.0" Border, White on Green;
 [EXIT 193] E Mod;

SEE SHEET ST33 FOR NOTES

DRAWN BY: LBJ

CHECKED BY: RFK

CERTIFIED BY

LIC. NO.

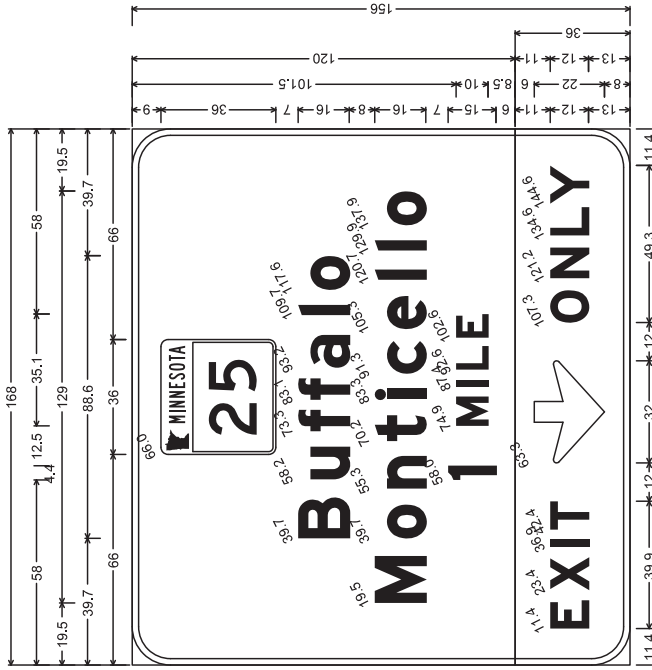
DATE 1/28/2016

TYPE EA SIGN PANEL OVERLAYS

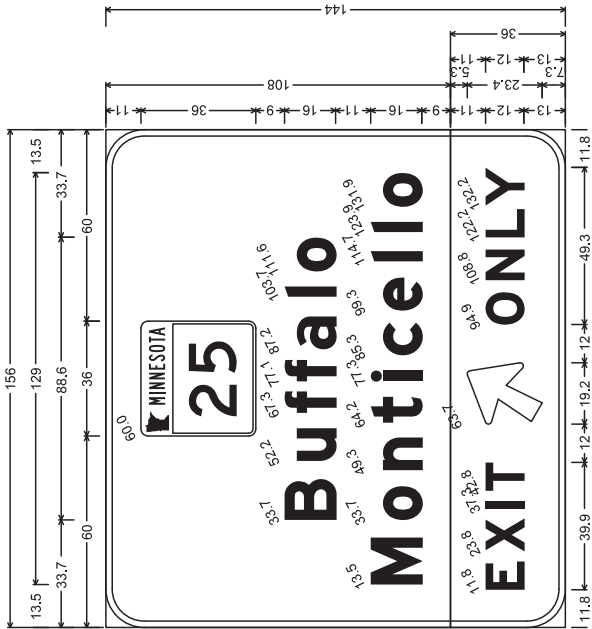
STATE PROJ. NO. 8680-515 (TH 94)

SHEET NO. ST31

OF ST53 SHEETS



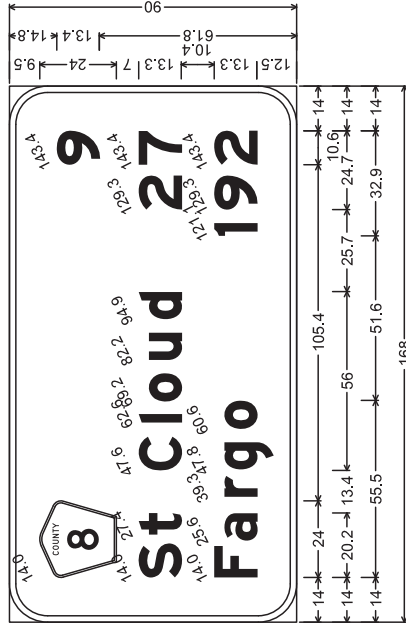
OH 194-627:
 12.0" Radius, 2.0" Border, White on Green;
 [Buffalo] E Mod; [Monticello] E Mod;
 [EXIT] Black E Mod; Arrow 8 - 25.0" 60° Black;
 [ONLY] Black E Mod;



OH 194-627:
 12.0" Radius, 2.0" Border, White on Green;
 [Buffalo] E Mod; [Monticello] E Mod;
 [EXIT] Black E Mod; Arrow 8 - 25.0" 60° Black;
 [ONLY] Black E Mod;

SEE SHEET ST33 FOR NOTES

DRAWN BY: LBJ	CHECKED BY: RFK	CERTIFIED BY: _____	DATE: 1/28/2016	LIC. NO. _____	STATE PROJ. NO. 8680-515 (TH 94)	SHEET NO. ST32	OF ST53 SHEETS
				OH SIGN PANELS			



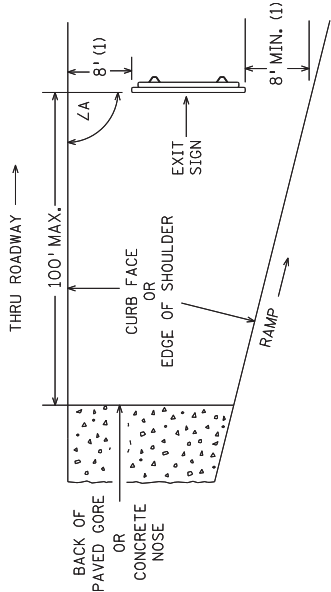
OH 194-503; 12.0" Radius, 2.0" Border, White on Green;
 [9] E Mod; [St Cloud] E Mod; [27] E Mod; [Fargo] E Mod;
 [192] E Mod;

- NOTES:
1. SEE MNDOT STANDARD SIGNS AND MARKINGS MANUAL FOR ARROW, FRACTION AND OVERLAY DETAIL.
 2. CORNERS OF THE SIGN PANELS EXTENDING BEYOND THE CORNERS SHALL NOT BE TRIMMED.

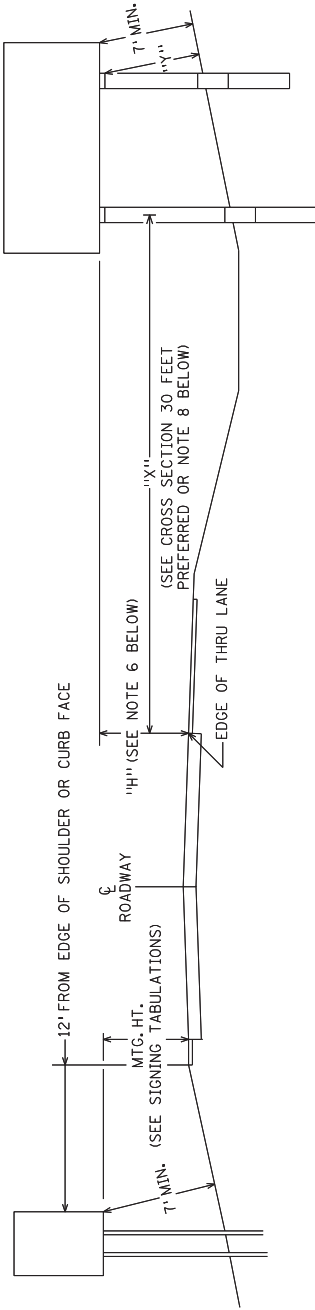
DRAWN BY: LBJ	CHECKED BY: RFK	CERTIFIED BY: _____	LIC. NO. _____	DATE: 1/28/2016	STATE PROJ. NO. 8680-515 (TH 94)	SHEET NO. ST33	OF ST53 SHEETS
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OH SIGN PANEL OVERLAYS

CORE PLACEMENT

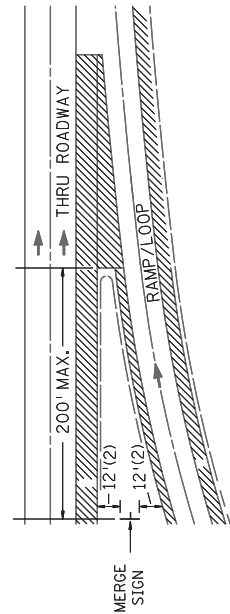


ROADSIDE PLACEMENT



ROUTE MARKER, REGULATORY & WARNING SIGNS - TYPE C
GUIDE SIGNS - TYPE D

GUIDE SIGN - TYPE A



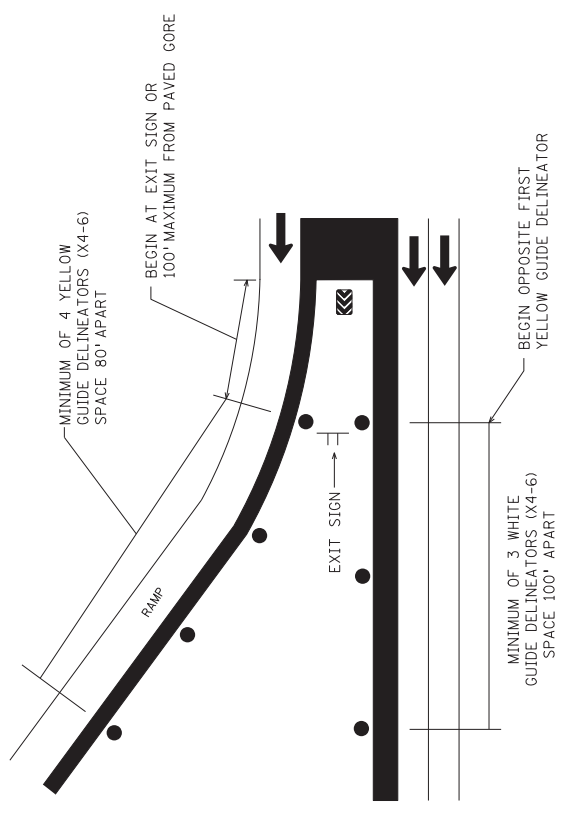
SPECIFIC NOTES:

- (1) EXIT SIGNS
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 SIGNS
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.

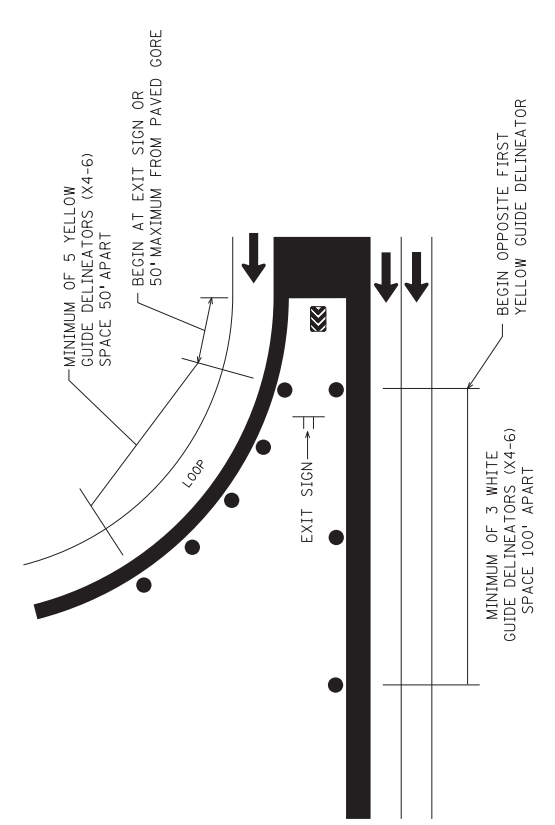
NOTES:

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 ABSENCE 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, LA 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.

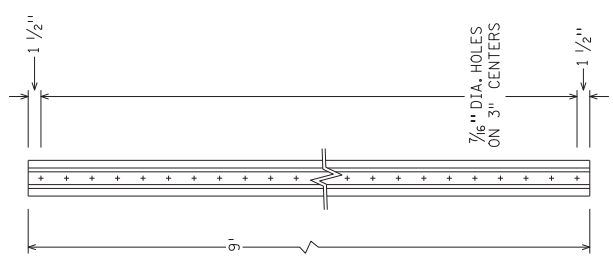
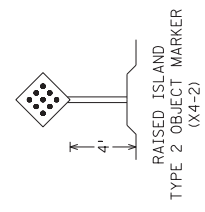
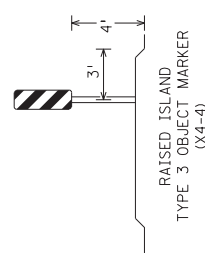
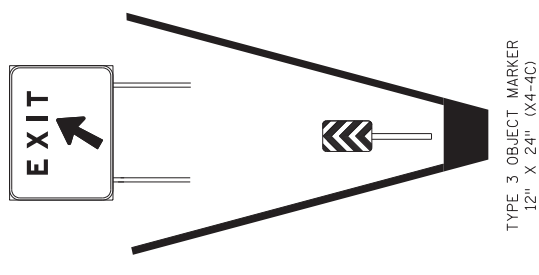
SIGN PLACEMENT



PLAN A
RAMP DELINEATION

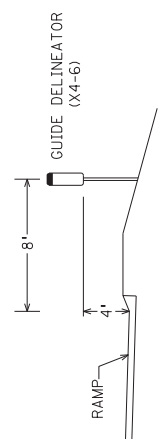
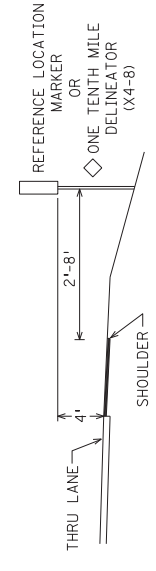


PLAN B
LOOP DELINEATION



MN DOT 3401
NORMAL WEIGHT = 2 LB./FT.

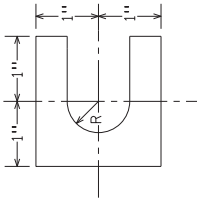
DELINEATOR POST



TYPICAL PLACEMENT

DELINEATORS AND MARKERS

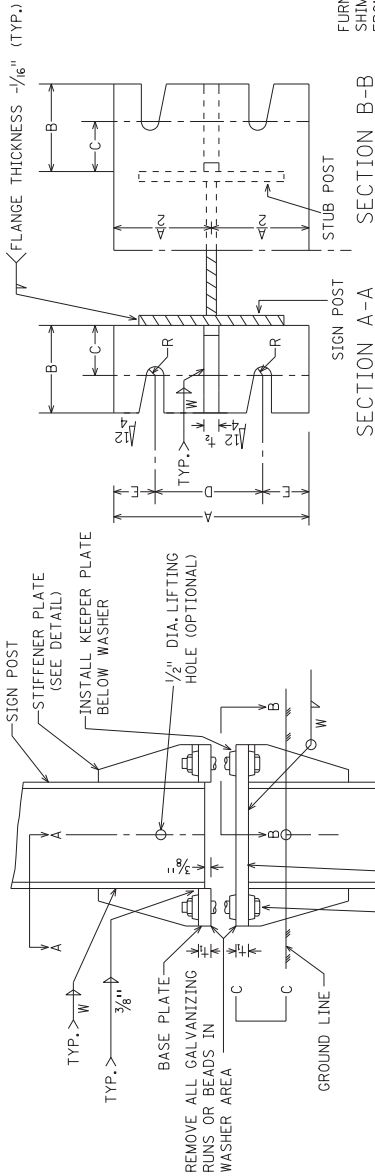
- BOLTING PROCEDURE - BASE CONNECTION**
1. ASSEMBLE SIGN POST TO STUB POST WITH BOLTS AND WITH ONE OF THE FLAT WASHERS ON EACH BOLT BETWEEN PLATES.
 2. SHIM AS REQUIRED TO PLUMB POST.
 3. TIGHTEN ALL BOLTS THE MAXIMUM POSSIBLE WITH 12" OR 15" WRENCH TO BED WASHERS AND SHIMS AND TO CLEAN BOLT THREADS, THEN LOOSEN EACH BOLT IN TURN AND RETIGHTEN IN A SYSTEMATIC ORDER TO THE PRESCRIBED TORQUE. (SEE TABLE)
 4. BURR THREADS AT JUNCTION WITH NUT USING A CENTER PUNCH TO PREVENT NUT LOOSENING.



FURNISH TWO-.012¹/₂ THICK AND TWO-.032¹/₄ THICK SHIMS PER POST. SHIMS SHALL BE FABRICATED FROM BRASS SHIM STOCK OR STRIP CONFORMING TO A.S.T.M. B36.

SHIM DETAIL

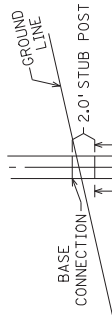
SIGN POST AND STUB POST ELEVATION



SECTIONS SHOWN ARE FOR INSTALLATIONS ON RIGHT SHOULDER AND IN GORE. PLATE SLOT BEVELS ARE OPPOSITE HAND FROM THAT SHOWN FOR INSTALLATIONS ON LEFT SHOULDER.

SECTION A-A SECTION B-B

(SEE TABLE FOR DIMENSIONS)

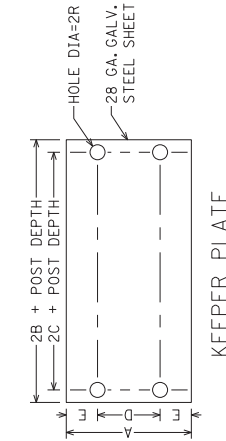


H-PILE FOOTING



STIFFENER PLATE DETAIL

(SEE TABLE FOR DIMENSIONS)



MAXIMUM PROJECTION OF STUB POST SHALL NOT EXTEND BEYOND A LINE, ABOVE AND 4" PARALLEL TO ANY CHORD, WHICH IS PERPENDICULAR TO (OR ALIGNED RADIALLY TO) THE CENTERLINE OF THE HIGHWAY AND HAS ITS (THE CHORD'S) END POINTS ON THE GROUND SURFACE ON OPPOSITE SIDES OF THE STUB POST.

VIEW C-C

SPECIFIC NOTES:

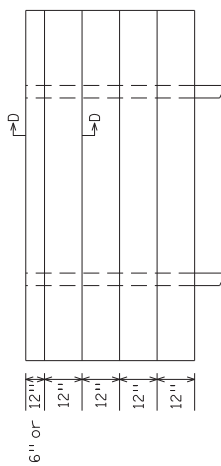
- ① MEASURED FROM TOP OF BASE PLATE
- ② OLD BEAM DEPTH = 10", NEW REVISED BEAM DEPTH = 9-7/8". KEEPER PLATES MUST BE FABRICATED ACCORDINGLY

POST SIZE	BASE CONNECTION DATA													FUSE AND HINGE PLATE DATA			FOOTING DATA							
	BOLT SIZE AND TORQUE	A	B	C	D	E	T ₁	T ₂	W	R	G	H	J	K	L	M	d ₁	d ₂	T ₃	BOLT DIA. LENGTH	BOLT LENGTH	STUB POST LENGTH	H PILE POST "P" (MIN. LENGTH)	
W4X13	3/4" DIA. x 3-1/2"	6"	2 1/2"	1 1/2"	3/2"	1 1/4"	1"	1/2"	1/4"	13/32"	2"	1 1/4"	4"	2 1/4"	7/8"	1"	1/16"	3/4"	3/8"	5/8"	2"	2"	2'	12'
W5X16	TORQUE=600#	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	15/32"	2 1/2"	1 1/4"	5"	2 3/4"	1 1/8"	1 1/8"	13/16"	7/8"	3/4"	3/4"	2"	2'	12'	
W6X20	7/8" DIA. x 4-1/4"	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	15/32"	2 1/2"	1 1/2"	6"	3 1/2"	1 1/4"	1 1/2"	5/16"	1 1/8"	3/4"	3/4"	2"	2'	12'	
W8X24	TORQUE=800#	8"	3"	2"	4"	2"	1 1/2"	3/4"	5/8"	17/32"	2 1/2"	1 1/2"	6 1/2"	3 1/2"	1 1/2"	1 1/2"	15/16"	1 1/8"	1/2"	1"	2 1/2"	2'	12'	
W8X28	1" DIA. x 5" TORQUE=1000#	8"	3"	2"	4"	2"	1 1/2"	3/4"	5/8"	17/32"	2 1/2"	1 1/2"	6 1/2"	3 1/2"	1 1/2"	1 1/2"	15/16"	1 1/8"	1/2"	1"	2 1/2"	2'	12'	
W8X31	1-1/8" DIA. x 5" TORQUE=1200#	9"	3 1/2"	2"	5"	2"	1 1/2"	3/4"	5/8"	19/32"	3"	1 3/4"	8"	5 1/2"	1 1/4"	2"	1 1/6"	1 1/2"	1"	1"	2 1/2"	2'	12'	
W10X39	TORQUE=1200#	9"	3 1/2"	2"	5"	2"	1 1/2"	3/4"	5/8"	19/32"	3"	1 3/4"	8"	5 1/2"	1 1/4"	2"	1 1/6"	1 1/2"	1"	1"	2 1/2"	2'	12'	

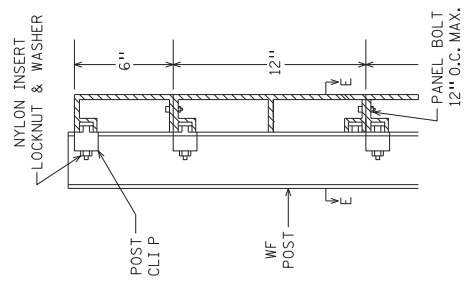
TYPE A SIGN STRUCTURAL DETAILS

H-PILE FOOTING SHEET 1 OF 2

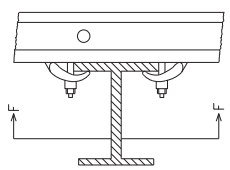
REVISED: 10-2-2013



TYPICAL PANEL MOUNTING



SECTION D-D



SECTION E-E

POST SHALL BE SAW CUT BEFORE GALVANIZING. USE H.S. BOLTS WITH HEX. HD., HEX. NUT, AND TWO FLAT WASHERS.

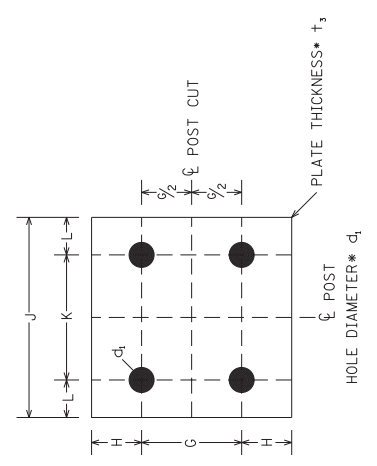
DETAIL "A" FRICTION FUSE

CONTRACTOR NOTE: ALL FRICTION FUSE BOLTS SHALL BE TORQUE WRENCH TIGHTENED IN THE FIELD IN THE PRESENCE OF THE ENGINEER OR HIS REPRESENTATIVE. NUTS SHALL HAVE BEEN RETAPPED AND BOLT THREADS SHALL HAVE BEEN CLEANED WITH A 1/64" OVERSIZED RETREADING DIE AFTER GALVANIZING. BEFORE TIGHTENING MAY BEGIN, THE TORQUE WRENCH SHALL BE CALIBRATED WITH A BOLT-TENSION-CALIBRATOR USING TYPICAL BOLT-NUT-WASHER ASSEMBLIES OF EACH SIZE AND LOT TO BE USED SO AS TO SHOW THE TORQUE NECESSARY TO OBTAIN THE FOLLOWING MINIMUM RESIDUAL TENSION IN EACH BOLT.

BOLT SIZE	MIN. RESIDUAL BOLT TENSION
1/2" DIA.	12,050*
5/8" DIA.	19,200*
3/4" DIA.	28,400*
7/8" DIA.	39,250*
1" DIA.	51,500*
1-1/8" DIA.	56,450*

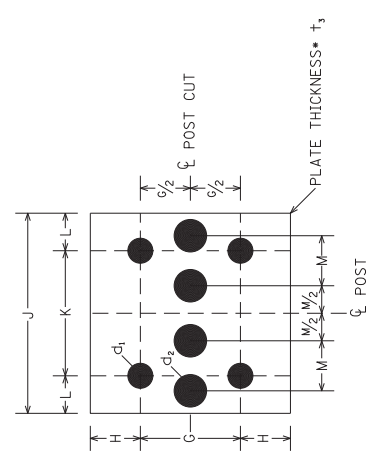
NOTE: POST CLIPS SHALL BE INSTALLED ON BOTH SIDES OF EACH POST AT EACH PANEL JOINT AS INDICATED.

SECTION F-F



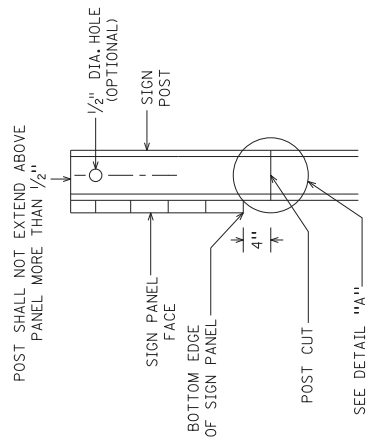
HINGE PLATE DETAIL

(SEE TABLE ON SHEET 1 OF 2 FOR DIMENSIONS)



FRICITION FUSE PLATE DETAIL

(SEE TABLE ON SHEET 1 OF 2 FOR DIMENSIONS)



FRICITION FUSE SIDE VIEW

SEE DETAIL "A"

GENERAL NOTES:

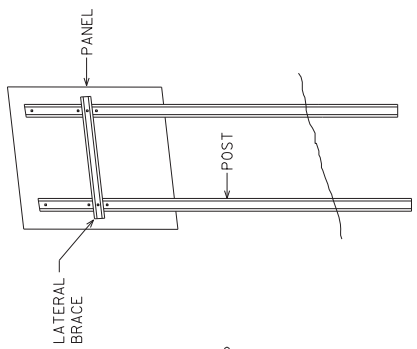
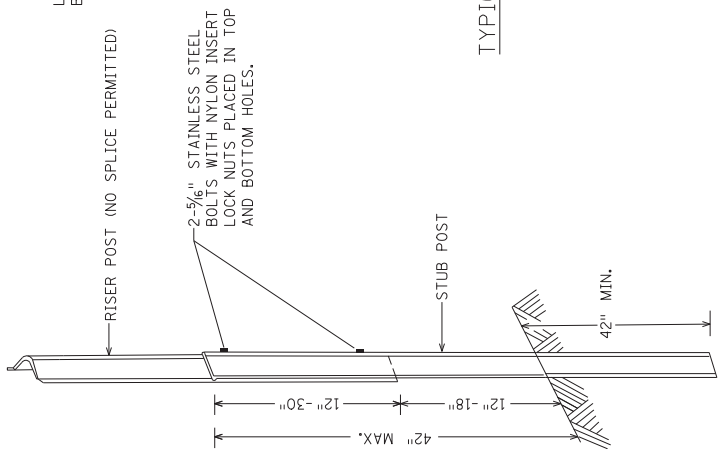
- STRUCTURAL STEEL SHALL CONFORM TO MNDOT 3308. REINFORCING BARS SHALL CONFORM TO MNDOT 3301. SPIRALS SHALL CONFORM TO MNDOT 3305-NO SPLICES. HIGH STRENGTH BOLTS SHALL CONFORM TO A.S.T.M.-A325.
- FORMS WILL BE REQUIRED FOR THE EXPOSED VERTICAL SURFACES OF THE FOOTINGS.
- REFER TO "SIGN DATA" SHEET FOR SPECIFIC DATA ON EACH INDIVIDUAL SIGN INSTALLATION.
- FRICTION FUSE PLATE SHALL BE INSTALLED ON SIDE OF POST FACING TRAFFIC.
- ALL POST CUTS SHALL BE SAW CUTS. PLATES MAY BE SHEARED OR FLAME CUT USING A MECHANICALLY GUIDED CUTTING TORCH. EDGE PREPARATION SHALL BE IN ACCORDANCE WITH MNDOT 2471.3.C.4 AND MNDOT 2471.3.D.4.

TYPE A SIGN STRUCTURAL DETAILS

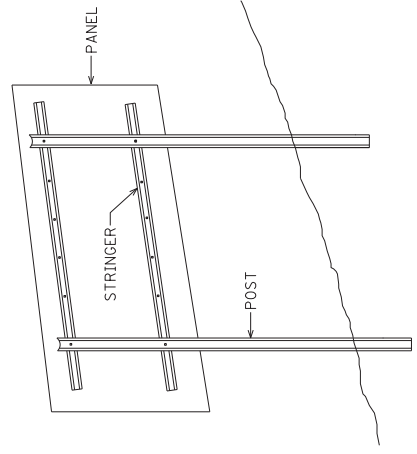
SHEET 2 OF 2

REVISED: 10-2-2013

TYPE C & D POST

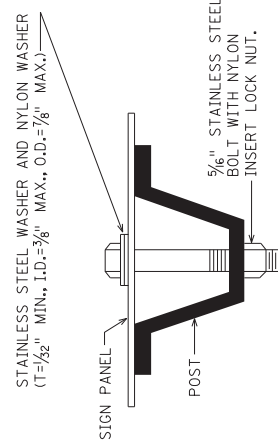


TYPICAL TYPE C INSTALLATION



TYPICAL TYPE D INSTALLATION

U POST BREAKAWAY SPLICE



U POST MOUNTING TYPE C SIGNS

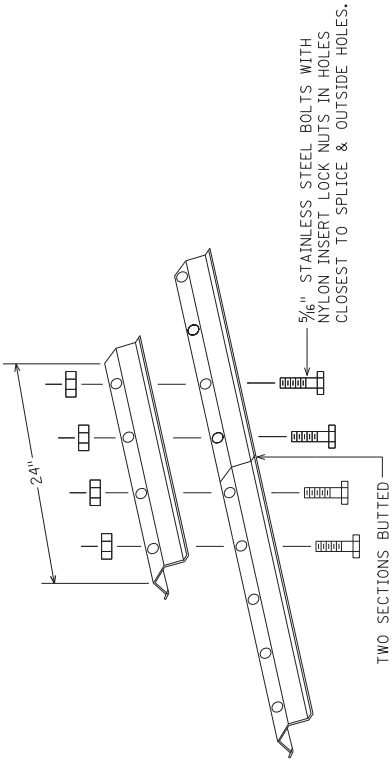
NOTES:

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 3352.246.
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 SECTION AND LOCATED APPROXIMATELY AT THE QUARTER POINTS AS SHOWN IN MODIFIED TYPE C INSTALLATION.

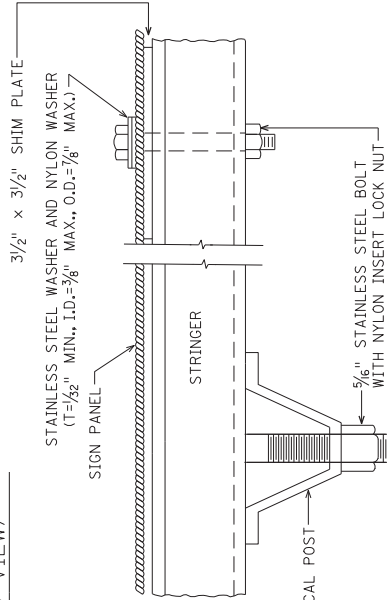
TYPE C & D SIGN

MODIFIED TYPE C INSTALLATION

STRUCTURAL DETAILS



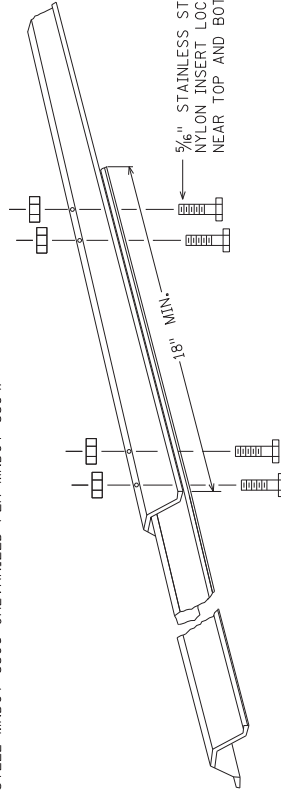
LATERAL BRACE OR STRINGER
SPLICE DETAIL (EXPLODED VIEW)



SECTION B-B

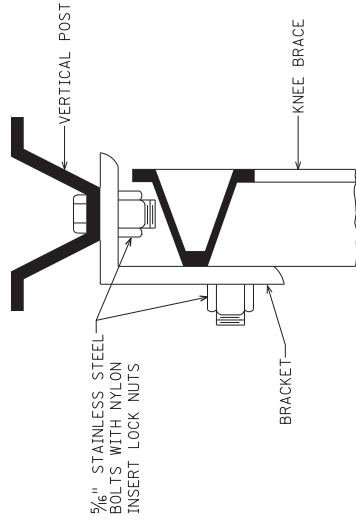
A-FRAME BRACKET

(STEEL MNDOT 3306 GALVANIZED PER MNDOT 3394)

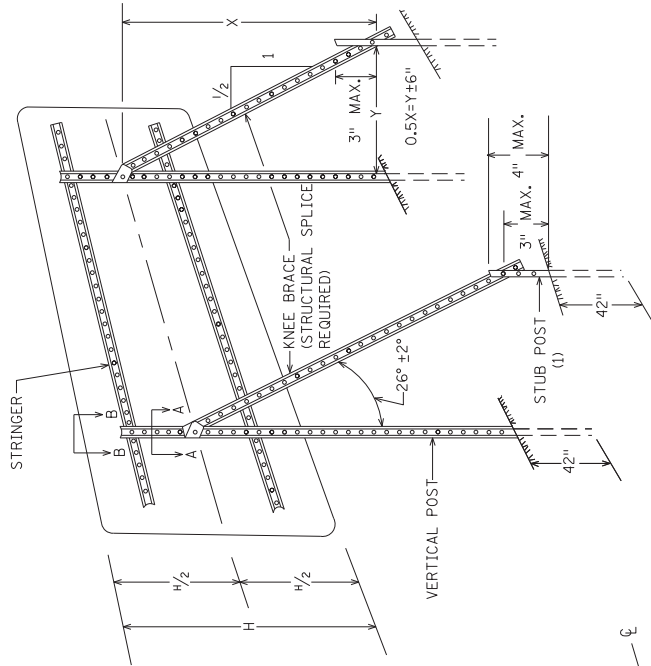


STRUCTURAL SPLICE

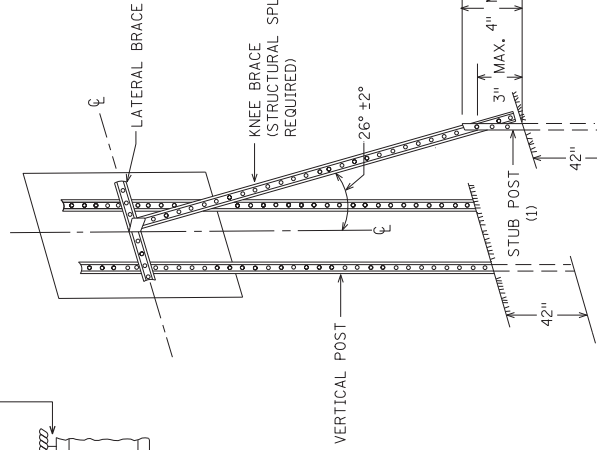
(USE WHEN IT IS NECESSARY TO FABRICATE THE CORRECT LENGTH OF POST FROM TWO PIECES)



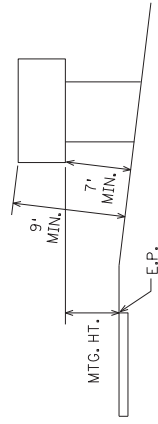
SECTION A-A



TYPICAL "A-FRAME" INSTALLATION
TYPE "D" SIGNS



TYPICAL "A-FRAME" INSTALLATION
TYPE "C" SIGNS

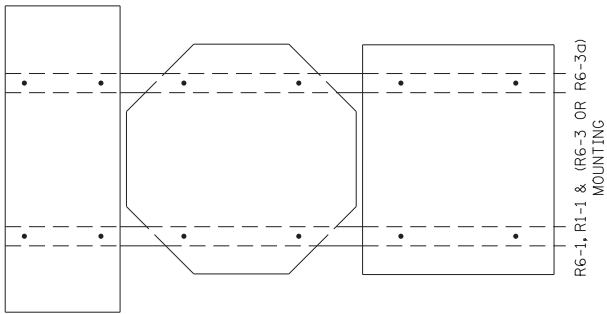


TYPICAL MOUNTING

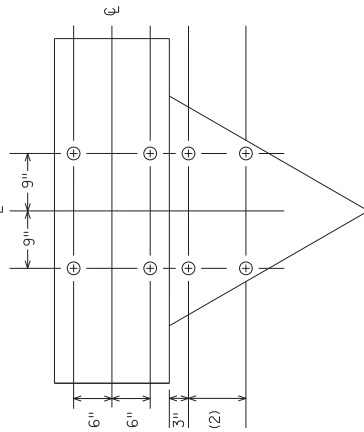
(1) OFFSET STUB POST 1' TOWARD ROADWAY
RELATIVE TO VERTICAL POST. ATTACH STUB
POST AND KNEE BRACE BACK TO BACK.

TYPE C & D SIGN
STRUCTURAL DETAILS

Sheet 2 of 3

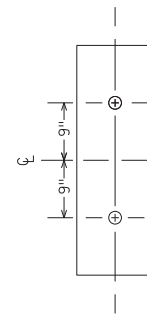


R6-1, R1-1 & (R6-3 OR R6-3a)
MOUNTING

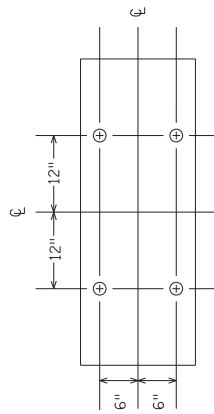


PUNCHING FOR R6-1 (54" x 18") AND
R1-2 (36" x 36" x 36" OR 48" x 48" x 48")

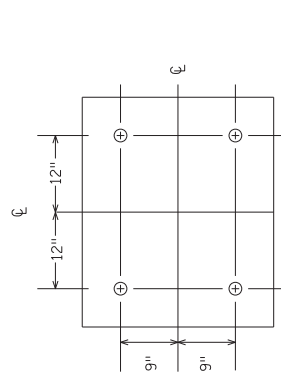
(2) 9" FOR 36" x 36" x 36"
18" FOR 48" x 48" x 48"



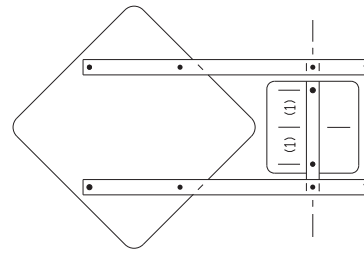
PUNCHING FOR R6-1 (36" x 12")



PUNCHING FOR R6-1 (54" x 18")

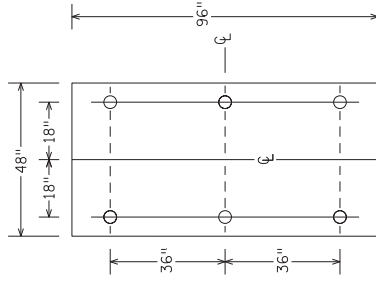


PUNCHING FOR R6-3 OR R6-3a (36" x 30")

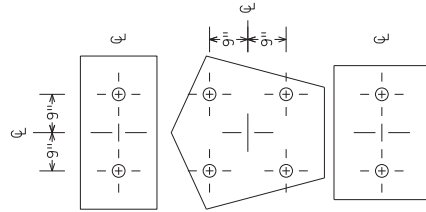


WARNING SIGN [30" x 30" OR 48" x 48"] AND
WARNING PLAQUE [18" x 18" OR 30" x 30"]
PUNCHING AND MOUNTING

(1) 6" FOR WARNING PLAQUE (18" x 18")
12" FOR WARNING PLAQUE (30" x 30")



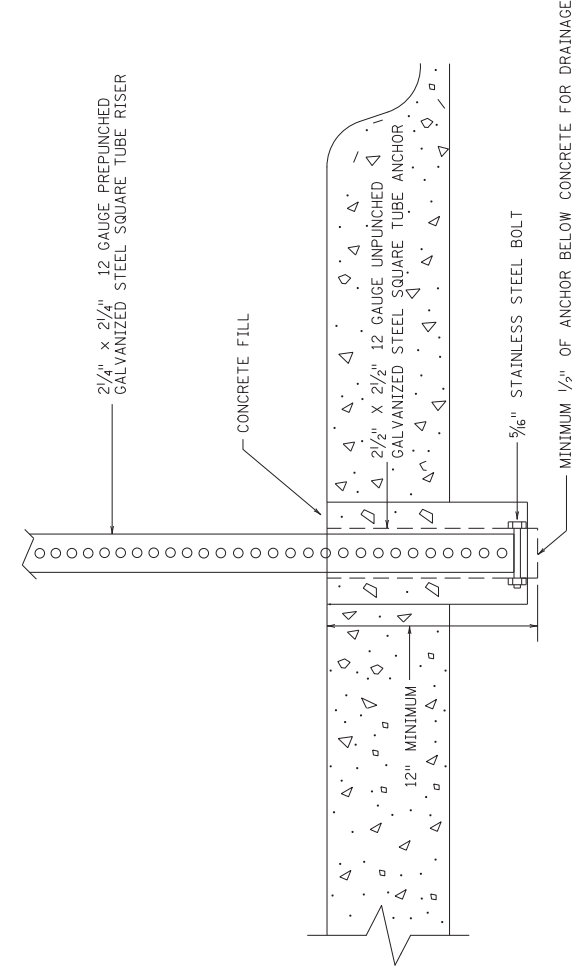
PUNCHING FOR R2-4b
SPEED LIMIT



(M3-1A, M3-2A, M3-3A OR M3-4A) [36" x 18"] J AND
M1-6 [36" x 36"] J AND
(M5-1A, M5-2A, M6-1A, M6-2A, M6-3A, M6-4A, M6-5A OR M6-6A) [30" x 24"] J
PUNCHING

TYPE C & D SIGN
STRUCTURAL DETAILS

Sheet 3 of 3



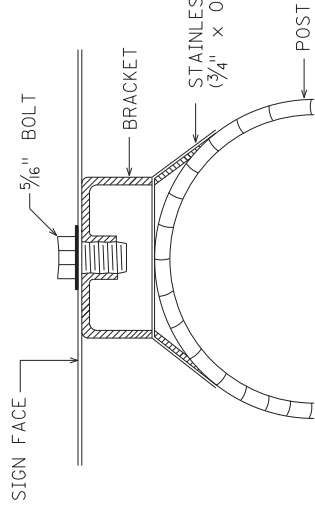
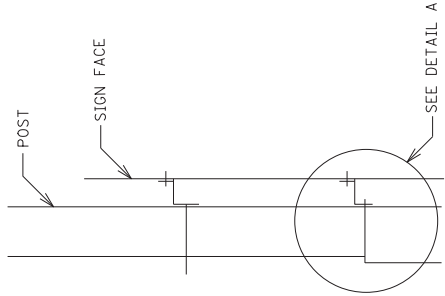
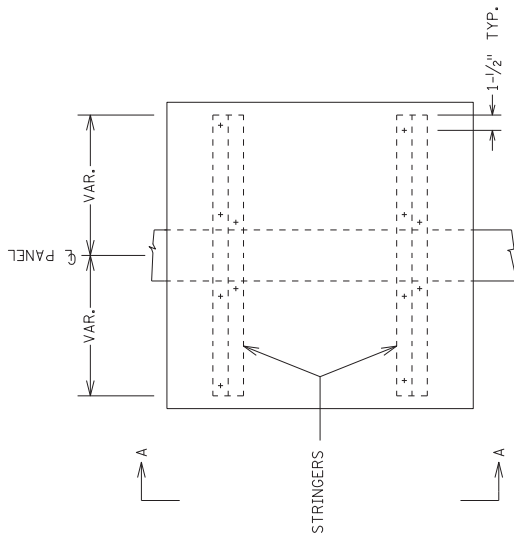
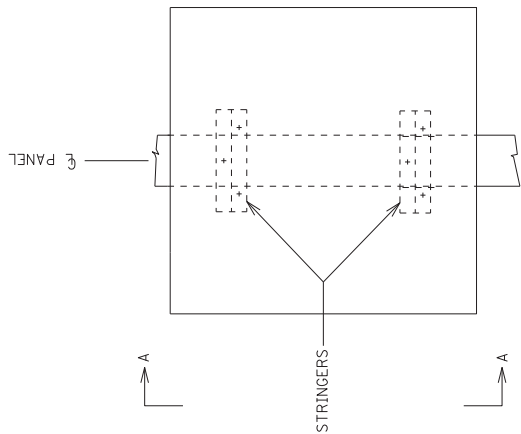
NOTES:

1. DRILL AN 8" DIAMETER HOLE THE FULL DEPTH OF THE ANCHOR.
2. DRILL 5/8" 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. 8680-515 (TH 94) SHEET NO. ST41 OF ST53 SHEETS



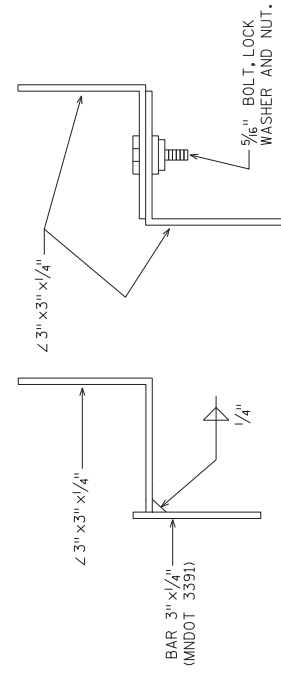
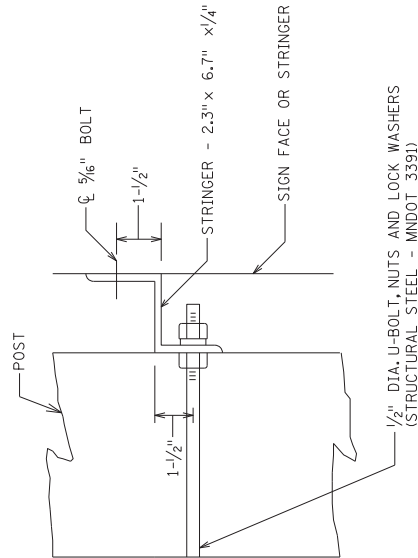
GALVANIZED OR STAINLESS
STEEL BRACKET, BOLT AND
WASHER.

SINGLE POST PUNCHING
ELEVATION

2-POST PUNCHING
ELEVATION

VIEW A-A

STRAP MOUNTING DETAIL FOR
OVERHEAD IDENTIFICATION AND
LIGHTING SYSTEM IDENTIFICATION PLATES

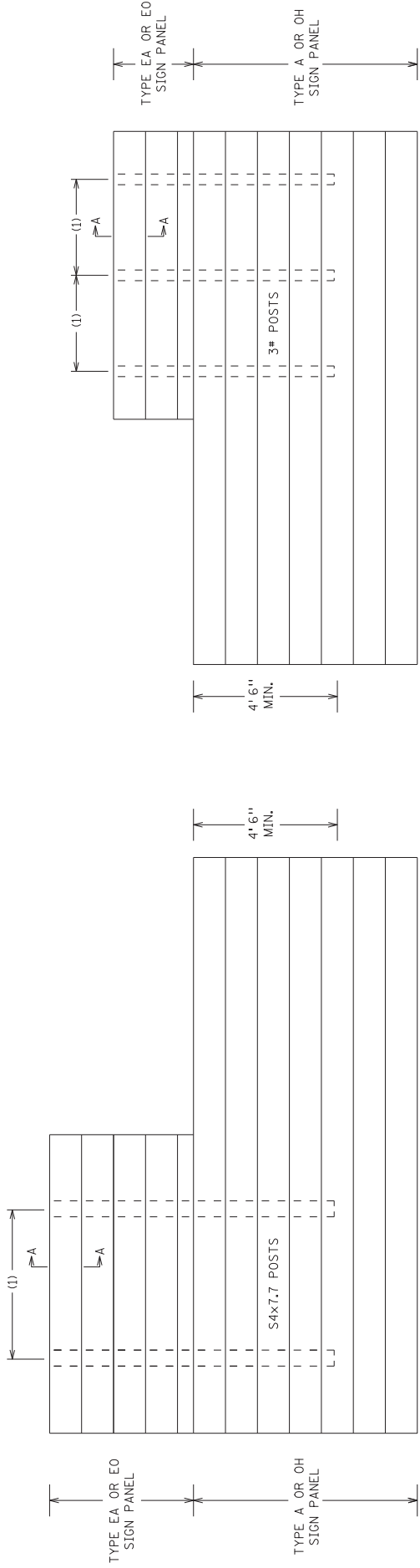


- NOTES:
- FOR DETAILS AND NOTES NOT SHOWN SEE "C" & "D" SIGN DETAILS.
 - FOR BACK TO BACK MOUNTINGS, ROTATE STRINGERS FOR ONE PANEL 180° FROM WHAT IS SHOWN SUCH THAT PANELS CAN BE MOUNTED AT SAME ELEVATION.
 - DETAIL A STRINGER MAY BE ONE OF THE THREE DESIGNS DETAILED OR AN APPROVED EQUAL STRUCTURAL 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

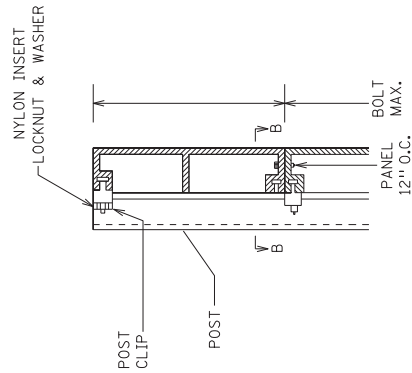
DETAIL A

DETAIL A STRINGER ALTERNATES

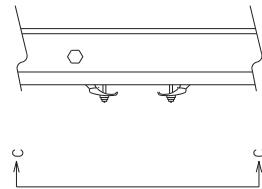


LEFT JUSTIFIED PANEL MOUNTING

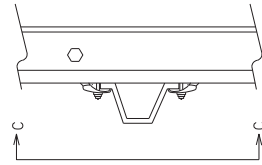
RIGHT JUSTIFIED PANEL MOUNTING



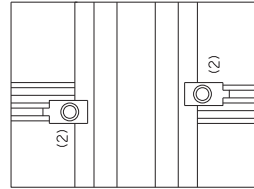
SECTION A-A



SECTION B-B
54x7.7 POST



SECTION B-B
3# POST
(Mn/DOT 3401)



VIEW C-C

SPECIFIC NOTES:

- (1) SEE TABULATION SHEET FOR NUMBER AND SPACING OF POSTS. SPACING AND LOCATION CAN BE ADJUSTED WHERE NECESSARY.
- (2) POST CLIPS SHALL BE ATTACHED ON BOTH SIDES OF EACH POST AT EACH PANEL JOINT AS INDICATED.

GENERAL NOTE:

- 1. TYPE EA OR EO SIGN PANEL SHALL BE LEFT JUSTIFIED FOR LEFT EXITS AND RIGHT JUSTIFIED FOR RIGHT EXITS ON TYPE A OR OH SIGN PANEL.

TYPE EA & EO SIGN
STRUCTURAL DETAILS

SPECIFIC NOTES:
 ① DIMENSION Y IS CONSTANT AND BASED ON THE DEEPEST SIGN PANEL ABOVE THAT WALKWAY. WHEN STANDARD SIGN PANELS AND CMS ARE MOUNTED ON THE SAME SPAN, DIMENSION Y SHALL BE GOVERNED BY THE CMS. ② ELEVATION EARS SHALL BE MOUNTED FROM THE HIGHEST ELEVATION OF PAVEMENT SHOULDERS AND MOUNTABLE CURBS, OR IF UNSURMOUNTABLE CURBS ARE USED, THE HIGHEST ELEVATION BETWEEN CURB LINES.

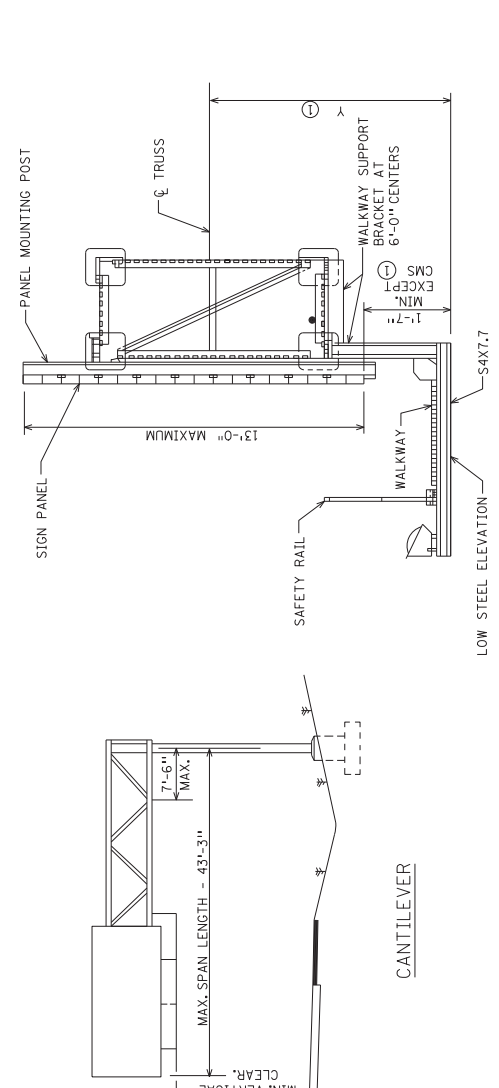
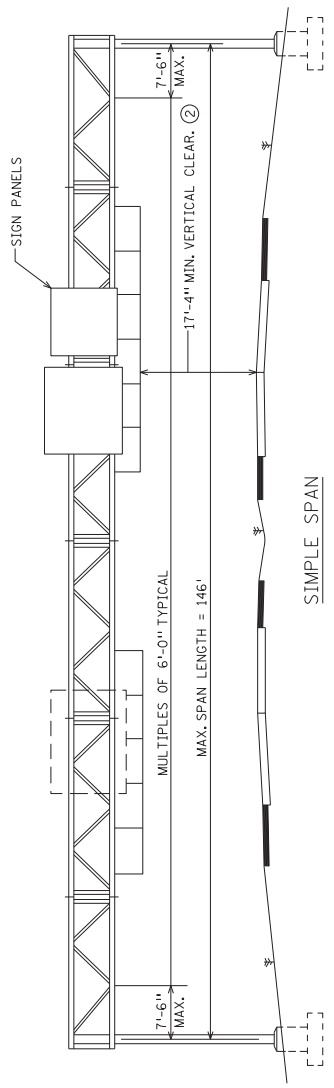
GENERAL NOTES:

DESIGN SPECIFICATIONS:
 TRUSS, POST, & HARDWARE:
 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS DATED 1999.
LOADING:
 WIND LOAD 90 M.P.H. NORMAL TO SIGN FACE IN COMBINATION WITH OTHER LOADS OUTLINED IN THE DESIGN SPECIFICATIONS.
UNIT STRESSES:
 CONCRETE----- Fc = 1,600 PSI
 REINFORCEMENT STEEL----- Fs = 24,000 PSI
 FOOTING SOIL PRESSURE----- 1-1/4 TONS PER SQ. FT.
MATERIALS:
 STRUCTURAL STEEL (EXCEPT POST, TUBES)- MNDOT 3306
 POST STEEL----- VARIES
 HIGH STRENGTH BOLTS----- MNDOT 3391.2B
 ANCHOR RODS----- MNDOT 3385
 CASTINGS----- MNDOT 3322
 REINFORCEMENT BARS----- MNDOT 3301
 SPIRAL----- MNDOT 3305 NO SPLICES
 WALKWAY GRATING----- FEDERAL SPECIFICATIONS RR-G-661b, TYPE 1, STEEL
 CONCRETE----- MNDOT 2461 (MIX 3Y43)

FINISH:
 ALL COMPONENTS SHALL BE GALVANIZED AFTER FABRICATION EXCEPT REINFORCEMENT BARS, LOWER PORTION OF ANCHOR RODS, ALUMINUM, AND OTHER NON FERROUS INCIDENTALS. GALVANIZING SHALL CONFORM TO MNDOT 3392 OR MNDOT 3394 AS APPLICABLE. BEARING SURFACES MUST BE SMOOTH.
FABRICATION:
 FABRICATION OF STRUCTURAL METALS SHALL BE IN ACCORDANCE WITH MNDOT 2471, MNDOT 2564 AND THE APPLICABLE SPECIAL PROVISIONS. ALL WELDING TO BE CONTINUOUS. ALL CONTACT SURFACES MUST BE COMPLETELY SEALED.

INSPECTION:
 INSPECTION BEFORE AND AFTER GALVANIZING PER MNDOT 1511 AND MNDOT 2471.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
GENERAL ELEVATIONS AND NOTES
DRAWING ST-1



SECTION

SIGN HEIGHT	Y ①	CMS (NEW LED)
6'-6"	4'-4"	
7'-0"	4'-7"	
7'-6"	4'-10"	
8'-0"	5'-1"	CMS (LED)
8'-6"	5'-4"	
9'-0"	5'-7"	CMS (DRUM)
9'-6"	5'-10"	
10'-0"	6'-1"	
10'-6"	6'-4"	
11'-0"	6'-7"	
11'-6"	6'-10"	
12'-0"	7'-1"	
12'-6"	7'-4"	
13'-0"	7'-7"	

INDEX OF STANDARD SIGN DRAWINGS

DRAWING	TITLE
ST-1	GENERAL ELEVATION AND NOTES
ST-2	CAMBER, POST IDENTIFICATION AND ESTIMATED QUANTITIES
ST-3	FOUNDATIONS AND ANCHOR RODS
ST-4	TRUSS/POST CONNECTION & BASEPLATE
ST-5	SIGN TRUSS DETAILS - TYPE A
ST-6	SIGN TRUSS DETAILS - TYPE B
ST-7	SIGN TRUSS DETAILS - TYPE C
ST-8	WALKWAY DETAILS
ST-9	FOLDING HANDRAIL
ST-10	SIGN PANEL AND PANEL MOUNTING POST DETAILS
ST-11	ELECTRICAL DETAILS
ST-12	ELECTRICAL DETAILS
ST-13	ELECTRICAL DETAILS (CMS SIGNS)

SIMPLE SPAN

SPAN	SIMPLE SPAN TRUSS CAMBER											
	40	50	60	70	80	90	100	110	120	130	140	150
CAMBER	1/4	3/8	1/2	5/8	3/4	7/8	1 1/8	1 1/4	1 1/2	1 5/8	1 3/4	1 7/8
DL DEFLECTION	0	1/16	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1 1/8	1 1/4	1 1/2
RESIDUAL CAMBER	1/4	3/8	1/2	5/8	3/4	7/8	1 1/8	1 1/4	1 1/2	1 5/8	1 3/4	1 7/8

NOTE: CAMBER AND DEFLECTIONS SHOWN ARE AT $\frac{1}{4}$ SPAN. THE DEFLECTIONS AND CAMBER AT THE QUARTER POINTS SHALL BE APPROXIMATELY 75% OF THESE VALUES.

CANTILEVER SPAN

SPAN	CANTILEVER SPAN TRUSS CAMBER			
	15'	20'	30'	45'
CAMBER	1/8	1/4	3/8	1/2
DL DEFLECTION	0	0	1/16	3/16
RESIDUAL CAMBER	1/8	1/4	3/8	1/2

NOTE: CAMBER AND DEFLECTIONS SHOWN ARE SHOWN AT END OF CANTILEVER.

WHEN ERECTING CANTILEVER TRUSSES, THE POSTS SHALL BE SET 1/8" PER FOOT OUT OF PLUMB TO COMPENSATE FOR THE BENDING OF THE POSTS.

TABLE 1 - POST IDENTIFICATION

POST IDENTIFICATION NUMBER	BASEPLATE DESIGN	PERMISSIBLE WALL THICKNESS (INCH)		PIPE SECTIONS MIN. YIELD=35 KSI		PIPE SECTIONS MIN. YIELD=42 KSI	
		OUTSIDE DIAMETER	WALL THICKNESS	OUTSIDE DIAMETER	WALL THICKNESS		
1	A	18	0.250	18	0.312	18	0.375
2	A	18	0.375	18	0.375	18	0.375
3	A	18	0.500	18	0.500	18	0.500
4	A	18	0.562	18	0.562	18	0.562
5	B	18	0.594	20	0.500	20	0.500
6	B	18	0.594	20	0.500	20	0.500
7	B	18	0.594	20	0.500	20	0.500

WALL THICKNESS IS MINIMUM, THINNER WALLS WILL NOT BE APPROVED

POST IDENTIFICATION NOTES:

POST MATERIAL SHALL CONFORM TO ONE OF THE FOLLOWING SPECIFICATIONS:
 ASTM A709, GRADE 36
 ASTM A53, GRADE B
 API 5L, GRADES B, X42, X46, X52, X56, X60, X65

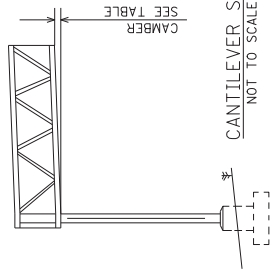
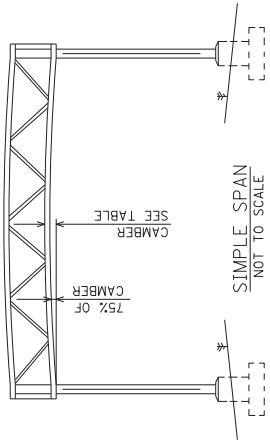
CONTRACTOR SHALL DEMONSTRATE THAT THE POST MATERIAL MEETS THE REQUIREMENTS OF ONE OF THE ABOVE CITED SPECIFICATIONS AND THE MINIMUM YIELD STRENGTH.

NO SPLICES OF ANY KIND WILL BE PERMITTED IN POSTS INTENDED FOR USE IN CANTILEVER TYPE STRUCTURES (BRIDGE TYPE B/C).

ONE OF TWO POSTS FOR SIMPLE SPAN STRUCTURES (BRIDGE TYPE S) MAY INCORPORATE ONE WELDED PERFORATED PIPE SPlice FORMING THE BACK UP BRACE. ALL OTHERS SHALL BE WELDED PERFORATED PIPE SPlices. ALL WELDED SPlices SHALL BE WELDED TO THE UPPER 1/2 OF THE LENGTH. BACK UP BRACES FORMING THE WELDED SPlices SHALL BE COMMERCIAL PRODUCTS. BUT WELDS REQUIRE RADIOGRAPHIC INSPECTION (MNDOT 2471.3).

ALL RADIOGRAPHIC INSPECTIONS AND MAGNETIC PARTICLE TESTING REPORTS AND RADIOGRAPHIC FILMS SHALL BECOME THE PROPERTY OF THE DEPARTMENT.

SEE DRAWING ST-4 FOR BASEPLATE DETAILS.



FOR FOUNDATION QUANTITIES SEE DRAWING ST-3

WALKWAY WEIGHTS:

1. USE 3'-4 1/4" WIDE GRATING @ 44 LBS./FT.
2. WEIGHT INCLUDES HANDRAIL (12 LBS./FT.) AND FIXTURE MOUNTING CHANNELS (4 LBS./FT.).

TRUSS QUANTITIES

USE LENGTH FROM $\frac{1}{4}$ POST WHEN CALCULATING TOTAL WEIGHTS.

TRUSS TYPE A	168 LBS./FT.
TRUSS TYPE B	196 LBS./FT.
TRUSS TYPE C	178 LBS./FT.

PANEL MOUNTING POST QUANTITIES INCLUDES MOUNTING ANGLES

PANEL HEIGHT	WEIGHT/POST
6'-6"	74
7'-0"	78
7'-6"	82
8'-0"	86
8'-6"	90
9'-0"	93
9'-6"	97
10'-0"	101
11'-0"	105
11'-6"	109
12'-0"	113
12'-6"	117
13'-0"	121

WALKWAY SUPPORT QUANTITIES

USE MAXIMUM PANEL HEIGHT (ON SPAN) TO CALCULATE QUANTITIES. THE NUMBER OF PANELS SHALL BE COVERED BY THE CWS.

PANEL HEIGHT	A	B	C
6'-6"	99	105	113
7'-0"	101	107	115
7'-6"	103	109	117
8'-0"	105	111	119
8'-6"	107	113	121
9'-0"	109	115	123
9'-6"	111	117	125
10'-0"	113	119	127
10'-6"	115	121	129
11'-0"	117	123	131
11'-6"	119	125	133
12'-0"	121	127	135
12'-6"	123	129	137
13'-0"	125	131	139

POST QUANTITIES

QUANTITIES INCLUDE ANCHORAGE ASSEMBLY AND TRUSS CONNECTION PLATES. PAY LENGTH OF POSTS FROM THE BOTTOM OF THE PLATE TO THE TOP OF THE TRUSS. POST QUANTITIES ARE BASED ON GRADE 45 STEEL. NO ADJUSTMENTS WILL BE MADE IN THE QUANTITIES FOR THE USE OF GRADE 35 STEEL POSTS.

POST TYPE	CANTILEVER			SIMPLE SPAN		
	TRUSS TYPE A	TRUSS TYPE B	TRUSS TYPE C	TRUSS TYPE A	TRUSS TYPE B	TRUSS TYPE C
1	1880+47 LBS/FT	1910+47 LBS/FT	1870+47 LBS/FT	1870+47 LBS/FT	1890+47 LBS/FT	1915+47 LBS/FT
2	1880+59 LBS/FT	1910+59 LBS/FT	1870+59 LBS/FT	1870+59 LBS/FT	1890+59 LBS/FT	1915+59 LBS/FT
3	1880+71 LBS/FT	1910+71 LBS/FT	1870+71 LBS/FT	1870+71 LBS/FT	1890+71 LBS/FT	1915+71 LBS/FT
4	1880+84 LBS/FT	1910+84 LBS/FT	1870+84 LBS/FT	1870+84 LBS/FT	1890+84 LBS/FT	1915+84 LBS/FT
5	2470+138 LBS/FT	2500+138 LBS/FT	2460+138 LBS/FT	N/A	2545+138 LBS/FT	2570+138 LBS/FT
6	N/A	2500+104 LBS/FT	N/A	N/A	2545+104 LBS/FT	2570+104 LBS/FT
7	N/A	2500+167 LBS/FT	N/A	N/A	2545+167 LBS/FT	2570+167 LBS/FT

SPECIFIC NOTES:

- G IS IN FEET. ROUND UP TO WHOLE NUMBER. E.G. G=4.10/20=8.2 NO. REQ'D=9.
- G AND R ARE IN FEET.
- BEND AS REQUIRED TO FORM A CLOSED LOOP.
- FOR STRUCTURE STEEL SEE SPREAD FOOTING.
- MUST BE FORMED A MIN. OF 6" BELOW THE GROUND SURFACE. THE SOIL EXCAVATED FOR FORMING SHALL BE BACKFILLED AND TAMPED TO EQUIVALENT COMPACTION AS SURROUNDING MATERIAL.
- SPECIAL LARGE RADIUS BARS ARE REQUIRED. SEE "BAR BENDING DIAGRAMS" FOR SIZES OF RADI.

GENERAL NOTES:

- SEE THE FORMAT SHEET FOR FOOTING LOCATIONS, POST DESIGNATIONS, TOP OF PEDESTAL ELEVATIONS AND BOTTOM OF FOOTING ELEVATIONS.
- ALL CONCRETE SHALL CONFORM TO CONCRETE MIX 3Y43 (MNDOT 246J).
- ALL BAR DIMENSIONS ARE OUT TO OUT OF BARS.
- ALL SPREAD FOOTINGS HAVE AN ALLOWABLE DESIGN BEARING PRESSURE OF 1 1/4 T PER SQUARE FOOT.
- DRILLED SHAFTS SHALL BE USED ONLY WHEN SPECIFIED IN THE CONTRACT PLANS.
- THE DRILLED SHAFTS HAVE AN ALLOWABLE DESIGN LATERAL BEARING PRESSURE OF 260 LBS. PER SQ. FT. PER FOOT OF DEPTH.
- UNLESS OTHERWISE NOTED, ALL REINFORCEMENT BARS SHALL BE EPOXY COATED IN ACCORDANCE WITH MNDOT3301. SPIRAL BARS AND J, K, L, & M BARS NEED NOT BE EPOXY COATED.
- THE FOLLOWING TORQUE VALUES SHALL BE USED WHEN INSTALLING ALL ANCHOR NUTS FOR OVERHEAD SIGN STRUCTURES:
ANCHOR BOLT DIAMETER TORQUE (FT./LBS.)
2 1/2" 375
2 1/2" 450

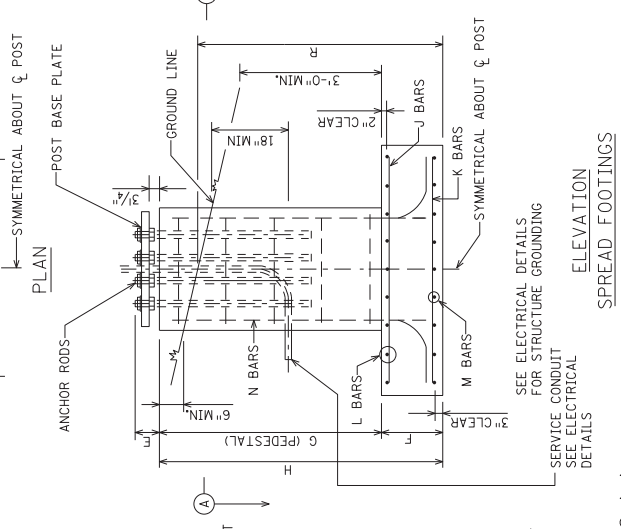
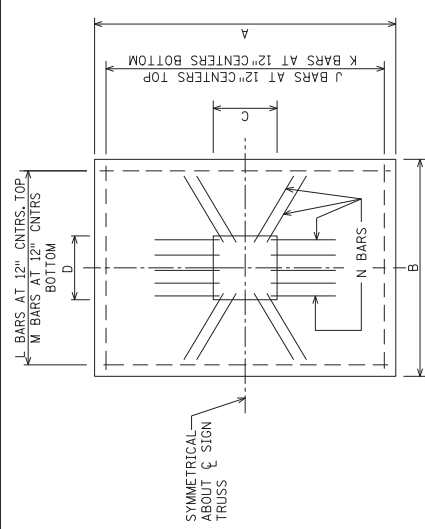
THE CONTRACTOR SHALL BURR THE THREADS OF THE ANCHOR BOLTS IN ACCORDANCE WITH MNDOT 2402.5H AFTER TORQUEING NUTS.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B

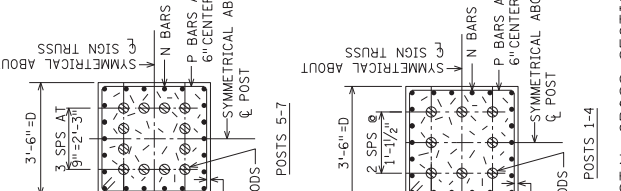
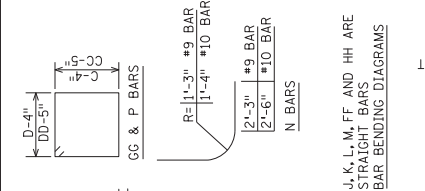
FOUNDATIONS AND ANCHOR RODS

DRAWING ST-3

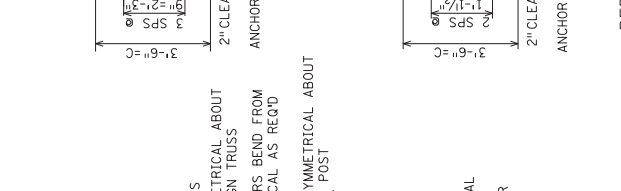
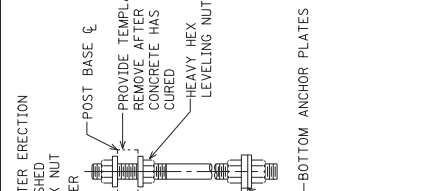
SHEET NO. ST46 OF ST53 SHEETS



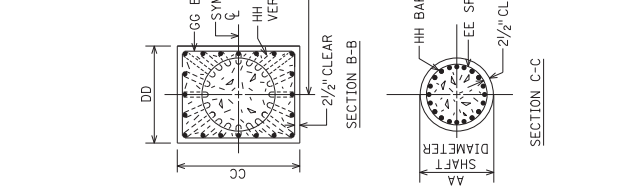
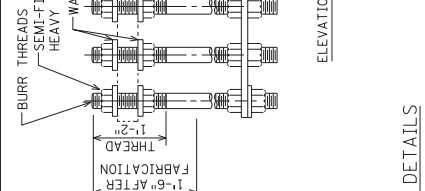
PEDESTAL CROSS SECTIONS A-A



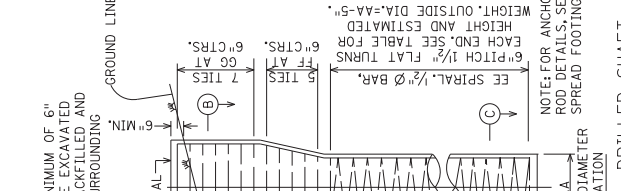
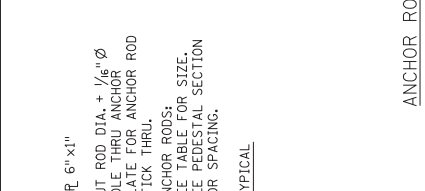
DRILLED SHAFT



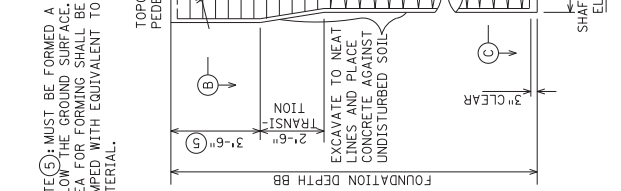
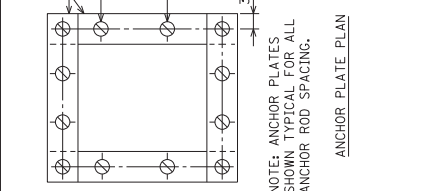
SPREAD FOOTINGS



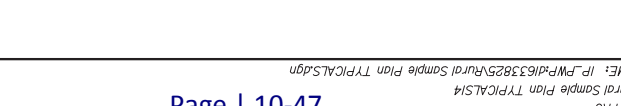
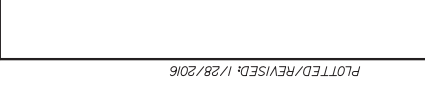
PEDESTAL CROSS SECTIONS A-A



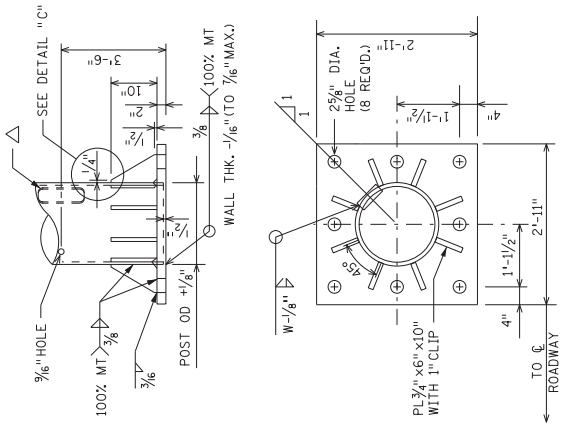
SPREAD FOOTINGS



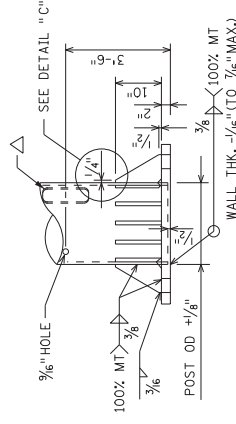
PEDESTAL CROSS SECTIONS A-A



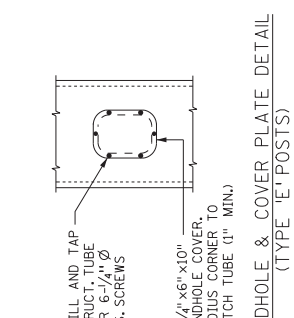
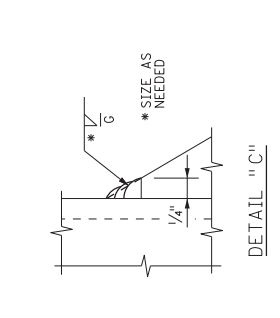
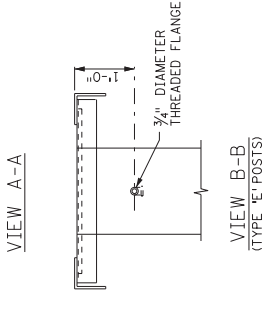
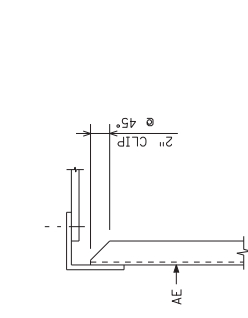
SPREAD FOOTINGS



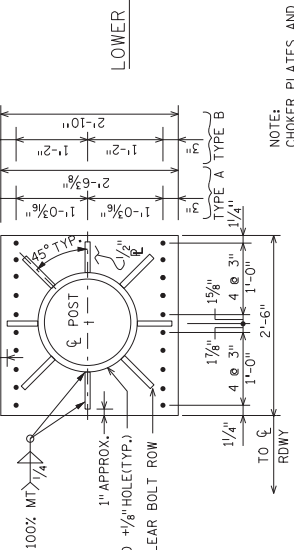
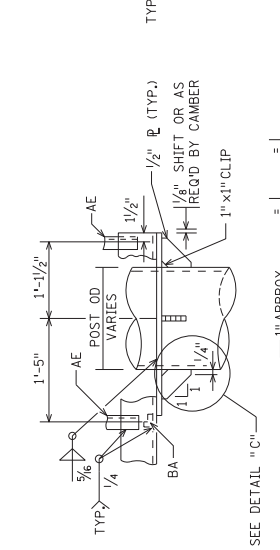
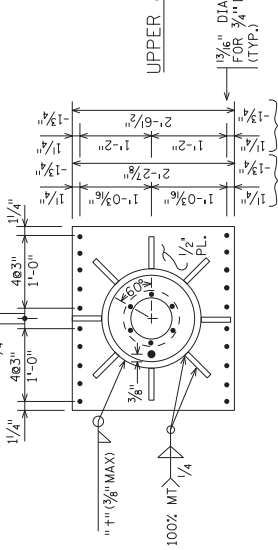
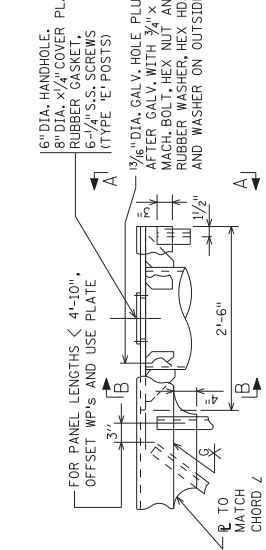
PLAN & ELEVATION - BASEPLATE TYPE A
POST NO. 1 THRU 4



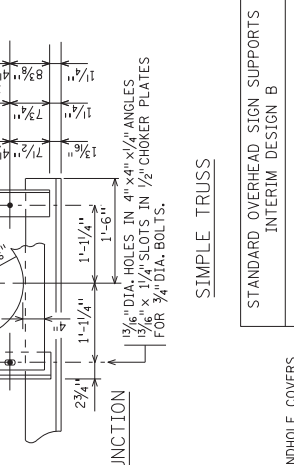
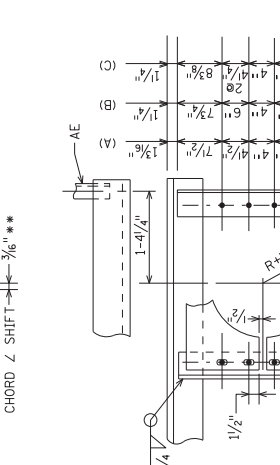
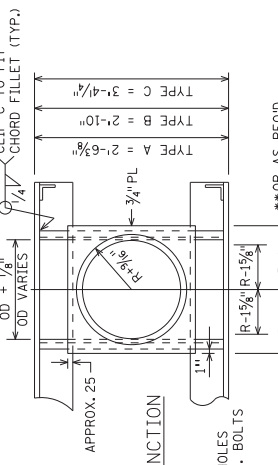
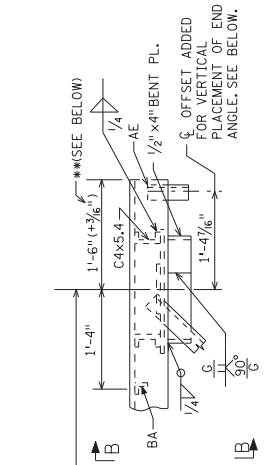
PLAN & ELEVATION - BASEPLATE TYPE B
POST NO. 5 THRU 7



CANTILEVER TRUSS



STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B



TRUSS/POST CONNECTION
&
BASEPLATES

DRAWING ST-4

NOTES:

TRUSS SECTIONS SHALL BE MADE IN MULTIPLES OF 6'-0", EXCEPT THAT THE BRACING PANEL NEAREST EACH POST MAY VARY TO MAKE UP THE NEAREST 6'-0" TO THE TOTAL LENGTH OF THE TRUSS. THE PERMITTED EXCEPT IN CANTILEVER TRUSSES AS NOTED BELOW.

CANTILEVER TRUSSES SHALL BE SUPPLIED AS A SINGLE UNIT WHENEVER POSSIBLE. WHEN CANTILEVER TRUSS LENGTH EXCEEDS 40'-0" CHORDS MAY BE SPLICED, AS SHOWN, IN THE END BRACING PANEL ONLY. CHORD SPLICES WELD SHALL BE COVERED BY PENETRATION, UNLESS OTHERWISE SHOWN. ALL WELDS SHALL BE 1/4" FILLET WELDS ALL AROUND.

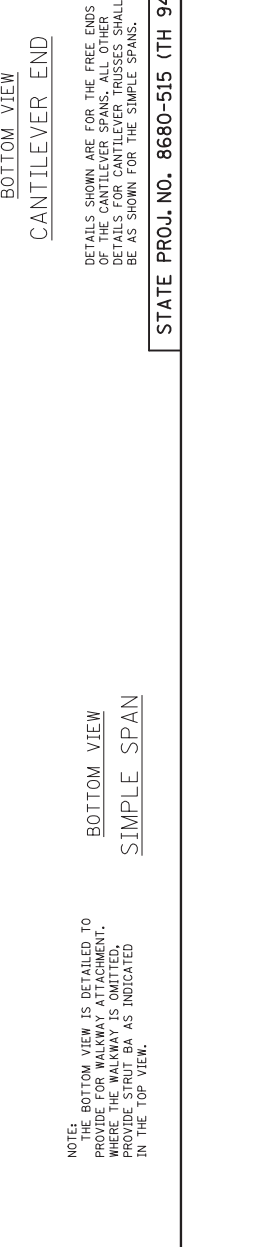
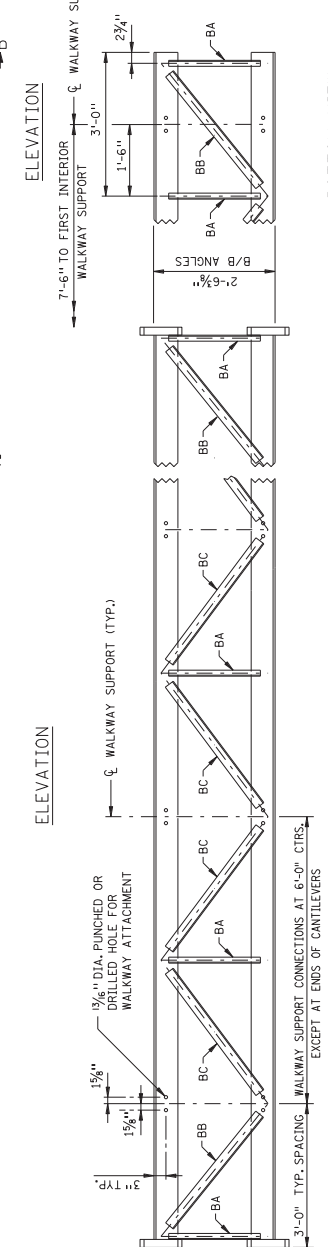
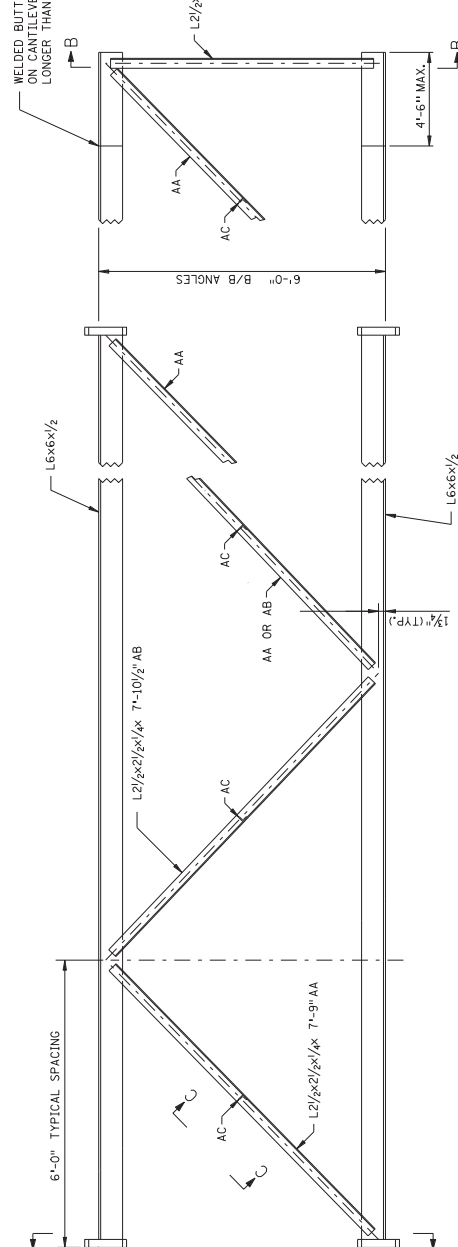
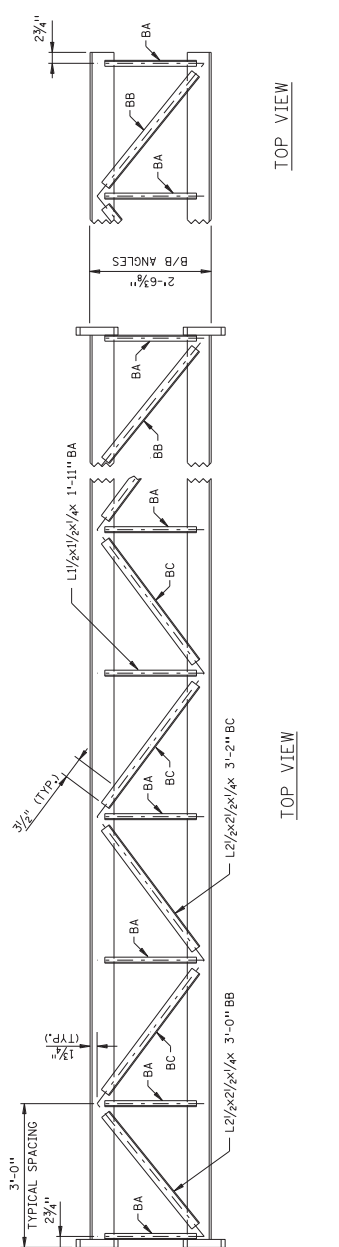
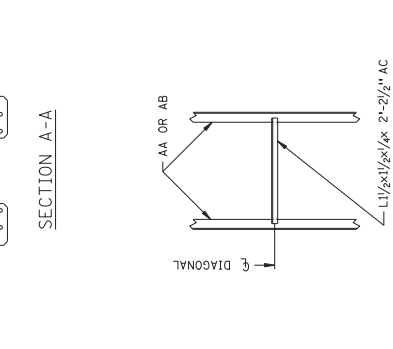
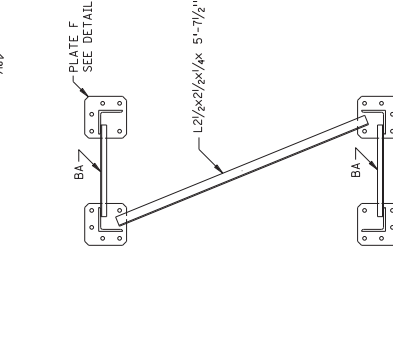
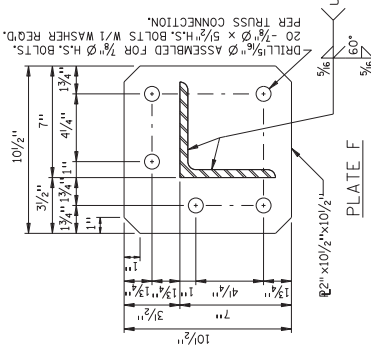
CMS SIGNS.

PROVIDE 2-1/8" BRASS, STAINLESS STEEL OR GALVANIZED STEEL SHIMS AT EACH FLANGE TO BRING TRUSS INTO CORRECT CAMBER AND ALIGNMENT. TRUSSES SHALL BE SHOP ASSEMBLED AND MATCH MARKED.

ALL VIEWS OF THE TRUSSES ARE DRAWN FROM THE INSIDE OF THE TRUSS LOOKING OUT.

SEE DRAWING ST-4 FOR POST CONNECTION DETAILS.

WELDED BUTT SPLICE PERMITTED ON CANTILEVER END OF CHORDS LONGER THAN 40'-0".

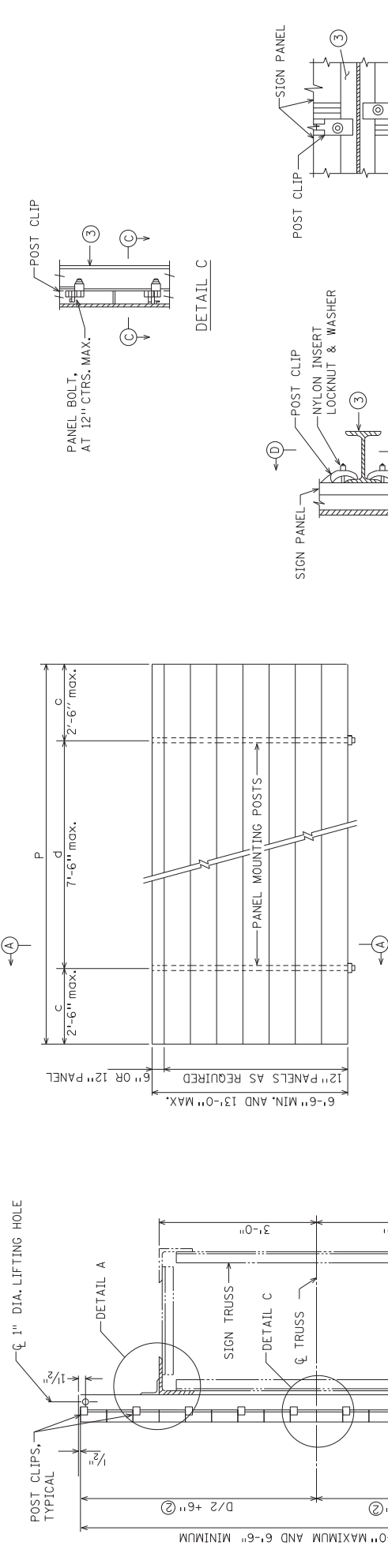


PL07TDD/REVISED: 1/28/2016

PL07TDD/REVISED: 1/28/2016

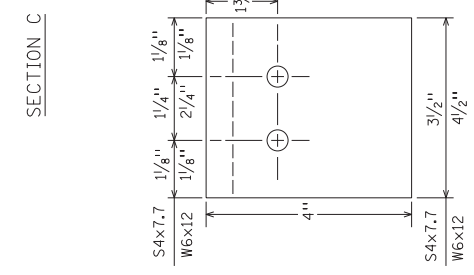
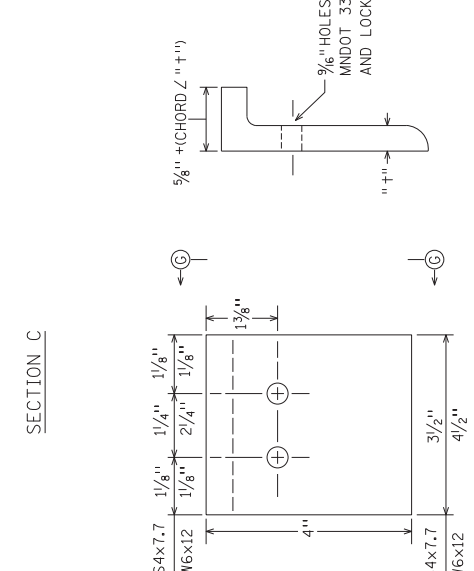
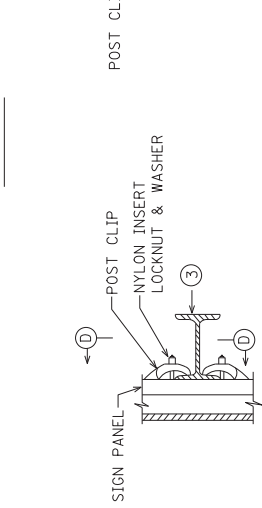
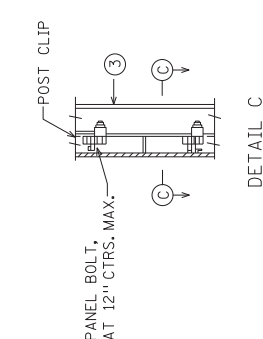
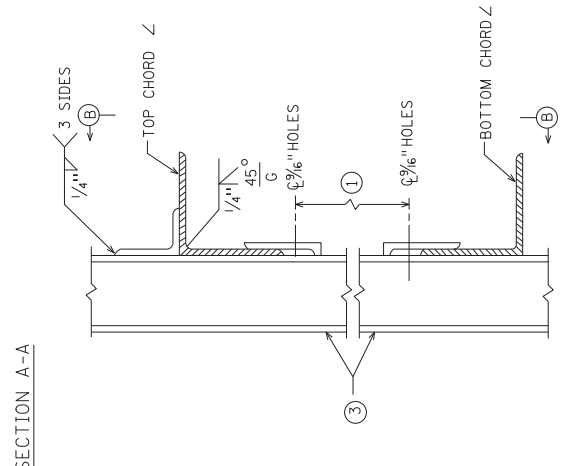
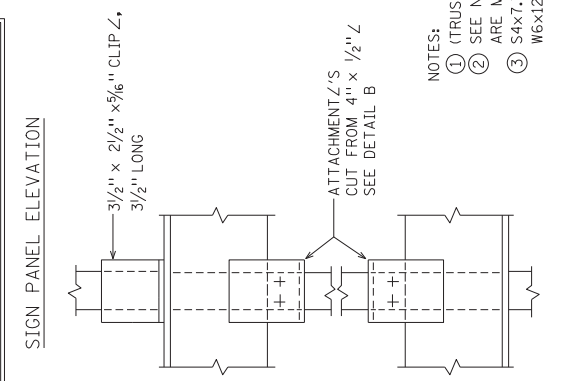
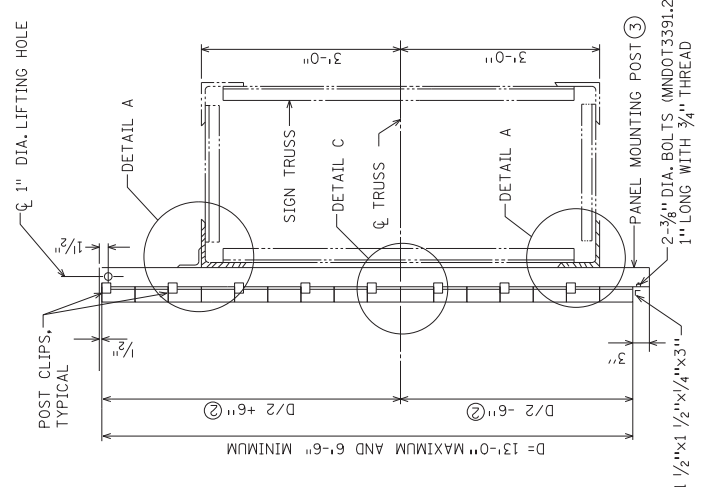
PL07TDD/REVISED: 1/28/2016

PL07TDD/REVISED: 1/28/2016



PANEL MOUNTING POST	
NO. OF POSTS	2
	P=144" OR LESS, C=207P, d=586P
	P=150" THRU 204", C=149P, d=355P
	P=210" THRU 276", C=107P, d=262P
	P=282" THRU 348", C=084P, d=208P
	P=354" THRU 420", C=070P, d=172P
	P=426" THRU 492", C=059P, d=147P

POST SPACING MAY BE ADJUSTED AS REQUIRED IF CONFLICT WITH TRUSS DETAILS IS ENCOUNTERED.

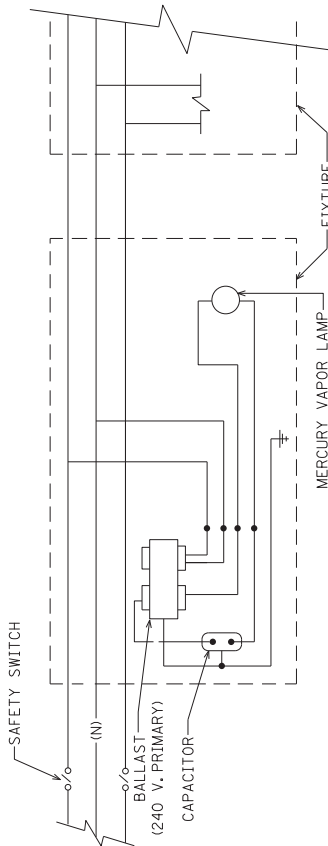


STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

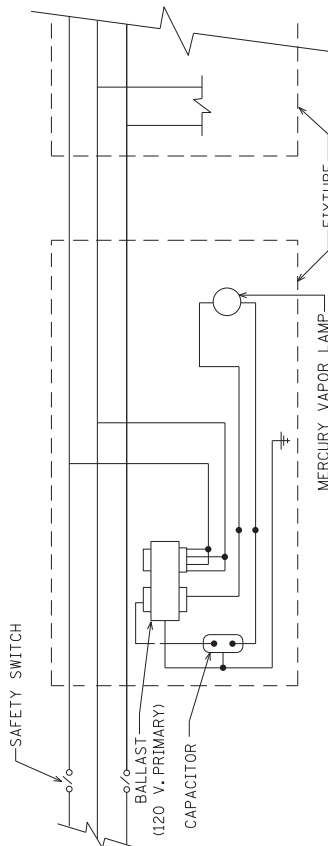
SIGN PANEL AND PANEL
MOUNTING POST DETAILS

DRAWING ST-10

- NOTES:
- (1) TRUSS DEPTH-(TOP & BOTTOM CHORD) LEGS=1/4"
 - (2) SEE NOTE 1 ON ST-1 WHEN STANDARD PANELS AND CMS ARE MOUNTED ON THE SAME SPAN
 - (3) S4x7.7 FOR SIGN HEIGHTS \leq 11'-0"
- W6x12 FOR SIGN HEIGHTS OVER 11'-0"



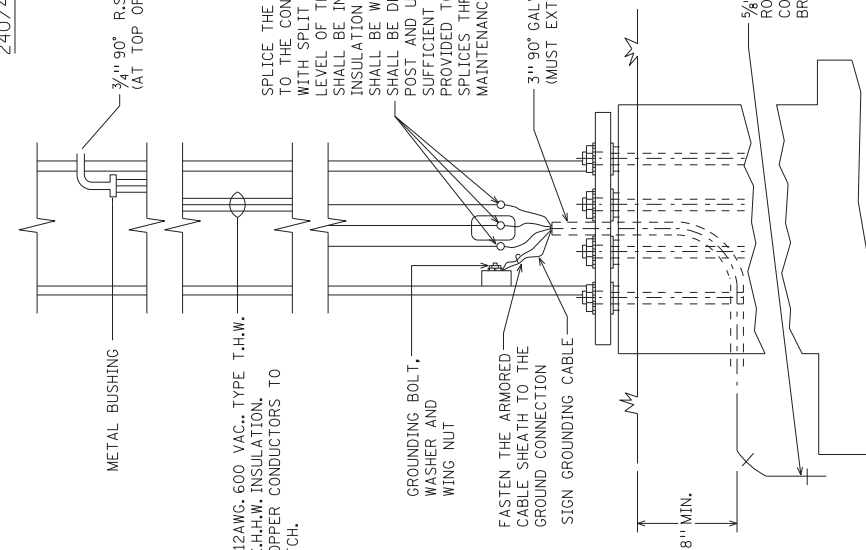
240/480 V. CIRCUIT



120/240 V. CIRCUIT

TYPICAL CIRCUIT DIAGRAMS

3/4" 90° R.S.C. ELBOW WITH COUPLING WELDED INTO POST.
(AT TOP OF CHORD ANGLE ON LOWER JOINTION)



SIGN BASE DETAIL

3 - 1/2" NO. 12 AWG. 600 VAC., TYPE T.H.W. STRANDED COPPER CONDUCTORS TO SAFETY SWITCH.

SPLICE THE ARMORED CABLE CONDUCTORS TO THE CONDUCTORS FROM THE SAFETY SWITCH WITH SPLIT BOLT TYPE CONNECTORS AT THE LEVEL OF THE HANDHOLE. THE SPLICES SHALL BE INSULATED TO THE LEVEL OF INSULATION OF THE POWER CONDUCTORS AND SHALL BE WATERPROOFED. THE SPLICES SHALL BE DRESSED IN THE CENTER OF THE POST AND UP FROM THE BASE PLATE WITH SUFFICIENT EXCESS CONDUCTOR LENGTH PROVIDED TO PERMIT WITHDRAWAL OF THE SPLICES THROUGH THE HANDHOLE FOR MAINTENANCE PURPOSES.

FASTEN THE ARMORED CABLE SHEATH TO THE GROUND CONNECTION SIGN GROUNDING CABLE

3" 90° GALV. CONDUIT ELBOW (MUST EXTEND AT LEAST 6" ABOVE ELEV. A)

18" MIN.

5/8" DIA. X 15' COPPER CLAD STEEL GROUND ROD. ATTACH A BARE NO. 6 AWG GROUND CONDUCTOR TO THE GROUND ROD WITH A BRONZE GROUNDING CLAMP.

ELECTRICAL NOTES:

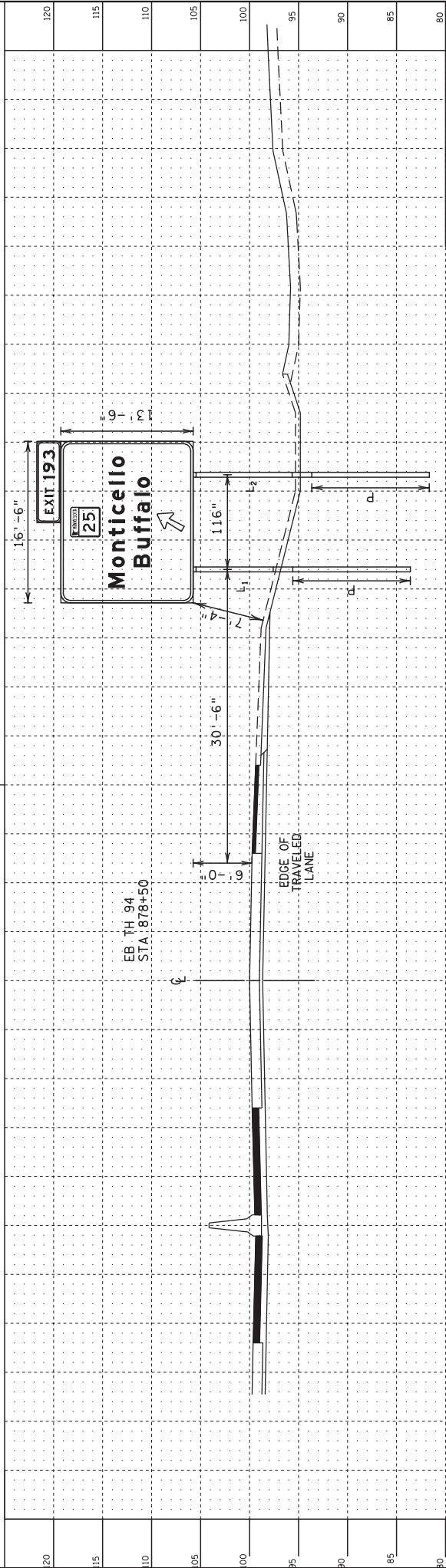
1. WHEN SIGN LIGHTING SYSTEMS HAVE BEEN COMPLETED, THE CONTRACTOR SHALL, WITHOUT FURTHER COMPENSATION, CONDUCT BURNING AND RESISTANCE TESTS FOR FINAL ACCEPTANCE. THE RESISTANCE TO GROUND OF EACH UNGROUNDED CONDUCTOR SHALL BE NOT LESS THAN 8 MEGOHMS.
2. ALL FITTINGS, HUBS, UNIONS, BUSHINGS, ETC. SHALL BE SUPPLIED AS PART OF CONDUIT. CONDUIT ENTERING SIGN POSTS SHALL HAVE INSULATED GROUNDING BUSHINGS INSTALLED BEFORE PULLING WIRE.
3. CONDUIT ON STRUCTURE SHALL BE SURFACED MOUNTED, STRAPPED AT EVERY ANGLE BRACE WITH U-BOLT TYPE CLAMPS.
4. SUCCESSIVE LIGHTING FIXTURES SHALL BE CONNECTED ON ALTERNATE SIDES OF THE 3-WIRE CIRCUIT.
5. THE CABLE SHEATH SHALL EXTEND AT LEAST 4" ABOVE THE TOP OF THE CONDUIT END AND THE TAPE ARMOR OF ARMORED CABLE SHALL BE CONNECTED TO THE GROUNDING BOLT IN THE SIGN POSTS.
6. WIRING FROM THE SAFETY SWITCH TO LIGHTING FIXTURES SHALL BE 1/2" NO. 12 AWG AND SHALL BE RUN IN 3/4" R.S.C. ALL SPLICING SHALL BE ACCOMPLISHED WITH A WIRE NUT AND WATERPROOF COATING. ALL CONDUIT CONNECTIONS SHALL BE RAIN TIGHT.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
ELECTRICAL DETAILS
DRAWING ST-12

SIGN A I94-504

E.B. T.H. 94
STA. 878+50

POST TYPE W8X24
 POST LENGTH L₁ 22.0 FT.
 POST LENGTH L₂ 23.5 FT.
 PILE FOOTING P 12.0 FT.

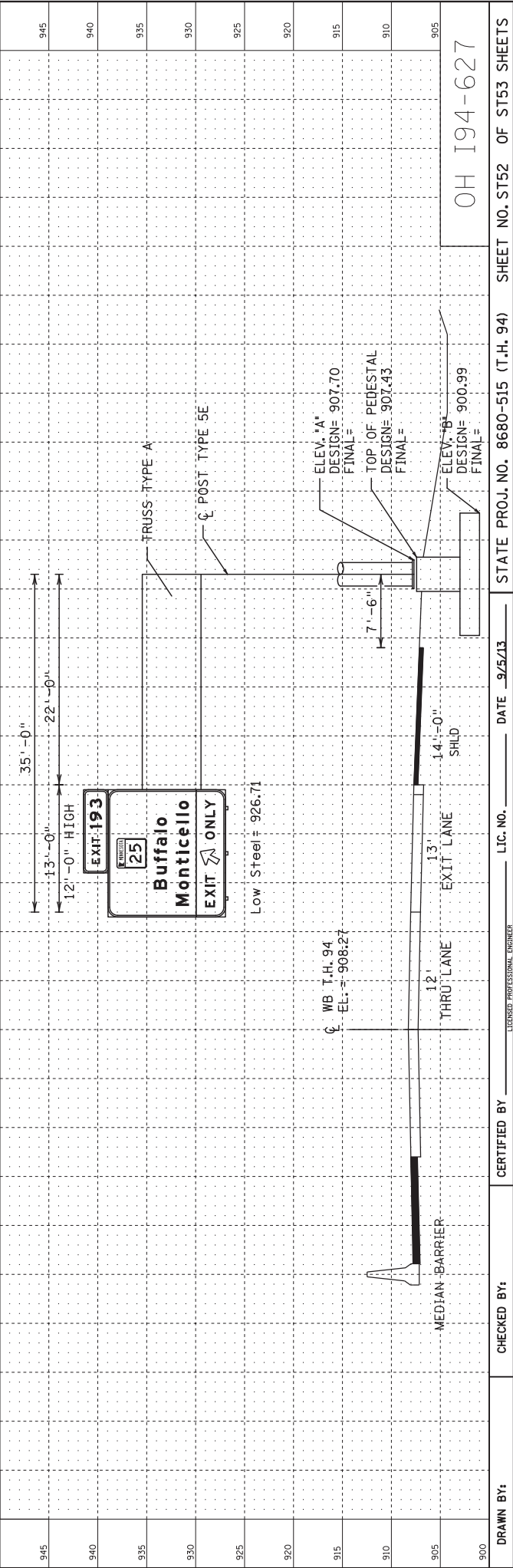


A I94-504

OH 194-627
 W.B. T.H. 94
 STA. 914+00

QUANTITIES	DESIGN	FINAL
POST STEEL	6300 POUNDS	_____
TRUSS STEEL	4305 POUNDS	_____
WALKWAY SUPPORT STEEL	0 POUNDS	_____
WALKWAY GRATING STEEL	0 POUNDS	_____
PANEL MOUNTING POST STEEL	498 POUNDS	_____
CONCRETE (SPREAD) FOOTING	18.7 CU YDS	_____

NOTES: 1. LOW STEEL IS BOTTOM OF PANEL MOUNTING POSTS.

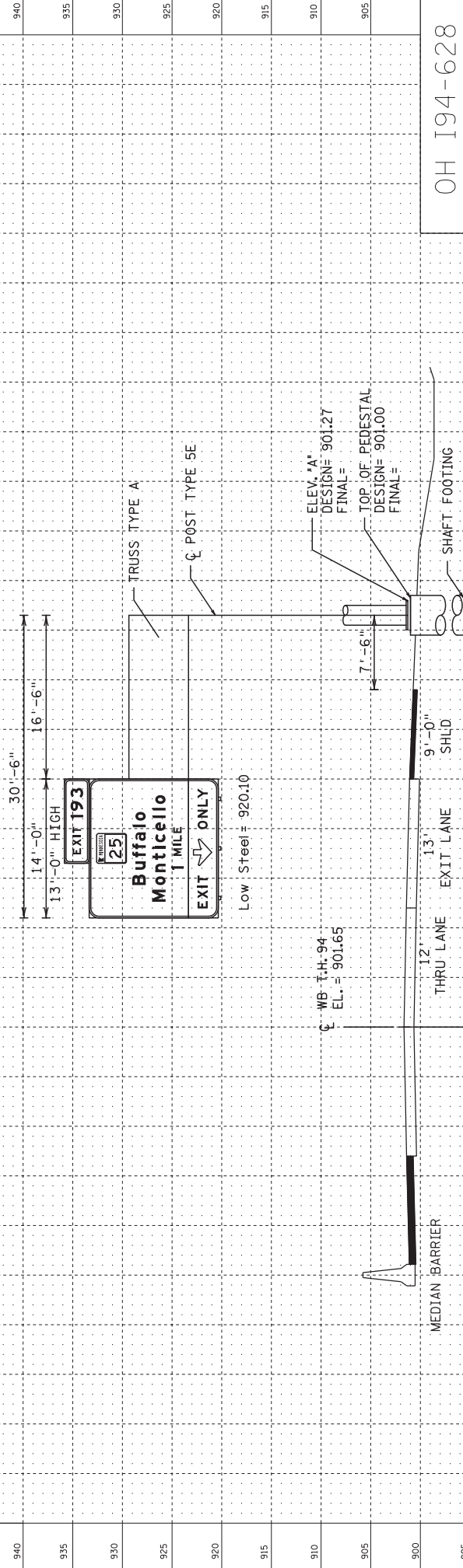


OH 194-627

OH 194-628
 W.B. T.H. 90
 STA. 966+00

QUANTITIES	DESIGN	FINAL
POST STEEL	6345 POUNDS	_____
TRUSS STEEL	3752 POUNDS	_____
WALKWAY SUPPORT STEEL	0 POUNDS	_____
WALKWAY GRATING STEEL	0 POUNDS	_____
PANEL MOUNTING POST STEEL	534 POUNDS	_____
CONCRETE (SHAFT) FOOTING	14.1 CU YDS	_____

NOTE: 1. LOW STEEL IS BOTTOM OF PANEL MOUNTING POSTS.



DATE 9/5/13
 STATE PROJ. NO. 8680-515 (T.H. 94)
 SHEET NO. ST53 OF ST53 SHEETS
 OH 194-628

DRAWN BY:

CHECKED BY:

LIC. NO.:

DATE 9/5/13

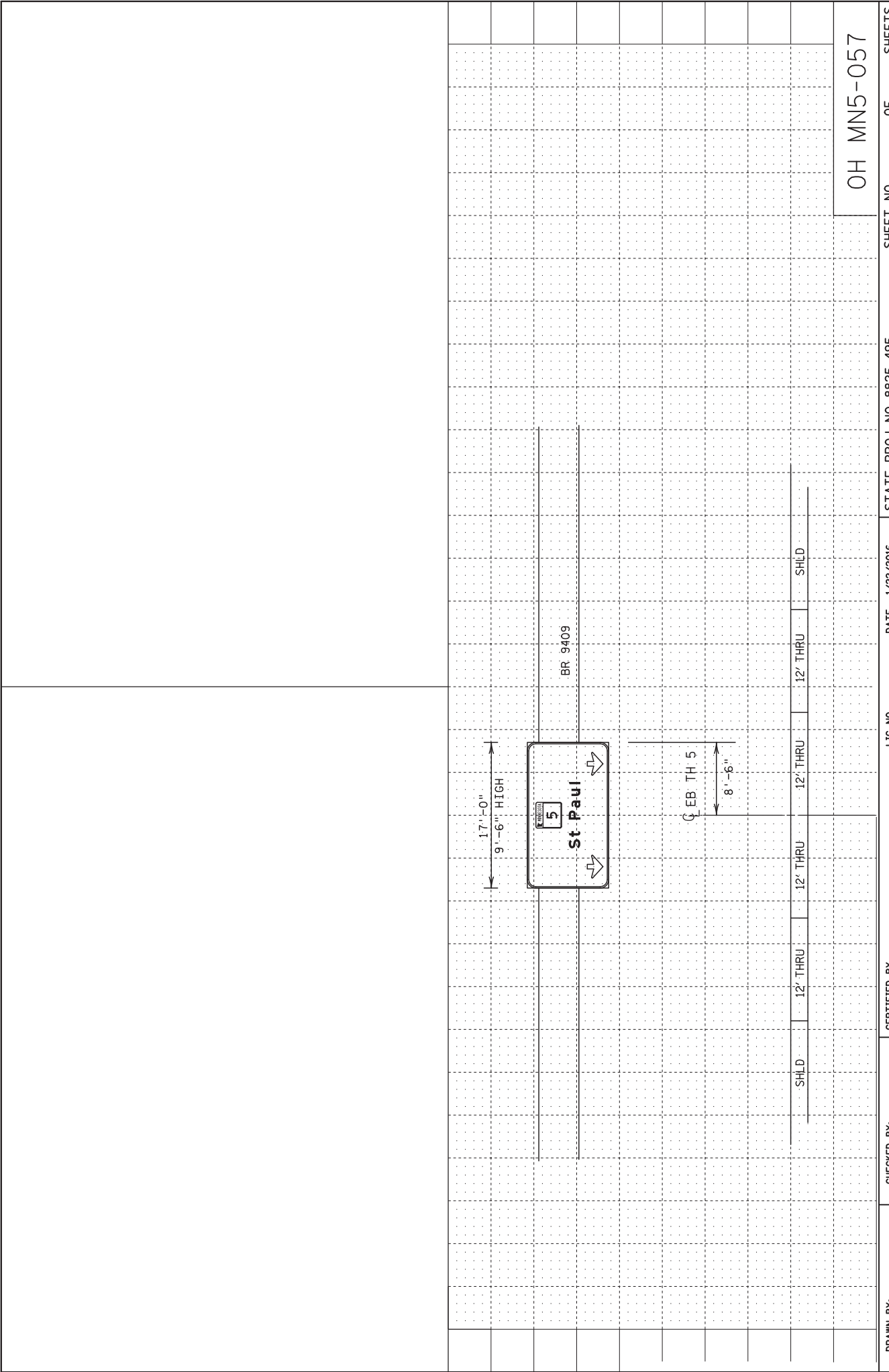
STATE PROJ. NO. 8680-515 (T.H. 94)

SHEET NO. ST53 OF ST53 SHEETS



11. BRIDGE MOUNTED SIGN CROSS SECTION EXAMPLE

The following is a handout of a bridge mounted sign cross section. This sample plan can be downloaded from the OTST Signing website, <http://www.dot.state.mn.us/trafficeng/signing/plans.html>.



OH MN5-057



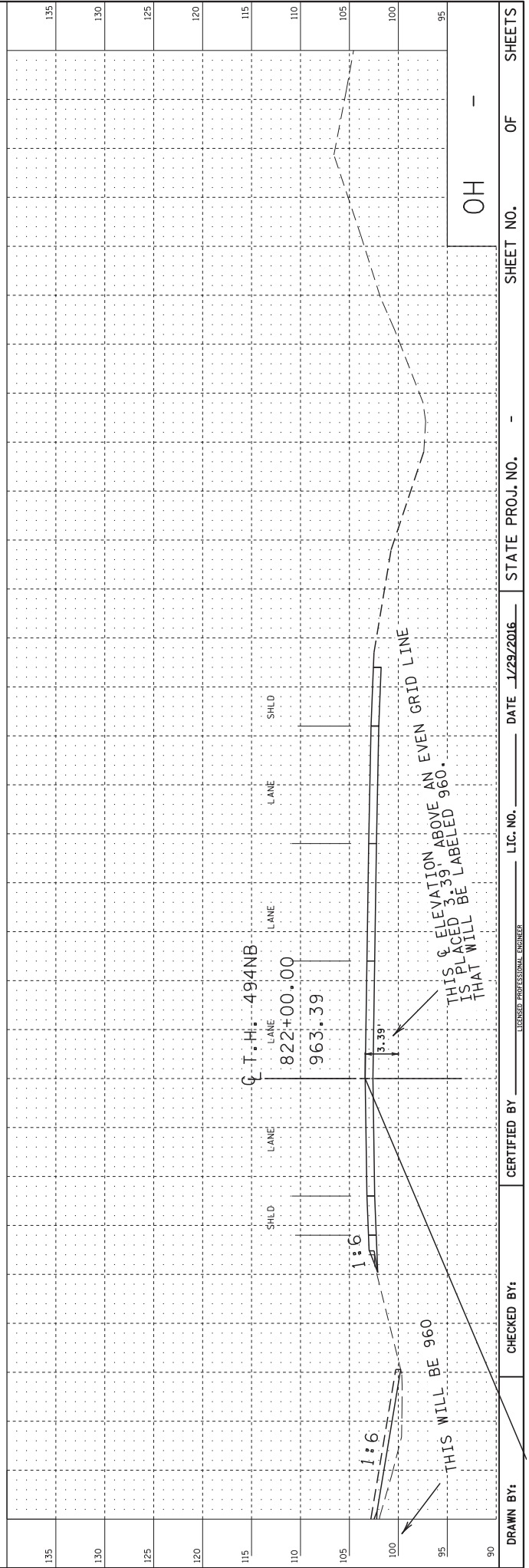
12. TYPE OH STRUCTURE DESIGN

The following is a handout of a type OH structure design. This sample plan can be downloaded from the OTST Signing website, <http://www.dot.state.mn.us/trafficeng/signing/plans.html>.

GET ENGINEERING APPROVAL FOR SIGN PANEL DESIGN AND INSTALLATION LOCATION BEFORE BEGINNING OH CROSS SECTION DESIGN.
 - USE MNDOT CELL XSECOH FOR SHEET BORDER
 CHECK THAT SCALE IS CORRECT

1. BRING THE ROADWAY/GROUNDLINE INTO THE CROSS SECTION GRID.

CROSS SECTION VIEW OF THE ROADWAY AND SIGN ARE SHOWN AS THEY WOULD APPEAR AS A DRIVER APPROACHES THE SIGN.
 GROUNDLINE MAY NEED TO BE "FLIPPED" OR REVERSED TO SHOW VANTAGE POINT OF DRIVER APPROACHING THE SIGN.
 SET THE CENTER LINE ELEVATION NEAR THE BOTTOM OF THE GRID.
 GRID LINES WILL BE EVEN VALUES. FIT CENTERLINE ELEVATION ACCORDINGLY.
 ADJUST AS NECESSARY. PLACEMENT WITHIN THE GRID WILL VARY FROM STRUCTURE TO STRUCTURE.



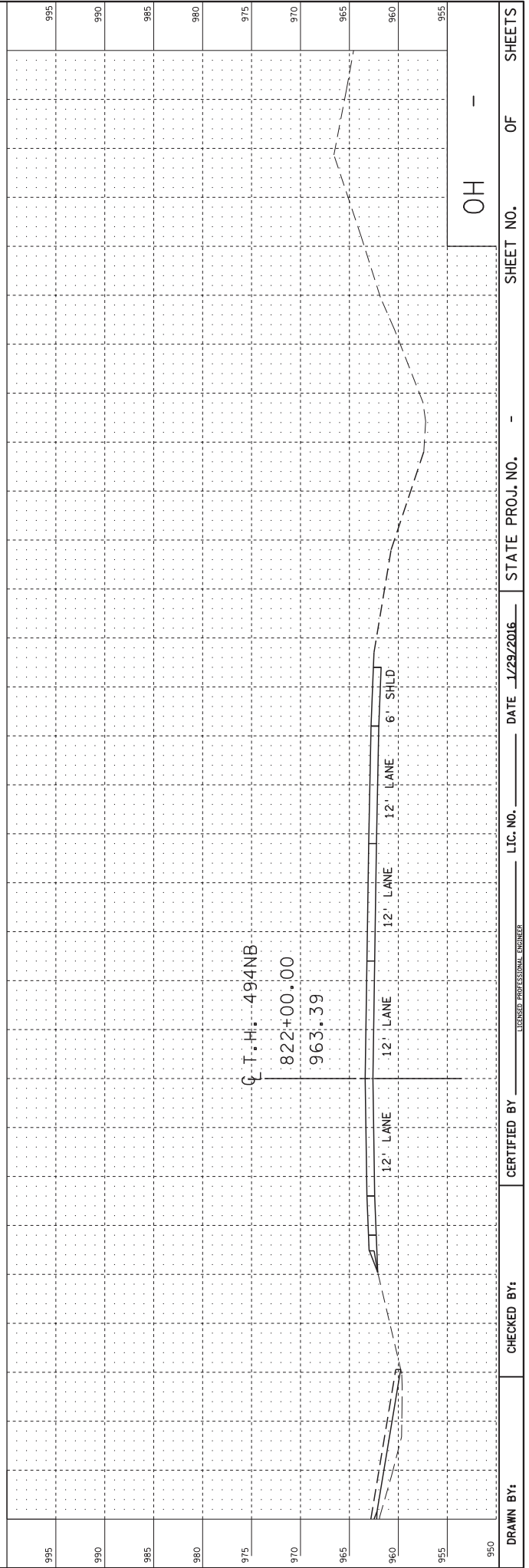
2. LABEL LANES ON ROADWAY

3. LABEL GRID ELEVATION LINES

SOMETIMES THE CROSS SECTION FILE PROVIDED FROM DESIGN FILE WILL DEFINE THE LANES, SOMETIMES NOT.

CONSTRUCTION PLAN WILL GIVE LANE AND SHOULDER WIDTH INFORMATION FOR NEW CONSTRUCTION.

IF BUILDING A NEW STRUCTURE ON AN EXISTING ROADWAY, FIELD CHECKING AND MEASURING EXISTING SHOULDER AND LANE WIDTHS MAY BE NECESSARY.



4. BRING IN (IMPORT) SIGN PANELS. INSURE SCALE IS ACCURATE (1 FOOT = 1 FOOT)

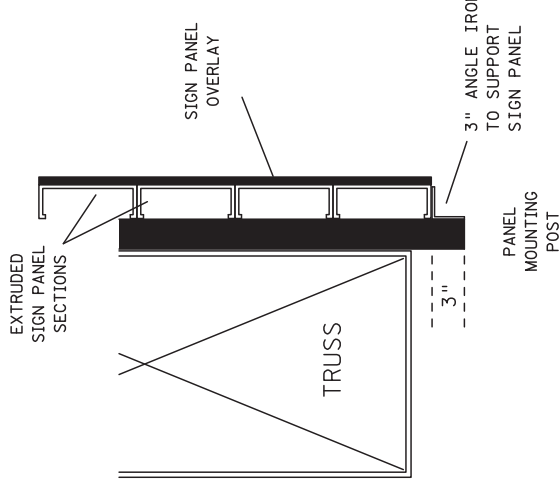
- FILL IN SIGN PANEL AREA INFORMATION ON OH COMPUTATION SHEET.

5. DRAW IN PANEL MOUNTING POSTS

THE NUMBER OF PANEL MOUNTING POSTS REQUIRED, AND THE SPACING BETWEEN POSTS ARE BASED ON THE WIDTH OF THE PANEL.

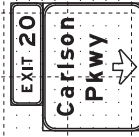
- *SEE CHART ON ST-10 FOR DETAILS
- *USE MNDOT CELL PMP OR PMP 2 FOR PANEL MOUNTING POSTS.
- *ONLY THE BOTTOM 3 INCHES OF THE PANEL MOUNTING POST (WHICH EXTEND BELOW THE PANEL) ARE VISIBLE IN THE CROSS SECTION DRAWING.

- FILL IN PANEL MOUNTING POST INFORMATION ON OH COMPUTATION SHEET.



EO PANEL IS 8' X 2.5'

PANEL IS 10' X 8'
(10' WIDE AND 8' HIGH)



BOTTOM 3 INCHES OF THE
PANEL MOUNTING POSTS

C.T.H. 494NB

822+00.00

963.39

12' LANE

12' LANE

12' LANE

12' LANE

6" SHLD

OH

5. DRAW IN PANEL MOUNTING POSTS (CONTINUED)

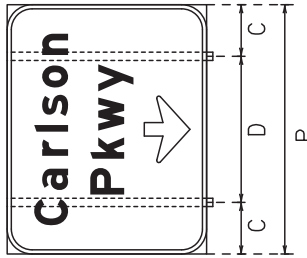
PANEL MOUNTING POSTS (PMP)

NO OF POSTS REQUIRED COMES FROM THE CHART ON ST-10
 SPACING OF THE POSTS ON THE PANEL COMES FROM CHART ON ST-10
 WEIGHT PER POST COMES FROM CHART ON ST-2

EXAMPLE:

PANEL SIZE = 10' x 8' OR 120" x 96"

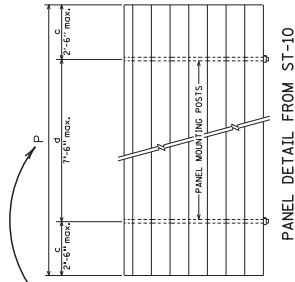
THE NUMBER OF PMP REQUIRED IS BASED ON PANEL WIDTH (P) AND INFORMATION FROM THE CHART ON ST-10
 SPACING BETWEEN THE POSTS ALSO COMES FROM THE CHART ON ST-10,



SIGN PANELS WITH A WIDTH OF 144" OR LESS REQUIRE 2 PMP

FOR SIGN PANELS 144" OR LESS, C = .207 x P
 C = .207 x 10 FEET
 C = 2.07 FEET

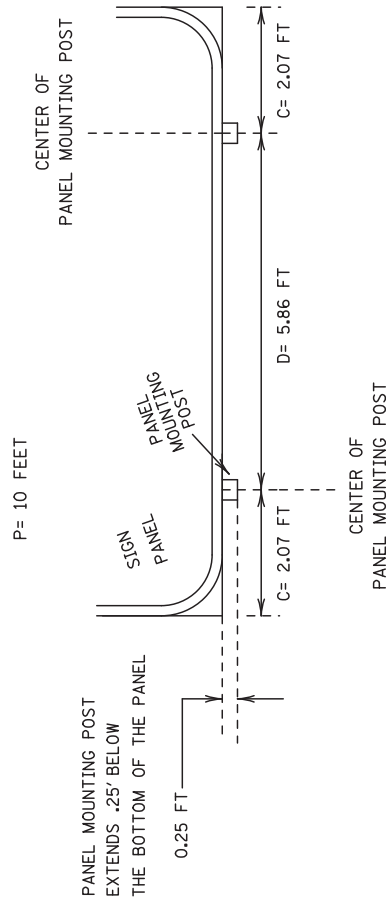
FOR SIGN PANELS 144" OR LESS, D = .586 x P
 D = .586 x 10 FEET
 D = 5.86 FEET



NO. OF POSTS	PANEL MOUNTING POST
2	P=144" OR LESS, C=.207P, d=.586P
3	P=150" THRU 204", c=.145P, d=.355P
4	P=210" THRU 276", c=.107P, d=.262P
5	P=282" THRU 348", c=.084P, d=.208P
6	P=354" THRU 420", c=.070P, d=.172P
7	P=426" THRU 492", c=.059P, d=.147P

POST SPACING MAY BE ADJUSTED AS REQUIRED IF CONFLICT WITH TRUSS DETAILS IS ENCOUNTERED.

CHART ON ST-10



WEIGHT PER POST

ONE PANEL MOUNTING POST FOR A PANEL 8' -0" WEIGHTS 82 LBS.
 SEE *PANEL MOUNTING POSTS QUANTITIES* CHART ON ST-2

PANEL MOUNTING POST QUANTITIES INCLUDES MOUNTING ANGLES	
PANEL HEIGHT	WEIGHT/POST
6'-6"	70
7'-0"	74
7'-6"	78
8'-0"	82
8'-6"	86
9'-0"	90
9'-6"	93
10'-0"	97
10'-6"	101
11'-0"	105
11'-6"	160
12'-0"	166
12'-6"	172
13'-0"	178

CHART ON ST-2

6. DETERMINE THE LOCATION OF THE OH STRUCTURE'S POST(S)

STANDARD POST PLACEMENT HAS THE CENTER OF THE POST 7'-6" FROM FACE OF CURB / EDGE OF BITUMINOUS (SHLD) IF DEVIATING FROM THIS STANDARD DISTANCE, INSURE THAT GUARD RAIL IMPLICATIONS ARE CONSIDERED.

7. POSITION PANEL(S) OVER THE DESIRED LANE(S) OF THE ROADWAY. (THIS WILL DETERMINE SPAN LENGTH)

AS A GENERAL RULE, MOST OVERHEAD PANELS ARE CENTERED OVER A LANE. (SEE EXAMPLES)

* SIGN PANELS WITH "DOWN ARROWS" SHOULD BE CENTERED OVER THE CORRESPONDING LANE. (A DOWN ARROW MAY BE UP TO 18 INCHES OFF CENTER IF CONDITIONS DONT ALLOW FOR IT TO BE EXACTLY CENTERED.)

* ADJUST THE PANEL POSITION(S) TO INSURE A SPAN LENGTH THAT FALLS INTO AN EVEN 6 INCH INCREMENT. (EXCEPTION BEING 43'-3" MAX LENGTH) ODD LENGTH TRUSSES ARE MORE COSTLY TO MANUFACTURE AND SHOULD BE AVOIDED.

FOR DESIGN PURPOSES, SPAN LENGTH IS THE DISTANCE BETWEEN THE CENTER OF THE POST AND THE OUTER EDGE OF THE SIGN PANEL.

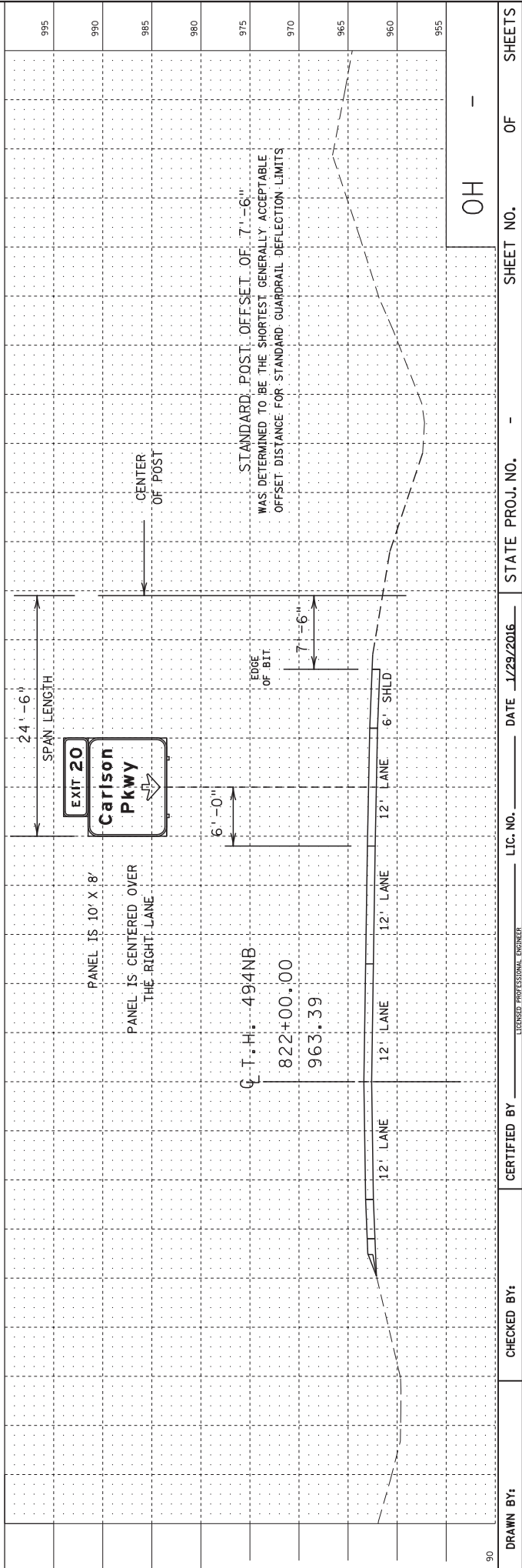
MAXIMUM CANTILEVER SPAN LENGTH IS 43'-3"

- FILL IN SPAN LENGTH INFORMATION ON OH COMPUTATION SHEET.

8. USE "TRUSS TYPE SELECTION" TABLE TO DETERMINE TRUSS TYPE REQUIRED. TRUSS: HORIZONTAL SUPPORT BEAM FOR THE STRUCTURE.

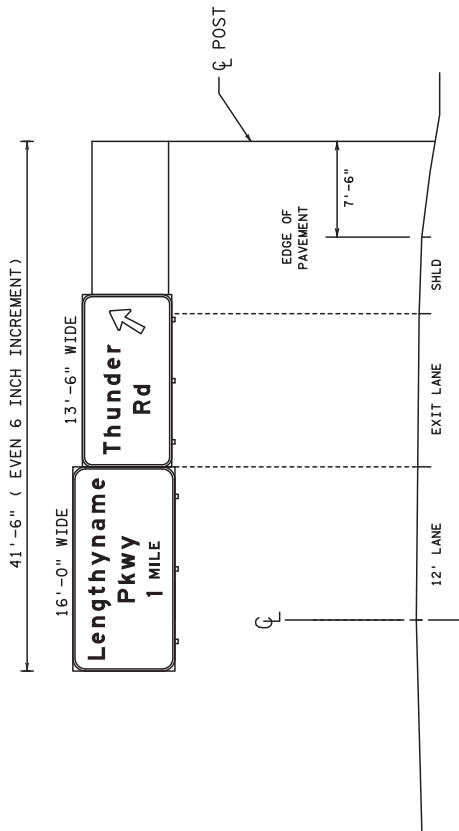
- FILL IN TRUSS STEEL INFORMATION ON OH COMPUTATION SHEET.

IT IS STRONGLY RECOMMENDED THAT TECHNICIANS GET ENGINEERING APPROVAL FOR PANEL PLACEMENT (OVER LANES) BEFORE PROCEEDING WITH THE DESIGN OF THE STRUCTURE.



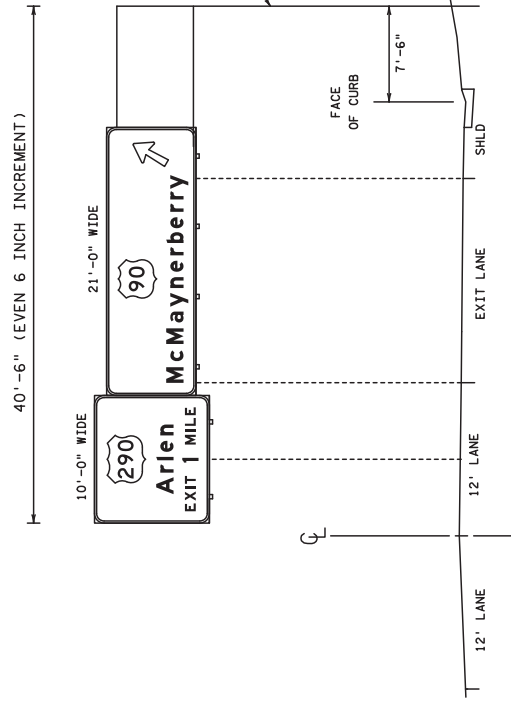
IF BOTH PANELS ARE TOO WIDE

IF PANELS ARE TOO WIDE FOR THE LANES THEY BELONG OVER, "BUTT" THEM TOGETHER OVER THE LANE LINE THEY SHARE



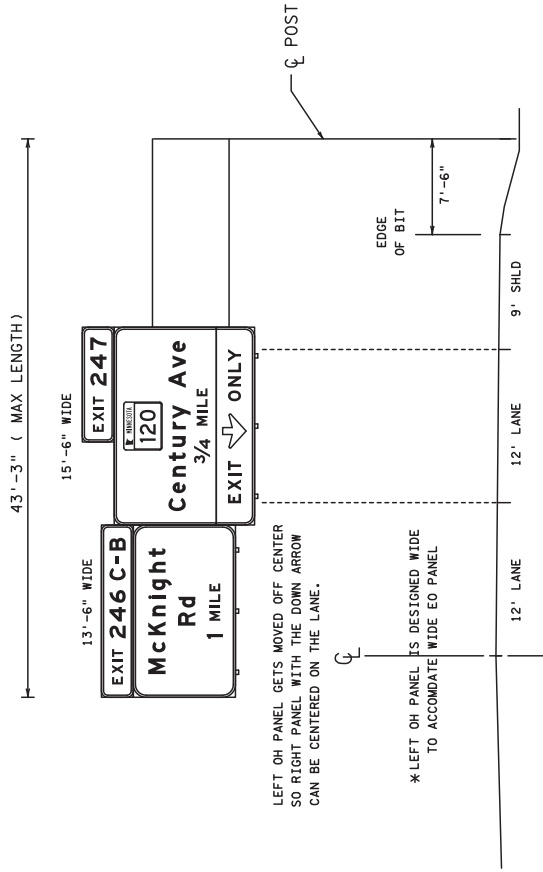
2 PANELS 1 NARROW, 1 WIDE.

CENTER NARROW PANEL OVER IT'S APPROPRIATE LANE. POSITION THE WIDE PANEL AS CLOSE AS POSSIBLE TO CENTERED OVER IT'S APPROPRIATE LANE.



LANE ASSIGNING "DOWN" ARROWS

THE POSITIONING OF PANELS WITH DOWN ARROWS TAKES PRIORITY OVER OTHER SIGNS. A WIDE PANEL WITH A DOWN ARROW MAY NEED TO "SPILL OVER" INTO THE NEIGHBORING LANES IN ORDER TO KEEP THE PANEL CENTERED. (DOWN ARROW PANELS SHOULD BE NO MORE THAN 18" OFF OF CENTER)

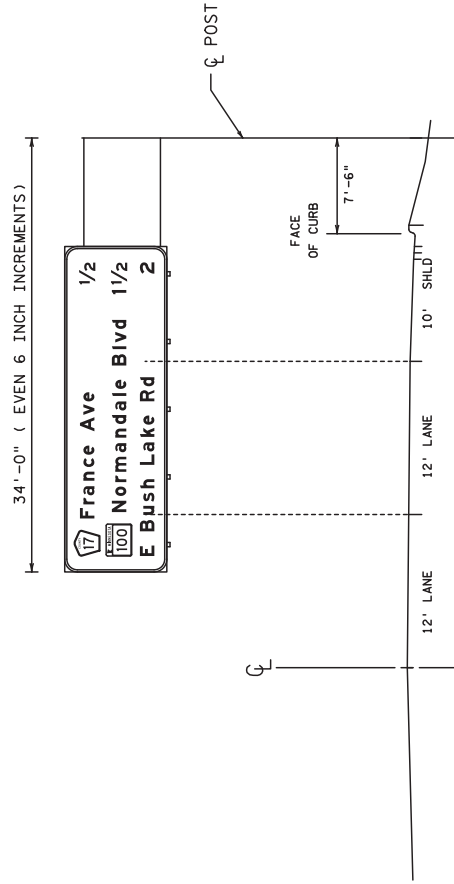


LEFT OH PANEL GETS MOVED OFF CENTER SO RIGHT PANEL WITH THE DOWN ARROW CAN BE CENTERED ON THE LANE.

* LEFT OH PANEL IS DESIGNED WIDE TO ACCOMMODATE WIDE EO PANEL

DISTANCE SIGNS

TYPICALLY INSTALLED OVER THE RIGHT LANE. NOT NECESSARILY CENTERED. MAY HANG OVER THE SHOULDER TO KEEP THE TRUSS LENGTH SHORTER.



8. (CONTINUED)

DETERMINING THE TRUSS TYPE REQUIRED

*** BE SURE TO USE THE CORRECT SELECTION TABLE.**
CANTILEVER, SIGNBRIDGE AND CMS EACH HAVE THEIR OWN TABLE.

CANTILEVER LENGTH → 24' - 6"

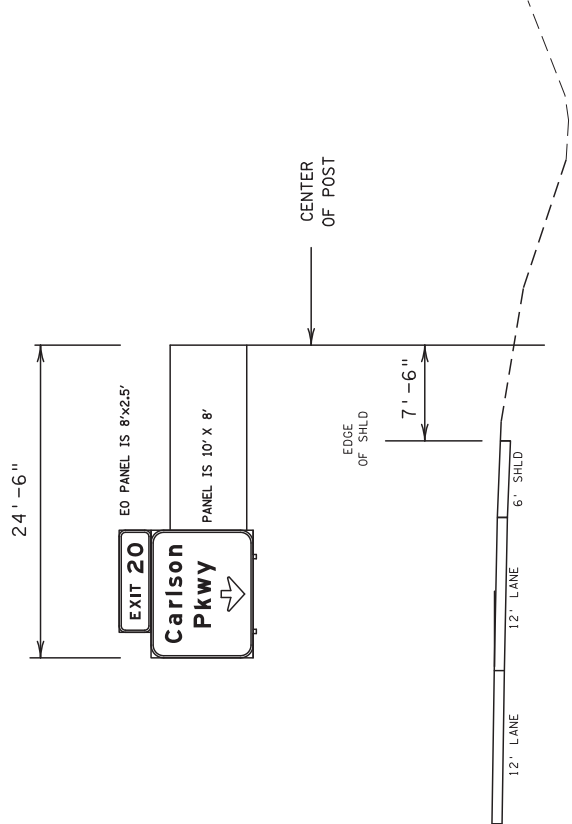
TOTAL SQUARE FEET OF SIGN PANEL
 EO PANEL IS 8'x2.5' = 20 SQ FT
 OH PANEL IS 10' X 8' = 80 SQ FT
 TOTAL SIGN PANEL AREA 100 SQ FT

ACCORDING TO THE CHART, THIS SIZE PANEL ON THIS LENGTH OF TRUSS CALLS FOR A TRUSS TYPE A

TABLE 1 - TRUSS TYPE SELECTION
 CANTILEVER STRUCTURE TYPE WITH
 CONVENTIONAL SIGNS

SIGN AREA (SQ. FT.)	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
350															
330															
310															
290															
270															
250															
230															
210															
190															
170															
150															
130															
110															
90															
70															
50															

"A" INDICATES TRUSS TYPE A. "B" INDICATES TRUSS TYPE B.
 SEE DRAWINGS ST-5 THROUGH ST-7 FOR TRUSS DETAILS.



CANTILEVER TRUSS TYPE SELECTION TABLE

DETERMINE THE AREA OF ALL THE SIGNS WHICH ARE TO BE PLACED ON THE SIGN STRUCTURE. THE SIGN AREA IS DEFINED AS THE SUMMATION OF THE INDIVIDUAL SIGN HEIGHTS MULTIPLIED BY THE SIGN WIDTHS. USE THIS VALUE TO ENTER THE APPROPRIATE TABLE FROM THE LEFT COLUMN. IF THE TOTAL SIGN AREA FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. (BE SURE TO INCLUDE EXIT SIGNS IN TOTAL AREA).

DETERMINE THE SPAN LENGTH OR CANTILEVER LENGTH AND ENTER THE APPROPRIATE TABLE ALONG THE TOP. IF THE SPAN LENGTH FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. THIS SPAN LENGTH IDENTIFIES THE VERTICAL COLUMN FROM WHICH A POST WILL BE SELECTED.

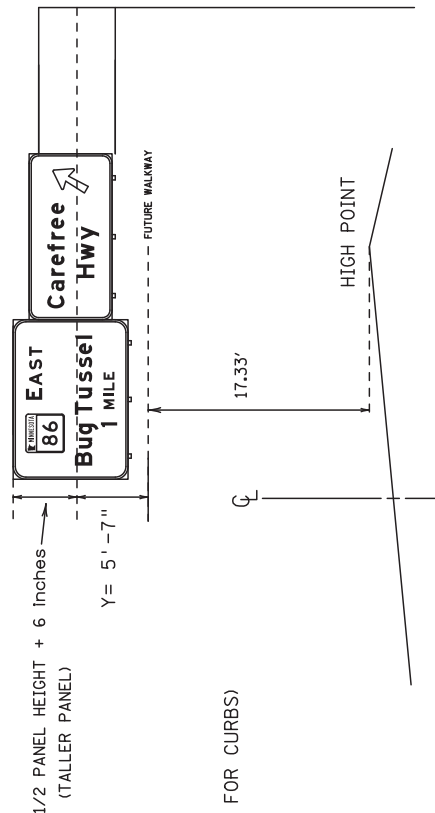
9. VERTICAL PLACEMENT OF THE SIGN PANEL ABOVE THE ROADWAY (THIS WILL DETERMINE POST HEIGHT)

"Y": DISTANCE FROM BOTTOM OF WALKWAY TO CENTER OF TRUSS. THIS DISTANCE IS CONTROLLED BY THE HEIGHT OF THE TALLEST PANEL ON THE STRUCTURE. (SEE ST-1)

- ① FIND THE HIGHEST POINT ON THE ROADWAY DIRECTLY BENEATH THE TRUSS. (SEE SPECIFIC NOTE ② ON ST-2 FOR CURBS)
- ② DRAW A HORIZONTAL LINE 17.33' ABOVE THIS POINT. (THIS LINE WILL REPRESENT THE FUTURE WALKWAY)
- ③ FIND THE "Y" DIMENSION OF THE TALLEST PANEL ON THE STRUCTURE. (SEE CHART ON ST-1)
- ④ DRAW IN THE CENTER OF THE TRUSS. ("Y" DIMENSION ABOVE THE FUTURE WALKWAY.)
- ⑤ LOCATE WHERE THE TOP OF THE PANEL(S) WILL BE MOUNTED IN RELATION TO THE CENTER OF THE TRUSS. (1/2 THE PANELS HEIGHT + 6 INCHES) * SEE DRAWING BELOW
- ⑥ MOVE THE PANEL VERTICALLY INTO THE POSITION IT WILL BE MOUNTED. BE SURE TO HOLD THE PANEL'S HORIZONTAL POSITIONING AS SET EARLIER.
- ⑦ DRAW IN THE TOP AND BOTTOM OF THE TRUSS.

* SIGN PANELS ARE MOUNTED 6 INCHES OFF CENTER ON THE TRUSS. USE THE FORMULA SHOWN, AND SEE SHEET ST-10 (SECTION A-A) FOR DETAILS

* ONCE THE TRUSS LENGTH, TOTAL SIGN PANEL AREA AND A "ROUGH" POST HEIGHT HAVE BEEN ESTABLISHED, YOU CAN SELECT THE APPROPRIATE POST TYPE (AND FOOTING) USING THE MDDOT POST SELECTION TABLE.

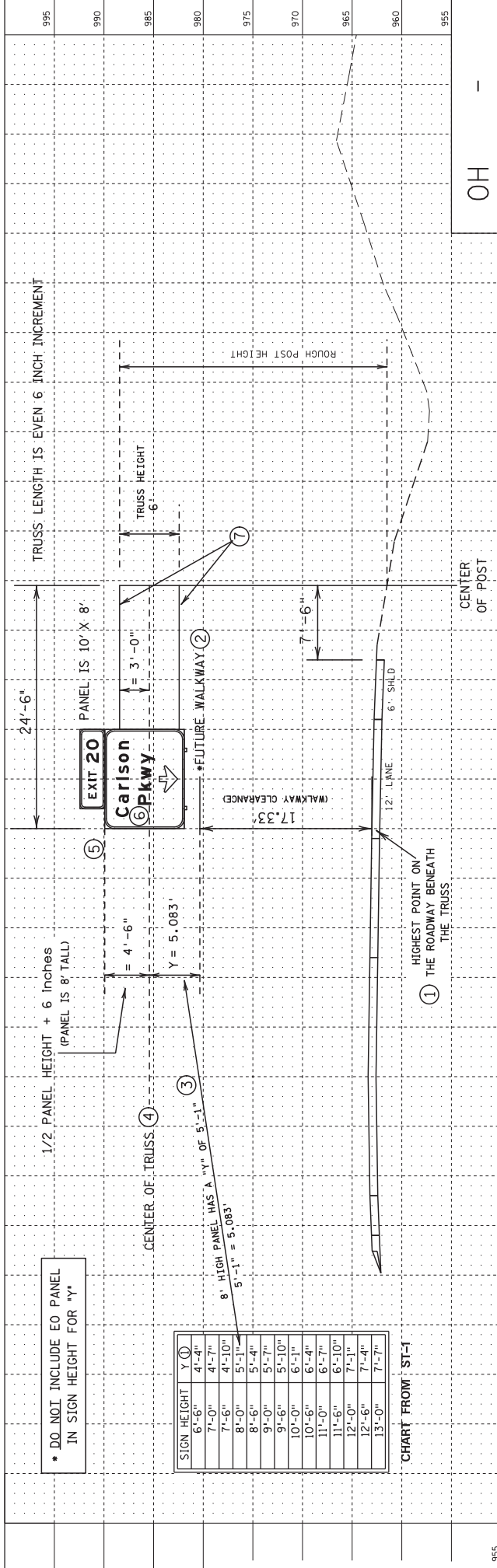


IN SOME CASES, THE HIGHEST POINT ON THE ROADWAY BENEATH THE TRUSS IS NOT DIRECTLY BELOW THE TALLEST PANEL ON THE TRUSS.
IT STILL GETS DESIGNED THE SAME WAY:
- WALKWAY CLEARANCE IS IN RELATION TO THE HIGHEST POINT ON THE ROADWAY BENEATH THE TRUSS.
- "Y" DIMENSION IS ALWAYS BASED ON THE STRUCTURE'S TALLEST PANEL.

* DO NOT INCLUDE E0 PANEL IN SIGN HEIGHT FOR "Y"

SIGN HEIGHT	Y (1)
6'-6"	4'-4"
7'-0"	4'-7"
7'-6"	4'-10"
8'-0"	5'-1"
8'-6"	5'-4"
9'-0"	5'-7"
9'-6"	5'-10"
10'-0"	6'-1"
10'-6"	6'-4"
11'-0"	6'-7"
11'-6"	6'-10"
12'-0"	7'-1"
12'-6"	7'-4"
13'-0"	7'-7"

CHART FROM: ST-1



10. SELECT THE OH POST REQUIRED.

USE THE POST SELECTION CHART TO DETERMINE WHAT SIZE POST IS REQUIRED. (FOOTING SIZE WILL CORRESPOND TO THE SIZE POST USED) TO USE THE POST SELECTION CHART, YOU WILL NEED TO KNOW THE FOLLOWING VALUES:

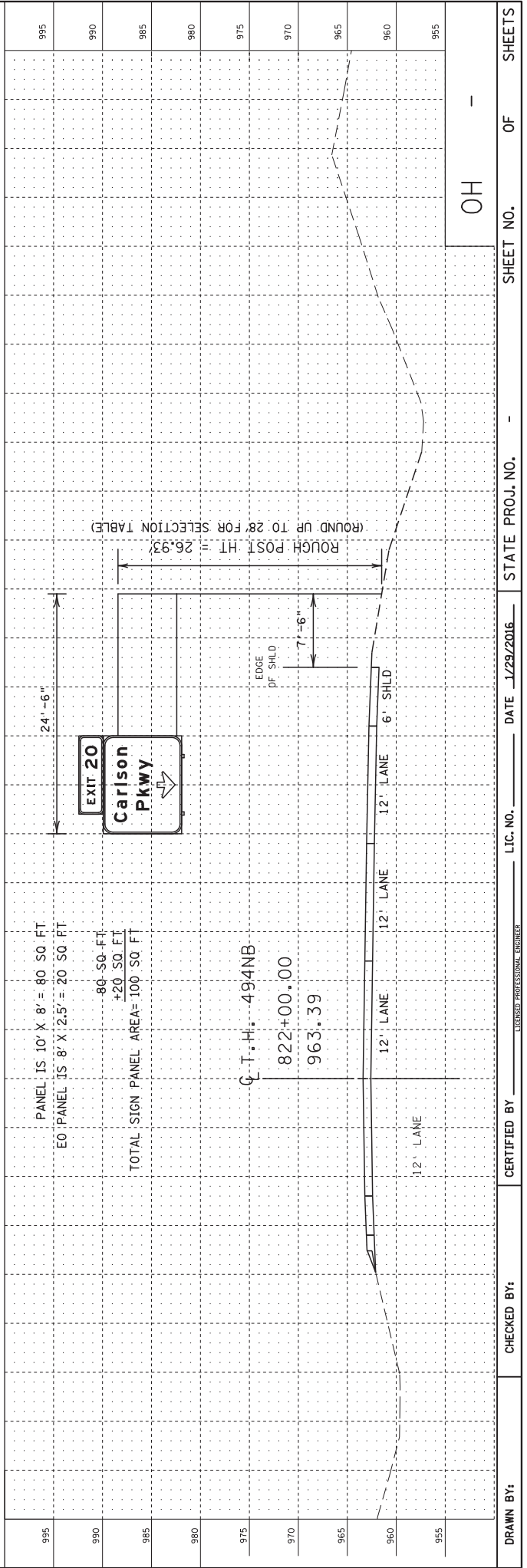
1. SIGN PANEL AREA (INCLUDING E0 PANELS)
2. POST HEIGHT
3. CANTILEVER LENGTH.

* POST HEIGHT WILL BE APPROXIMATE AT THIS STAGE OF THE STRUCTURE'S DESIGN.

ROUGH POST HEIGHT = 26.93 FT
 SIGN AREA = 100 SQ FT
 CANTILEVER LENGTH = 24.5' FT

THE POST SELECTION CHART CALLS FOR A POST TYPE 2 FOR THIS STRUCTURE.

● FILL IN STRUCTURE'S POST TYPE INFORMATION ON OH COMPUTATION SHEET.



11. PLACE THE FOOTING CELL

USE MNDOT CELL (PT14SP) THIS CELL IS USED FOR SPREAD FOOTINGS FOR POSTS 1 THROUGH 4

-INSURE CELL IS SCALED PROPERLY.

-FOOTING DIMENSIONS ARE FOUND IN CHART ON ST-3

① CONCRETE FOOTING CELL IS CENTERED ON THE OH POST.

TOP OF FOOTING MUST BE A MINIMUM OF 6 INCHES ABOVE FINISHED GRADE.

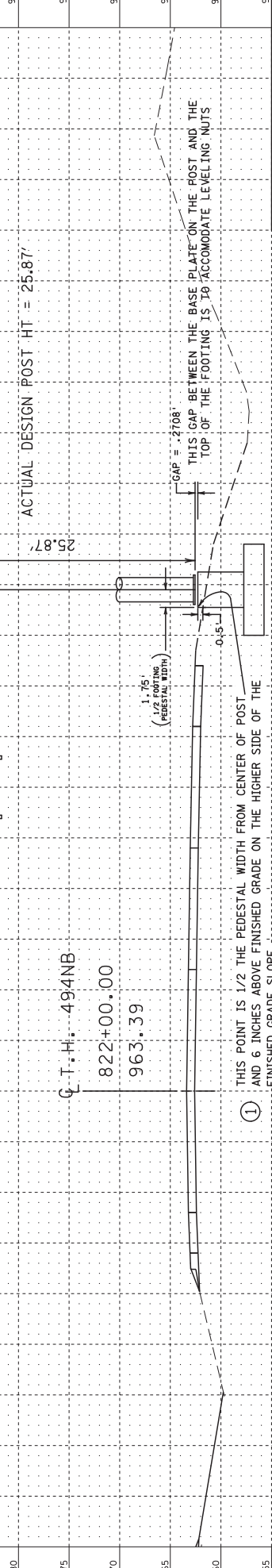
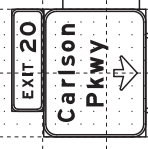
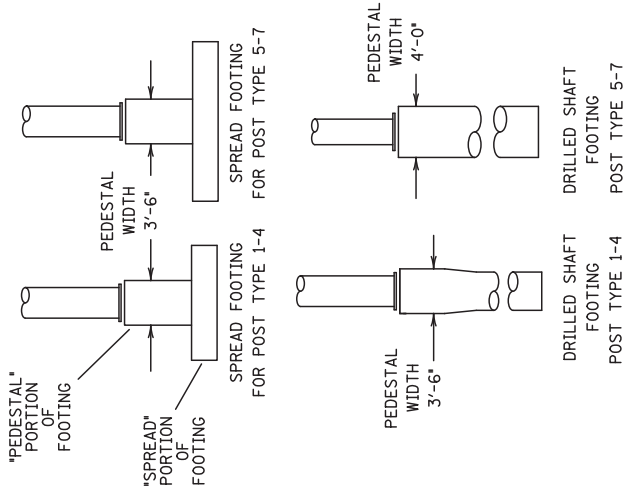
DELETE PORTION OF THE LINE REPRESENTING THE CENTER OF THE POST BELOW THE BASE PLATE.

POST LENGTH WILL BE IMPACTED BY FOOTING PLACEMENT.

(EXTENDING 6 INCHES ABOVE FINISHED GRADE, AND THE

3 -1/4 INCH GAP BETWEEN TOP OF PEDESTAL BASE PLATE)

RECHECK POST TYPE ON SELECTION TABLE USING DESIGN POST HEIGHT.



C.T.H.: 494NB
822+00.00
963.39

GAP = .2708'

THIS GAP BETWEEN THE BASE PLATE ON THE POST AND THE TOP OF THE FOOTING IS TO ACCOMMODATE LEVELING NUTS

① THIS POINT IS 1/2 THE PEDESTAL WIDTH FROM CENTER OF POST AND 6 INCHES ABOVE FINISHED GRADE ON THE HIGHER SIDE OF THE FINISHED GRADE SLOPE.

OH

CANTILEVER POST SELECTION TABLE

*** POST SELECTION TABLES ARE EXCLUSIVE TO THE STRUCTURE TYPE.
CANTILEVERS, SIGNBRIDGES AND CMS SIGNBRIDGES USE DIFFERENT TABLES**

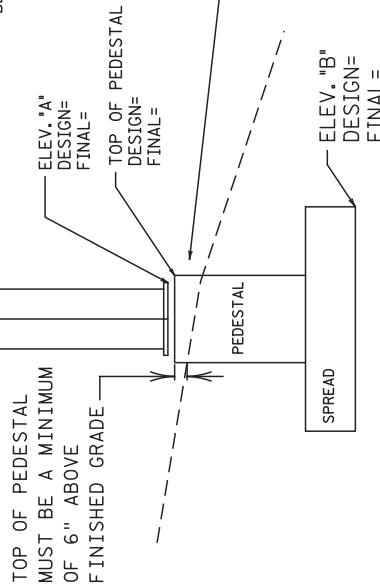
**THREE POST AND OTHER UNIQUE STRUCTURES DO NOT HAVE POST SELECTION CHARTS
UNIQUE STRUCTURES MUST BE SUBMITTED TO THE MNDOT BRIDGE OFFICE FOR
POST SIZE DETERMINATIONS.**

POST IS
CENTERED
ON THE
FOOTING

GIVEN THESE COMPONENTS:
ROUGH POST HEIGHT = 26.93 FT
SIGN AREA = 100 SQ FT
CANTILEVER LENGTH = 24.5' FT

THE CHART CALLS FOR A POST TYPE 2

* IF ACTUAL POST HEIGHT VALUE OR PANEL AREA VALUE FALLS
BETWEEN VALUES ON THE SELECTION CHART, USE THE LARGER VALUE.



ELEV A: BOTTOM OF OH POST BASE PLATE
ELEV B: BOTTOM OF SPREAD FOOTING

TABLE 6 - POST SELECTION - CANTILEVER SIGN STRUCTURE

STN. AREA (SQ. FT.)	POST HT. (FT.)	SELECTION	CANTILEVER LENGTH (FEET)	STRUCTURE
350	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
330	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
310	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
290	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
270	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
250	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
230	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
210	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
190	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
170	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
150	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
130	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
110	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
90	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
70	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44
50	16	16	18	20
	24	22	24	26
	26	28	30	36
	28	34	36	38
	30	40	42	44

12. LOW STEEL ELEVATION

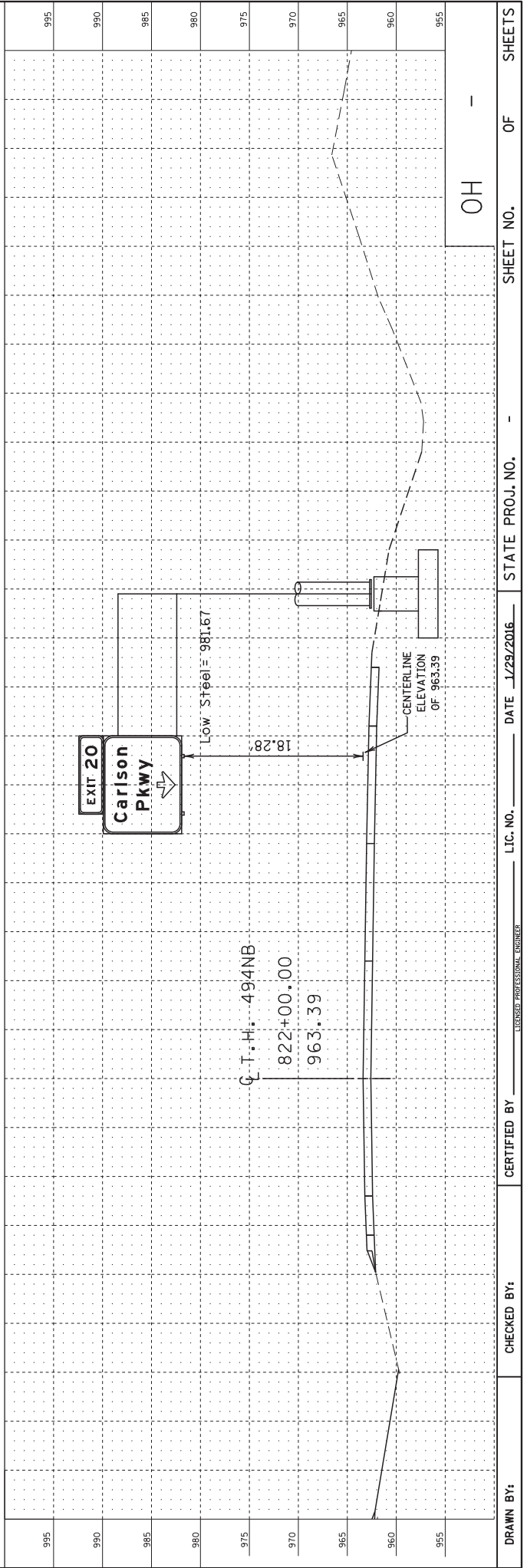
LOW STEEL : THE LOWEST POINT ON THE SIGN PANEL OR TRUSS.

FOR STRUCTURES WITH WALKWAYS, LOW STEEL IS THE BOTTOM OF THE WALKWAY
 FOR STRUCTURES WITH NO WALKWAY LOW STEEL IS THE BOTTOM OF THE PANEL MOUNTING POSTS ON THE STRUCTURES TALLEST SIGN PANEL.

LOW STEEL ON A STRUCTURE BEING DESIGNED TO ACCOMMODATE A FUTURE WALKWAY, IS MEASURED AT THE BOTTOM OF THE PANEL MOUNTING POST(S) ON THE STRUCTURES TALLEST PANEL.

MEASURE AND LABEL THE STRUCTURES LOW STEEL ELEVATION.

- FILL IN STRUCTURE'S LOW STEEL ELEVATION INFORMATION ON OH COMPUTATION SHEET.



13. MEASURE AND LABEL ELEVATION "A"

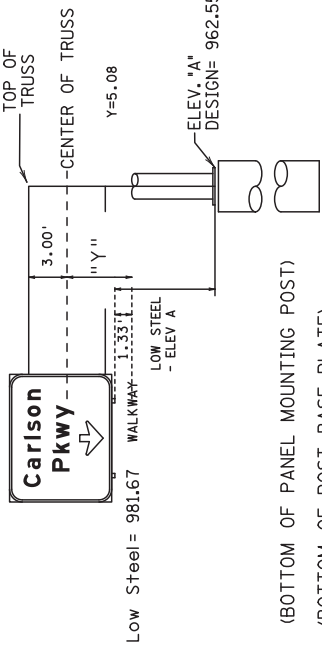
ELEVATION A: ELEVATION OF THE BOTTOM OF THE POST'S BASE PLATE.

ELEV. "A"
DESIGN=
FINAL=

USE MNDOT CELL "RELA" TO LABEL ELEVATION OF THE BOTTOM OF THE POST'S BASE PLATE.

- FILL IN ELEVATION "A" FOR THE STRUCTURE ON OH COMPUTATION SHEET.
- FILL IN "Y" DIMENSION ON OH COMPUTATION SHEET.

POST HEIGHT MEASURED FROM ELEV A TO TOP OF TRUSS.



14 CALCULATE POST HEIGHT.

FOLLOW STRUCTURE COMPUTATION SHEET

MEASURE POST HEIGHT IN MICROSTATION. IT SHOULD MATCH CALCULATED VALUE.

POST HEIGHT

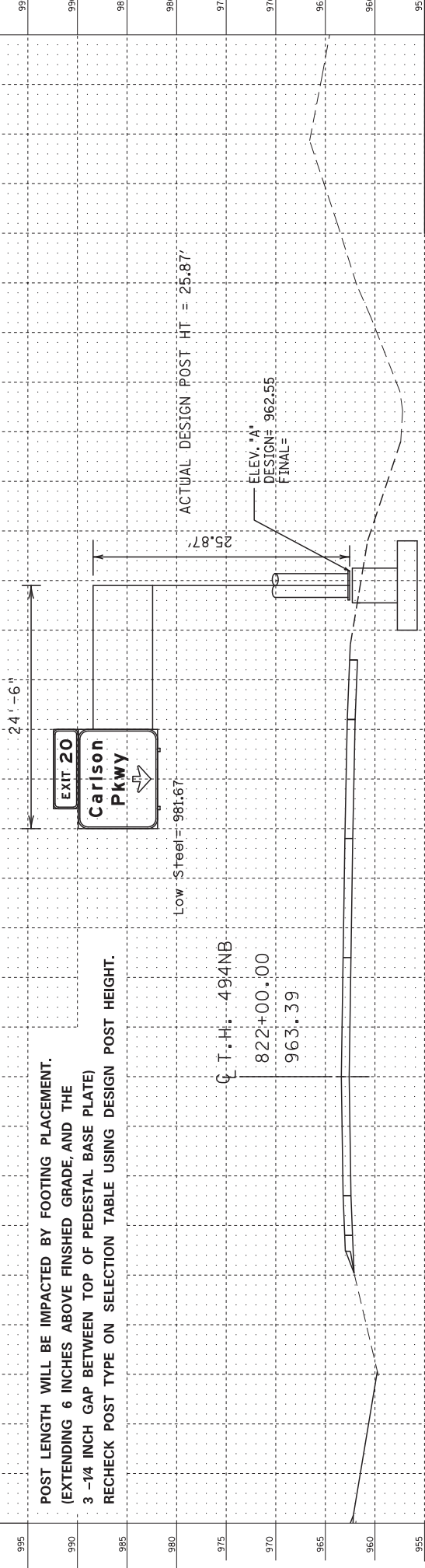
- 981.67 LOW STEEL ELEVATION (BOTTOM OF PANEL MOUNTING POST)
- 962.55 - ELEV A (BOTTOM OF POST BASE PLATE)
- 5.08 + Y DIMENSION (DISTANCE FROM WALKWAY BOTTOM TO CENTER OF TRUSS)
- 3.00 + 3.00 (DISTANCE FROM CENTER OF TRUSS TO TOP OF TRUSS)
- 1.33 - 1.33 (DISTANCE FROM BOTTOM OF PANEL MOUNTING POST TO BOTTOM OF WALKWAY)
- 25.87 = POST HEIGHT

*"Y" DIMENSION: DISTANCE FROM BOTTOM OF 'FUTURE WALKWAY' TO CENTER OF TRUSS. BASED ON PANEL HEIGHT AND COMES FROM CHART ON ST-1 SHEET.

SEE COMPUTATION SHEET NOTES FOR DETAILS ON POST HEIGHT CALCULATION

● FILL IN POST HEIGHT INFORMATION ON OH COMPUTATION SHEET.

POST LENGTH WILL BE IMPACTED BY FOOTING PLACEMENT. (EXTENDING 6 INCHES ABOVE FINISHED GRADE, AND THE 3 - 1/4 INCH GAP BETWEEN TOP OF PEDESTAL BASE PLATE) RECHECK POST TYPE ON SELECTION TABLE USING DESIGN POST HEIGHT.



15. CALCULATE POST STEEL QUANTITY.

USE INTERIM DESIGN B STRUCTURE COMPUTATION SHEET

EXAMPLE FOR:

TYPE A TRUSS AND A 25.87 FT TALL POST TYPE 2

$$\text{POST STEEL: } \frac{59}{\text{LEFT FT FROM ST-2 CHART}} + \frac{25.87}{\text{LEFT POST}} + \frac{\text{RIGHT POST}}{\text{LEFT POST CONSTANT}} + \frac{1880}{\text{LEFT POST CONSTANT}} = \frac{3406.33}{\text{RIGHT POST CONSTANT}} \text{ POUNDS}$$

*THIS BLANK IS USED FOR 2 POST STRUCTURES (SIGN BRIDGES)

*THIS BLANK IS USED FOR 2 POST STRUCTURES (SIGN BRIDGES)

$$59 \times 25.87 = 1526.33$$

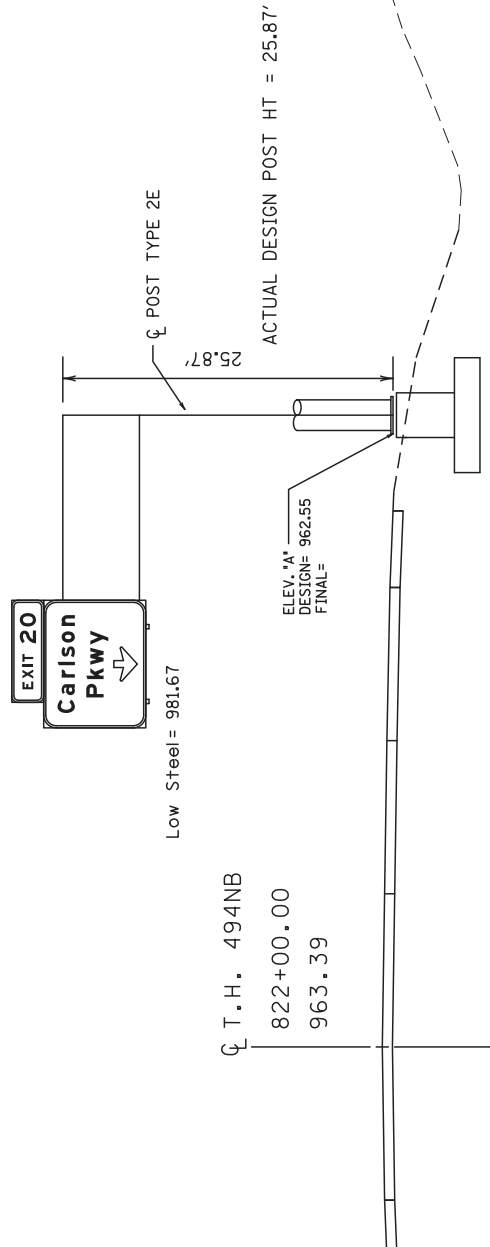
$$1526.33 + 1880 = 3406.33$$

CHART FROM ST-2

POST TYPE	CANTILEVER		SIMPLE SPAN	
	TRUSS TYPE A	TRUSS TYPE B	TRUSS TYPE A	TRUSS TYPE B
1	1880+47 LBS/FT	1910+47 LBS/FT	1870+47 LBS/FT	1890+47 LBS/FT
2	1880+59 LBS/FT	1910+59 LBS/FT	1870+59 LBS/FT	1890+59 LBS/FT
3	1880+71 LBS/FT	1910+71 LBS/FT	1870+71 LBS/FT	1890+71 LBS/FT
4	1880+94 LBS/FT	1910+94 LBS/FT	1870+94 LBS/FT	1890+94 LBS/FT
5	2470+138 LBS/FT	2500+138 LBS/FT	2460+138 LBS/FT	2505+138 LBS/FT
6	N/A	2500+104 LBS/FT	N/A	2545+104 LBS/FT
7	N/A	2500+167 LBS/FT	N/A	2570+167 LBS/FT

QUANTITIES INCLUDE ANCHORAGE ASSEMBLY AND TRUSS CONNECTION PLATES. PAY LENGTH OF POSTS FROM THE TOP OF THE BASE PLATE TO THE TOP OF THE TRUSS. POST FOUNDATIONS ARE BASED ON GRADE LEVEL. NO ADJUSTMENTS WILL BE MADE IN THE QUANTITIES FOR THE USE OF GRADE 35 STEEL POSTS.

● FILL IN STRUCTURE'S POST STEEL INFORMATION ON OH COMPUTATION SHEET.



16. PEDESTAL HEIGHT "G" AND MINIMUM DEPTH OF SPREAD

"DROP" THE FOOTING CELL.
 ADJUST PEDESTAL HEIGHT TO INSURE SPREAD PORTION OF THE FOOTING IS A MINIMUM OF 3' BELOW FINISHED GRADE.
 3 FOOT MINIMUM BELOW FINISHED GRADE APPLIES ONLY TO SPREAD TYPE FOOTINGS.
 IT DOES NOT APPLY FOR DRILLED SHAFT FOOTINGS.

CALCULATE SPREAD FOOTING CONCRETE QUANTITY

- FILL IN FOOTING INFO ON OH COMPUTATION SHEET.

HERE IS HOW THE COMPUTATION SHEET WORKS FOR AN OH CANTILEVER STRUCTURE WITH POST TYPE 2 SPREAD FOOTING AND A "G" OF 4.54'

$$\text{SPREAD FOOTING (LEFT): } 9.3 + (0.46 \times 4.54) = 11.38 \text{ CUBIC YARDS}$$

$$.46 \times 4.54 = 2.08$$

$$9.3 + 2.08 = 11.38$$

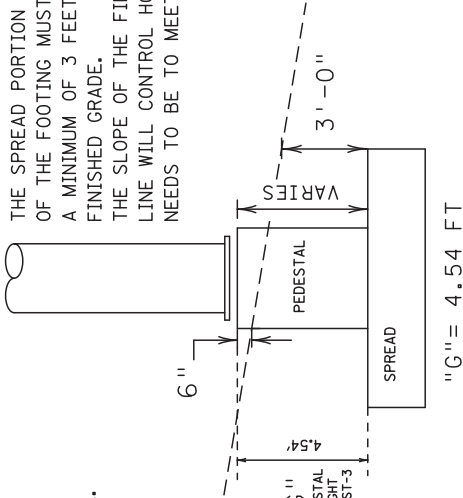


CHART FROM ST-3

TOP LINE OF CHART FOR POSTS TYPE 1 THRU 4
 CONSTANT OF 9.3 OR 16.7
 BASED ON POST TYPE-SEE CHART ON ST-3

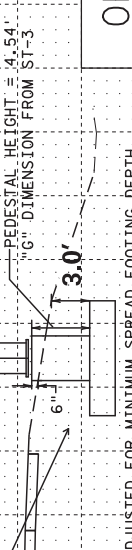
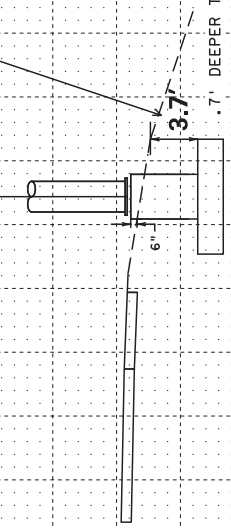
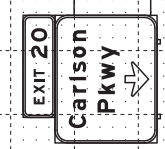
POST NO.	DIMENSIONS				DRILLED SHAFT REINFORCING BARS				ESTIMATED QUANTITIES (4)				SPREAD FOOTINGS SUMMARY OF ESTIMATED QUANTITIES			
	AA	BB	CC	DD	EE	FF	GG	HH	CONCRETE CY	ESTIMATE CYREIN	STEEL LBS.	CONCRETE CY	REIN. STEEL LBS.	ANCH. ASSM. LBS	ST. EXC. C.Y.	
1-4	3'-0"	Ø23'-0"	3'-6"	16'-6"	197 LBS.	5 #5x 14'-1"	7 #5x 14'-1"	20 #9x 22'-7"	6.9	1910	945 + 980	9.3 + 0.46 G	781	7.4 R		
5-7	4'-0"	Ø29'-0"	4'-0"	14'-0"	22'-6"	362 LBS.	5 #5x 16'-1"	24 #10x 28'-7"	14.1	3490	2333 + 1330	16.7 + 0.46 G	1320	12.1 R		

THIS FOOTING IS DEEPER THAN IT NEEDS TO BE.

WHEN YOU BRING THE FOOTING CELL INTO YOUR CROSS SECTION, IT WILL USUALLY USUALLY NEED ADJUSTING TO GET THE 3 FOOT MINIMUM SPREAD DEPTH BELOW FINISHED GRADE.

DROP THE FOOTING CELL AND ADJUST PEDESTAL HEIGHT TO INSURE SPREAD PORTION OF THE FOOTING IS A MINIMUM OF 3' BELOW FINISHED GRADE.

PEDESTAL ADJUSTED FOR MINIMUM SPREAD DEPTH OF 3 FEET.



17. LABEL STRUCTURE COMPONENTS, DIMENSION TRUSS/PANEL DISTANCES.

FILL IN STRUCTURES OH NUMBER, LOCATION AND PAY ITEM QUANTITY INFORMATION.

USE MNDOT CELLS 'RCLP', 'RTOP' ETC. WHEN LABELING CROSS SECTION COMPONENTS.



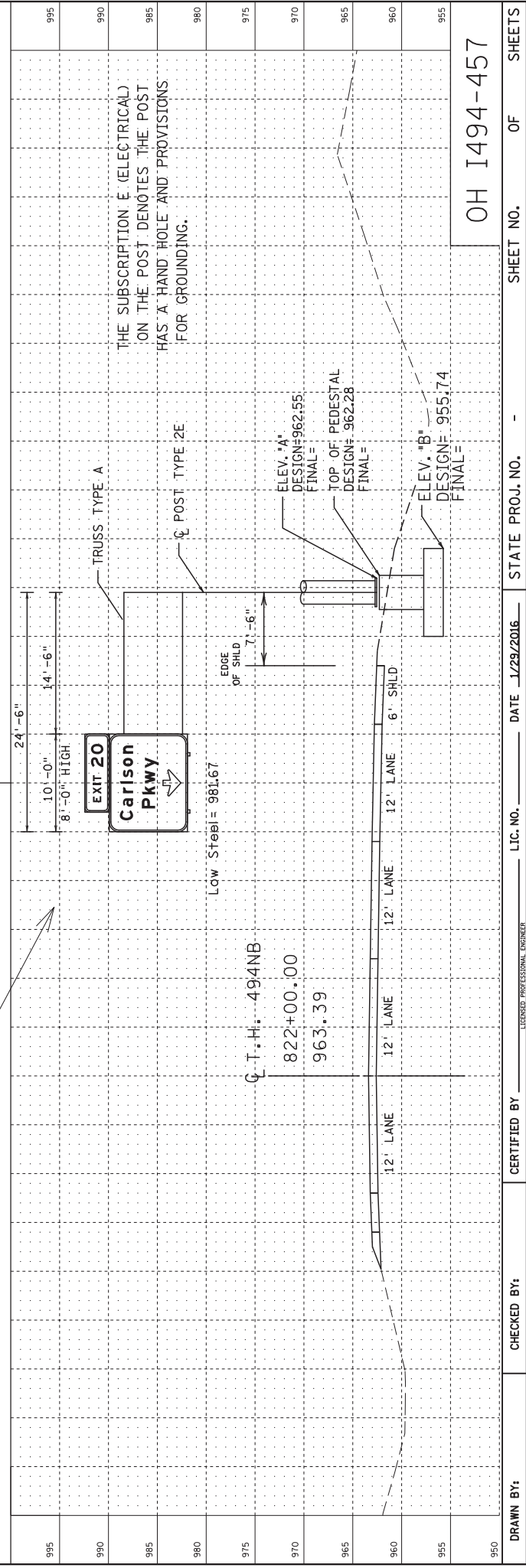
OH 1494-457
N.B. TH 494
STA. 822+00
QUANTITIES

	DESIGN	FINAL
POST STEEL	3406 LBS	
TRUSS STEEL	3014 LBS	
WALKWAY SUPPORT STEEL	0 LBS	
WALKWAY GRATING STEEL	0 LBS	
PANEL MOUNTING POST STEEL	164 LBS	
CONCRETE (SPREAD) FOOTING	11.4 CU YDS	

NOTES:

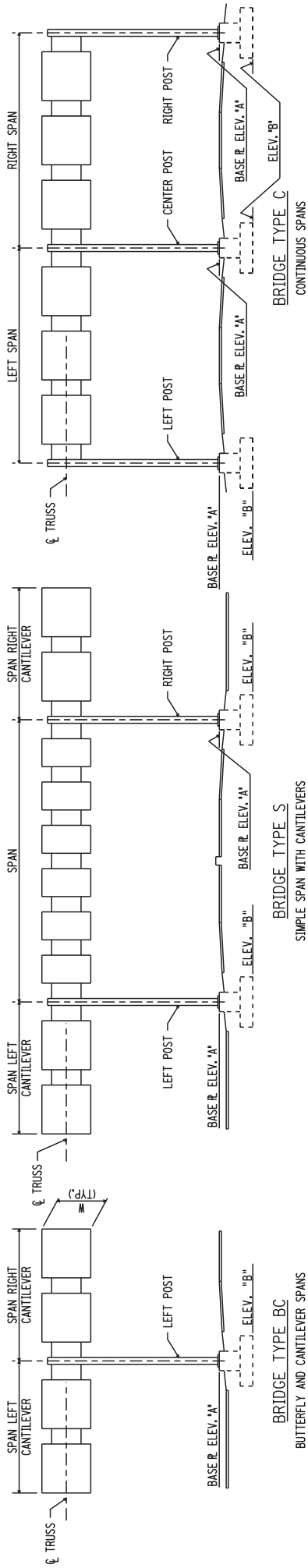
1. LOW STEEL IS BOTTOM OF PANEL MOUNTING POST ON THE TALLEST PANEL.
2. STRUCTURE IS DESIGNED FOR FUTURE WALKWAY.

LABEL AS SHOWN.



THE SUBSCRIPTION E (ELECTRICAL) ON THE POST DENOTES THE POST HAS A HAND HOLE AND PROVISIONS FOR GROUNDING.

OH 1494-457



OVERHEAD SIGN STRUCTURES

SIGN NO.	STATION	BRIDGE TYPE	TRUSS TYPE	SPAN LENGTHS				LOW STEEL ELEVATION (1)	LEFT POST		CENTER POST		RIGHT POST	
				LEFT CANT	RIGHT CANT	SPAN OR LEFT SPAN	RIGHT SPAN		ELEVATION (1)	TYPE	ELEVATION (1)	TYPE	ELEVATION (1)	TYPE
OH 1494-457	822+00	BC	A	24'-6"			981.67	A	B	A	B	A	B	
							962.55	955.74						

TABLULATION OF OVERHEAD SIGN STRUCTURE QUANTITIES (2)

SIGN NO	OH 1494-457	QUANTITY	UNIT	AA
STRUCT. STEEL POSTS (3)	3406			TOTALS
STRUCT. STEEL TRUSSES	3014			3406
STRUCT. STEEL WALKWAY SUPPORTS	0			3014
STRUCT. STEEL WALKWAY GRATING	0			0
STRUCT. STEEL PANEL MTG. POSTS	164			0
CONCRETE FOOTINGS (SPREAD)	11.4			164
CONCRETE FOOTINGS (SHAFT)				11.4

GENERAL NOTES:

- THE SUBSCRIPTION E ON THE POST TYPE DENOTES THE POST WHICH HAS THE HAND HOLE AND PROVISIONS FOR GROUNDING, I. E. POST TYPE 3E.
- TABLULATED ELEVATIONS AND DIMENSIONS ARE APPROXIMATE ONLY. FABRICATION DEPENDENT ON THESE ELEVATIONS AND DIMENSIONS SHALL NOT BE STARTED UNTIL THE ENGINEER HAS MADE FINAL DETERMINATION OF THEM IN THE FIELD.
- LEFT AND RIGHT DESIGNATIONS ARE SHOWN IN DIRECTION OF TRAFFIC FLOW. WHEN TWO DIRECTIONS OF TRAFFIC ARE SPANNED THE DESIGNATIONS ARE SHOWN LOOKING UP STATIONING.
- SEE SHEETS XX-XX FOR DETAILS.
- SEE SHEET XXX-XX FOR CROSS SECTIONS.

SPECIFIC NOTES:

- CENTER LINE ELEVATION IS FIELD ELEVATION.
- BASED ON TABULATED ELEVATIONS AND DIMENSIONS.
- REVISE AS NECESSARY USING QUANTITY TABLES ON SHEET XX INCLUDES F. & I. OH SIGN IDENTIFICATION PLATE (X5-1), SEE SHEET XX FOR MOUNTING DETAIL.

DRAWN BY:

CHECKED BY:

CERTIFIED BY:

LIC. NO. _____

DATE

1/29/2016

STATE PROJ. NO.

OVERHEAD DATA SHEET

SHEET NO.

OF

SHEETS

TABLE 1 - TRUSS TYPE SELECTION CANTILEVER STRUCTURE TYPE WITH CONVENTIONAL SIGNS

SIGN AREA (SQ. FT.)	CANTILEVER LENGTH (FEET)														
	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
350	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
330	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
310	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
290	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
270	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
250	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
230	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
210	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
190	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
170	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
150	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
130	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
110	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
90	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
70	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
50	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

"A" INDICATES TRUSS TYPE A. "B" INDICATES TRUSS TYPE B.
SEE DRAWINGS ST-5 THROUGH ST-7 FOR TRUSS DETAILS.

TABLE 3 - TRUSS TYPE SELECTION SIMPLE SPAN STRUCTURE WITH CHANGEABLE MESSAGE SIGNS (DRUM)

NO. OF CMS SIGNS	SPAN LENGTH (FEET)																		
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120
1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

"A" INDICATES TRUSS TYPE A. "B" INDICATES TRUSS TYPE B.
"C" INDICATES TRUSS TYPE C.
* THIS ASSUMES THAT THE CMS'S ARE ON THE OPPOSITE SIDES OF THE TRUSS.

TABLE 2 - TRUSS TYPE SELECTION SIMPLE SPAN STRUCTURE WITH CONVENTIONAL SIGNS

SIGN AREA (SQ. FT.)	SPAN LENGTH (FEET)																								
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	146	
1000	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
900	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
800	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
700	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
600	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
500	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
400	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
300	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
200	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
100	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	

"A" INDICATES TRUSS TYPE A. "B" INDICATES TRUSS TYPE B.
"C" INDICATES TRUSS TYPE C. "NA" NOT ALLOWED.
SEE DRAWINGS ST-5 THROUGH ST-7 FOR TRUSS DETAILS.

TABLE 4 - TRUSS TYPE SELECTION SIMPLE SPAN STRUCTURE WITH CHANGEABLE MESSAGE SIGNS (LED)

NO. OF CMS SIGNS	SPAN LENGTH (FEET)																							
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	
1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

"A" INDICATES TRUSS TYPE A. "B" INDICATES TRUSS TYPE B.
"C" INDICATES TRUSS TYPE C. "NA" NOT ALLOWED.
* THIS ASSUMES THAT THE CMS'S ARE ON THE OPPOSITE SIDES OF THE TRUSS.

TABLE 5 - POST SELECTION - CHANGEABLE MESSAGE SIGN (LED) ON SIMPLE SPAN SIGN STRUCTURE

NO. OF CMS LIMITS	CMS AREA (SQ. FT.)	SPAN LENGTH (FEET)																							
		40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140			
1	261	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	522	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		24	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
		26	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
		28	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
		30	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	

TYPE A TRUSS ← → TYPE B TRUSS → → TYPE C TRUSS
* CMS'S ATTACHED ON OPPOSITE SIDES OF THE TRUSS.

- TRUSS SELECTION PROCEDURE**
- THESE STANDARD PLANS ARE SUITABLE ONLY FOR SIMPLE SPAN AND CANTILEVER OVERHEAD SIGN STRUCTURES. WITH ONLY A SINGLE TYPE OF SIGN (CMS OR CONVENTIONAL) ATTACHED TO THE STRUCTURE. THE FOLLOWING CONDITIONS ARE NOT PRESENTED IN THIS PLAN SET AND WILL REQUIRE ADDITIONAL DESIGN ATTENTION.
 - INSTALLATION OF 2 CMS'S ON THE SAME SIDE OF THE TRUSS.
 - BUTTERFLY, CONTINUOUS OR A COMBINATION OF SIMPLE AND CANTILEVERED STRUCTURES.
 - ANY COMBINATION OF CMS AND CONVENTIONAL SIGNS.
 - DETERMINE THE TYPE OF STRUCTURE FOR WHICH THE TRUSS IS TO BE USED FOR. REFER TO PLANS FOR BRIDGE TYPE BC OR BRIDGE TYPE S.
CANTILEVERED SIGN STRUCTURE - BRIDGE TYPE BC
SIMPLE SPAN SIGN STRUCTURE - BRIDGE TYPE S
 - DETERMINE THE TABLE WHICH CORRESPONDS TO THE STRUCTURE TYPE UNDER CONSIDERATION.
TABLE 1 - CANTILEVER W/CONVENTIONAL SIGNS
TABLE 2 - SIMPLE SPAN W/CONVENTIONAL SIGNS
TABLE 3 - SIMPLE SPAN W/DRUM CMS
TABLE 4 - SIMPLE SPAN W/LED CMS
THIS TABLE IS TO BE USED FOR STEPS 4 & 5.
 - DETERMINE THE AREA OF ALL THE SIGNS WHICH ARE TO BE PLACED ON THE SIGN STRUCTURE. THE SIGN AREA IS DEFINED AS THE SUMMATION OF THE INDIVIDUAL SIGN HEIGHTS MULTIPLIED BY THE WIDTHS. USE THIS VALUE TO ENTER THE APPROPRIATE TABLE FROM THE LEFT COLUMN. IF THE TOTAL SIGN AREA FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. (BE SURE TO INCLUDE EXIT SIGNS IN TOTAL AREA.)
DETERMINE THE SPAN LENGTH OR CANTILEVER LENGTH AND ENTER THE APPROPRIATE TABLE ALONG THE TOP. IF THE SPAN LENGTH FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. THE SPAN LENGTH IDENTIFIES THE VERTICAL COLUMN FROM WHICH A TRUSS WILL BE SELECTED.

EXAMPLE: SIGN AREA: 250 SQ. FT.
SPAN LENGTH: 102 FT
SIGN TYPE: SIMPLE SPAN
TRUSS TYPE: CONVENTIONAL
TRUSS TYPE: B

STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B
POST/TRUSS SELECTION
TABLES

NOTE: FOR CMS (LED) POST SELECTION SEE POST/TRUSS SELECTION TABLES (TABLE 5)

NO. OF CMS UNITS (50, FT.)	SPAN LENGTH (FEET)																			
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

TYPE A TRUSS ← TYPE B TRUSS → TYPE C TRUSS

• CMS'S ATTACHED ON OPPOSITE SIDES OF THE TRUSS.

SIGN AREA POST HT. (50, FT.)	SPAN LENGTH (FEET)																								
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	146	
1000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
900	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
800	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
700	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
600	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
500	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
400	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
300	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
200	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

TYPE A TRUSS ← TYPE B TRUSS → TYPE C TRUSS

SIGN AREA POST HT. (50, FT.)	CANTILEVER LENGTH (FEET)														
	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
350	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
330	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
290	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
270	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
250	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
230	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
210	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
170	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
150	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
130	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
110	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
90	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
70	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

• USE ONLY 20" Ø x .812" WALL (42 KSI) OPTION.

TYPE B TRUSS → TYPE A TRUSS

POST SELECTION PROCEDURE

- THESE STANDARD PLANS ARE SUITABLE ONLY FOR SIMPLE SPAN AND CANTILEVERED OVERHEAD SIGN STRUCTURES. THE FOLLOWING CONVENTIONAL ATTACHED TO THE STRUCTURE. THE FOLLOWING CONDITIONS ARE NOT PRESENTED IN THIS PLAN SET AND WILL REQUIRE ADDITIONAL DESIGN ATTENTION.
 - INSTALLATION OF 2 CMS'S ON THE SAME SIDE OF THE TRUSS.
 - BUTTERFLY, CONTINUOUS OR A COMBINATION OF SIMPLE AND CANTILEVERED STRUCTURES.
 - ANY COMBINATION OF CMS AND CONVENTIONAL SIGNS.
- DETERMINE THE TYPE OF STRUCTURE FOR WHICH THE POSTS ARE TO BE USED FOR. REFER TO PLANS FOR BRIDGE TYPE BC OR BRIDGE TYPE S.
- CANTILEVERED SIGN STRUCTURE - BRIDGE TYPE BC
SIMPLE SPAN SIGN STRUCTURE - BRIDGE TYPE S
- DETERMINE THE TABLE WHICH CORRESPONDS TO THE STRUCTURE TYPE UNDER CONSIDERATION, TABLE 5, 6, 7 OR 8 IS TO BE USED FOR STEPS 4 THROUGH 7.
- DETERMINE THE AREA OF ALL THE SIGNS WHICH ARE TO BE PLACED ON THE SIGN STRUCTURE. THE SIGN AREA IS DEFINED AS THE SUMMATION OF THE INDIVIDUAL SIGN HEIGHTS MULTIPLIED BY THE SIGN WIDTHS. USE THIS VALUE TO ENTER THE APPROPRIATE TABLE FROM THE LEFT COLUMN. IF THE TOTAL SIGN AREA FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. BE SURE TO INCLUDE EXIT SIGNS IN TOTAL AREA.
- DETERMINE THE POST HEIGHT APPLICABLE FOR THE STRUCTURE UNDER CONSIDERATION. THE POST HEIGHT IS DEFINED AS THE VERTICAL DISTANCE BETWEEN THE BOTTOM OF THE BASEPLATE TO THE TOP OF THE TRUSS, USING THE VALUES BRACKETED WITHIN THE SIGN AREA FROM STEP 4. LOCATE THE POST HEIGHT. IF THE ACTUAL HEIGHT FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. THIS POST HEIGHT IDENTIFIES THE HORIZONTAL ROW FROM WHICH A POST WILL BE SELECTED.
- DETERMINE THE SPAN LENGTH OR CANTILEVER LENGTH AND ENTER THE POSTS IDENTIFICATION TABLE. THE OPPOSITE END OF THE SPAN FALLS BETWEEN TWO VALUES. USE THE LARGER VALUE. THIS SPAN LENGTH IDENTIFIES THE VERTICAL COLUMN FROM WHICH A POST WILL BE SELECTED.
- DETERMINED THE POST IDENTIFICATION NUMBER BY READING ACROSS THE ROW FROM THE IDENTIFIED POST HEIGHT AND DOWN THE COLUMN FROM THE IDENTIFIED SPAN LENGTH. THE INTERSECTION OF THIS ROW AND COLUMN WILL UNIQUELY IDENTIFY THE APPROPRIATE POST IDENTIFICATION NUMBER.
- USE THE POST IDENTIFICATION NUMBER TO DETERMINE THE RANGE OF PIPE REQUIREMENTS AVAILABLE FROM THE POST IDENTIFICATION TABLE (TABLE 1, DRAWING 31-2).

EXAMPLE: SIGN AREA: 250 SQ. FT.
POST HEIGHT: 27 FT.
SPAN LENGTH: 30 FT.
TYPE: SIMPLE SPAN
SIGN TYPE: CONVENTIONAL
POST IDENTIFICATION NUMBER: 3

STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

POST SELECTION TABLES

SPECIFIC NOTES:
 ① DIMENSION Y IS CONSTANT AND BASED ON THE DEEPEST SIGN PANEL ABOVE THAT WALKWAY, WHEN STANDARD SIGN PANELS AND SIGNS ARE MOUNTED ON THE SAME SPAN, DIMENSION Y SHALL BE GOVERNED BY THE SIGN.
 ② MINIMUM CLEARANCE WILL BE MEASURED FROM THE HIGHEST ELEVATION OF PAVEMENT, SHOULDERS AND MOUNTABLE CURBS, OR IF INSURMOUNTABLE CURBS ARE USED, THE HIGHEST ELEVATION BETWEEN CURB LINES.

GENERAL NOTES:

DESIGN SPECIFICATIONS:

TRUSS, POST, & HARDWARE:
 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS DATED 1999.

LOADING:

WIND LOAD 90 MPH H, NORMAL TO SIGN FACE IN COMBINATION WITH OTHER LOADS OUTLINED IN THE DESIGN SPECIFICATIONS.

UNIT STRESSES:

CONCRETE----- $F_c = 1,600$ PSI
 REINFORCEMENT STEEL----- $F_s = 24,000$ PSI
 FOOTING SOIL PRESSURE----- 1-1/4 TONS PER SQ. FT.

MATERIALS:

STRUCTURAL STEEL (EXCEPT POST, TUBES)- MNDOT 3306
 POST STEEL----- VARIES
 HIGH STRENGTH BOLTS----- MNDOT 3391, 2B
 ANCHOR RODS----- MNDOT 3385
 CASTINGS----- MNDOT 3322
 REINFORCEMENT
 BARS----- MNDOT 3301
 SPIRAL----- MNDOT 3305 NO SPLICES
 WALKWAY GRATING----- FEDERAL SPECIFICATIONS RR-G-661b, TYPE 1, STEEL
 CONCRETE----- MNDOT 2461 (MIX 3G52)

FINISH:

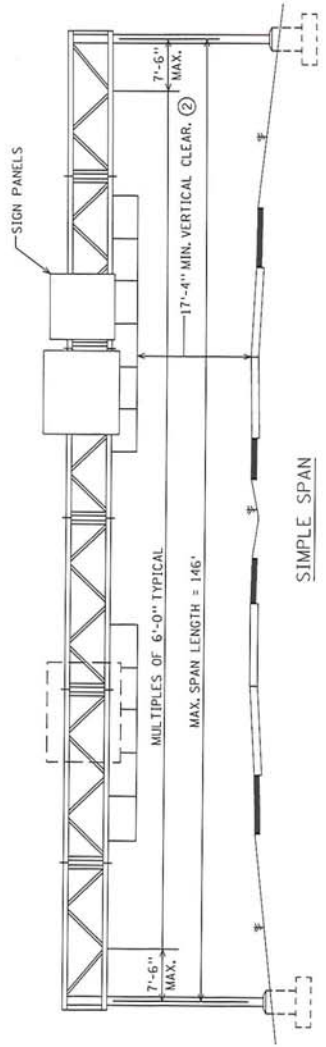
ALL COMPONENTS SHALL BE GALVANIZED AFTER FABRICATION EXCEPT REINFORCEMENT BARS, LOWER PORTION OF ANCHOR RODS, ALUMINUM, AND OTHER NON FERROUS INCIDENTALS. GALVANIZING SHALL CONFORM TO MNDOT 3392 OR MNDOT 3394 AS APPLICABLE. BEARING SURFACES MUST BE SMOOTH.

FABRICATION:

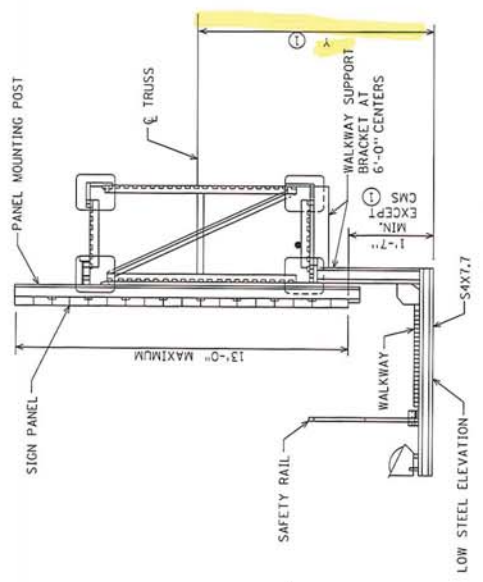
FABRICATION OF STRUCTURAL METALS SHALL BE IN ACCORDANCE WITH MNDOT 2471, MNDOT 2564 AND THE APPLICABLE SPECIAL PROVISIONS. ALL WELDING TO BE CONTINUOUS. ALL CONTACT SURFACES MUST BE COMPLETELY SEALED.

INSPECTION:

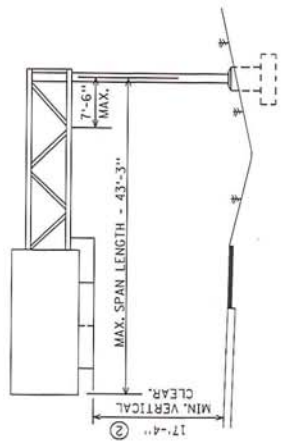
INSPECTION BEFORE AND AFTER GALVANIZING PER MNDOT 1511 AND MNDOT 2471.



SIMPLE SPAN



SECTION



CANTILEVER

INDEX OF STANDARD SIGN DRAWINGS

DRAWING	TITLE
ST-1	GENERAL ELEVATION AND NOTES
ST-2	CAMBER, POST IDENTIFICATION AND ESTIMATED QUANTITIES
ST-3	FOUNDATIONS AND ANCHOR RODS
ST-4	TRUSS/POST CONNECTION & BASEPLATE
ST-5	SIGN TRUSS DETAILS - TYPE A
ST-6	SIGN TRUSS DETAILS - TYPE B
ST-7	SIGN TRUSS DETAILS - TYPE C
ST-8	WALKWAY DETAILS
ST-9	FOLDING HANDRAIL
ST-10	SIGN PANEL AND PANEL MOUNTING POST DETAILS
ST-11	ELECTRICAL DETAILS
ST-12	ELECTRICAL DETAILS
ST-13	ELECTRICAL DETAILS (CMS SIGNS)

SIGN HEIGHT	Y (1)	CMS
6'-6"	4'-4"	
7'-0"	4'-7"	
7'-6"	4'-10"	
8'-0"	5'-1"	
8'-6"	5'-4"	
9'-0"	5'-7"	
9'-6"	5'-10"	
10'-0"	6'-1"	
10'-6"	6'-4"	
11'-0"	6'-7"	
11'-6"	6'-10"	
12'-0"	7'-1"	
12'-6"	7'-4"	
13'-0"	7'-7"	

STANDARD OVERHEAD SIGN SUPPORTS
 INTERIM DESIGN B
 GENERAL ELEVATIONS
 AND NOTES

SIMPLE SPAN

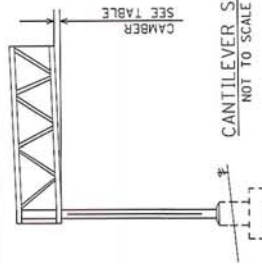
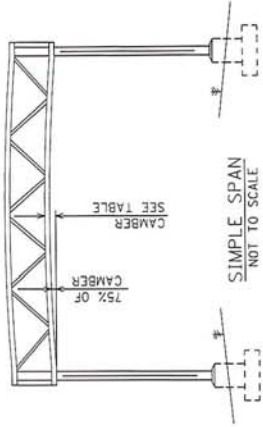
SPAN	SIMPLE SPAN TRUSS CAMBER											
	40	50	60	70	80	90	100	110	120	130	140	150
CAMBER	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 5/8	1 3/4
DL DEFLECTION	0	1/16	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
RESIDUAL CAMBER	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 5/8	1 3/4

NOTE:
CAMBER AND DEFLECTIONS SHOWN ARE AT $\frac{1}{4}$ SPAN.
THE DEFLECTIONS AND CAMBER AT THE QUARTER
POINTS SHALL BE APPROXIMATELY 75% OF THESE
VALUES.

CANTILEVER SPAN

SPAN	CANTILEVER SPAN TRUSS CAMBER			
	15'	20'	30'	45'
CAMBER	1/8	1/4	3/8	1/2
DL DEFLECTION	0	0	1/8	1/4
RESIDUAL CAMBER	1/8	1/4	3/8	1/2

NOTE:
CAMBER AND DEFLECTIONS SHOWN ARE SHOWN AT
END OF CANTILEVER.
WHEN ERECTING CANTILEVER TRUSSES, THE POSTS
SHALL BE SET 1/2" PER FOOT OUT OF PLUMB TO
COMPENSATE FOR THE BENDING OF THE POSTS.



FOR FOUNDATION QUANTITIES SEE DRAWING ST-3

WALKWAY WEIGHTS:
1. USE 3'-4 1/2" WIDE GRATING @ 44 LBS./FT.
2. WEIGHT INCLUDES HANDRAIL (12 LBS./FT.) AND FIXTURE
MOUNTING CHANNELS (4 LBS./FT.)

POST IDENTIFICATION NUMBER	BASEPLATE DESIGN	PERMISSIBLE PIPE SECTIONS		WALL THICKNESS (INCH)
		MIN. YIELD=35 KSI	MIN. YIELD=42 KSI	
1	A	N.A.	N.A.	18
2	A	18	18	0.312
3	A	18	18	0.375
4	A	18	18	0.500
5	B	18	18	0.750
6	B	20	20	0.594
7	B	N.A.	N.A.	20

WALL THICKNESS IS MINIMUM, THINNER WALLS WILL NOT BE APPROVED

POST IDENTIFICATION NOTES:

POST MATERIAL SHALL CONFORM TO ONE OF THE FOLLOWING SPECIFICATIONS:
ASTM A709, GRADE 36
ASTM A53, GRADE B
API 5L, GRADES B, X42, X46, X52, X56, X60, X65

CONTRACTOR SHALL DEMONSTRATE THAT THE POST MATERIAL MEETS THE REQUIREMENTS OF ONE OF THE ABOVE CITED SPECIFICATIONS AND THE MINIMUM YIELD STRENGTH.

NO SPLICES OF ANY KIND WILL BE PERMITTED IN POSTS INTENDED FOR USE IN CANTILEVER TYPE STRUCTURES (BRIDGE TYPE BC).

ONE OF TWO POSTS FOR SIMPLE SPAN STRUCTURES (BRIDGE TYPE SA) MAY INCORPORATE ONE WELDED (CIRCUMFERENTIAL BUT NOT CONFORMING TO AWS D1.1) OR TWO WELDED (CIRCUMFERENTIAL BUT NOT CONFORMING TO AWS D1.1) SPLICES. WELDED SPLICES SHALL BE COMMERCIAL PRODUCTS. BUT WELDS REQUIRE RADIOGRAPHIC INSPECTION (MNDOT 2471.3).

ALL RADIOGRAPHIC INSPECTIONS AND MAGNETIC PARTICLE TESTING REPORTS AND RADIOGRAPHIC FILMS SHALL BECOME THE PROPERTY OF THE DEPARTMENT.

SEE DRAWING ST-4 FOR BASEPLATE DETAILS.

TRUSS QUANTITIES
USE LENGTH FROM $\frac{1}{4}$ POST WHEN CALCULATING TOTAL WEIGHTS.

TRUSS TYPE A	168 LBS./FT.
TRUSS TYPE B	196 LBS./FT.
TRUSS TYPE C	123 LBS./FT.

PANEL MOUNTING POST QUANTITIES
INCLUDES MOUNTING ANGLES

PANEL HEIGHT	WEIGHT/POST
6'-6"	70
7'-0"	74
7'-6"	78
8'-0"	82
8'-6"	86
9'-0"	90
9'-6"	93
10'-0"	97
10'-6"	101
11'-0"	105
11'-6"	160
12'-0"	166
12'-6"	172
13'-0"	178

WALKWAY SUPPORT QUANTITIES

USE MAXIMUM PANEL HEIGHT ON SPAN TO CALCULATE QUANTITIES. WHEN CONVENTIONAL SIGN PANEL(S) AND CMS ARE MOUNTED ON THE SAME SPAN, QUANTITIES SHALL BE GOVERNED BY THE CMS.

PANEL HEIGHT	TRUSS TYPE (WEIGHT/SUPPORT)		
	A	B	C
6'-6"	99	105	113
7'-0"	101	107	115
7'-6"	103	109	117
8'-0"	105	111	119
8'-6"	107	113	121
9'-0"	109	115	123
9'-6"	111	117	125
10'-0"	113	119	127
10'-6"	115	121	129
11'-0"	135	142	151
11'-6"	138	144	153
12'-0"	141	147	156
12'-6"	143	150	159
13'-0"	146	153	162

POST QUANTITIES

QUANTITIES INCLUDE ANCHORAGE ASSEMBLY AND TRUSS CONNECTION PLATES. PAY LENGTH OF WELDED (CIRCUMFERENTIAL BUT NOT CONFORMING TO AWS D1.1) OR TWO WELDED (CIRCUMFERENTIAL BUT NOT CONFORMING TO AWS D1.1) SPLICES SHALL BE COMMERCIAL PRODUCTS. BUT WELDS REQUIRE RADIOGRAPHIC INSPECTION (MNDOT 2471.3). ALL RADIOGRAPHIC INSPECTIONS AND MAGNETIC PARTICLE TESTING REPORTS AND RADIOGRAPHIC FILMS SHALL BECOME THE PROPERTY OF THE DEPARTMENT.

POST TYPE	CANTILEVER			SIMPLE SPAN		
	TRUSS TYPE A	TRUSS TYPE B	TRUSS TYPE C	TRUSS TYPE A	TRUSS TYPE B	TRUSS TYPE C
1	1880+47 LBS/FT	1910+47 LBS/FT	1870+47 LBS/FT	1870+47 LBS/FT	1890+47 LBS/FT	1915+47 LBS/FT
2	1880+59 LBS/FT	1910+59 LBS/FT	1870+59 LBS/FT	1870+59 LBS/FT	1890+59 LBS/FT	1915+59 LBS/FT
3	1880+71 LBS/FT	1910+71 LBS/FT	1870+71 LBS/FT	1870+71 LBS/FT	1890+71 LBS/FT	1915+71 LBS/FT
4	1880+84 LBS/FT	1910+84 LBS/FT	1870+84 LBS/FT	1870+84 LBS/FT	1890+84 LBS/FT	1915+84 LBS/FT
5	2470+138 LBS/FT	2500+138 LBS/FT	2460+138 LBS/FT	2460+138 LBS/FT	2480+138 LBS/FT	2505+138 LBS/FT
6	N/A	2500+104 LBS/FT	N/A	N/A	2545+104 LBS/FT	2570+104 LBS/FT
7	N/A	2500+167 LBS/FT	N/A	N/A	2545+167 LBS/FT	2570+167 LBS/FT

STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

CAMBER, POST IDENTIFICATION
AND ESTIMATED QUANTITIES

DRAWING ST-2

STATE PROJ. NO.

SHEET NO. OF SHEETS

SPECIFIC NOTES:

- G IS IN FEET, ROUND UP TO WHOLE NUMBER, E.G. G-4.10/2G-B.2, NO. RD'D=9.
- G AND R ARE IN FEET.
- BEND AS REQUIRED TO FORM A CLOSED LOOP.
- FOR STRUCTURE STEEL SEE SPREAD FOOTING.
- MUST BE FORMED A MIN. OF 6" BELOW THE GROUND SURFACE. THE SOIL EXCAVATED FOR FORMING SHALL BE BACKFILLED AND TAMPED TO EQUIVALENT COMPACTION AS SURROUNDING MATERIAL.
- SPECIAL LARGE RADIUS BENDS ARE REQUIRED. SEE "BAR BENDING DIAGRAMS" FOR SIZES OF RADI.

GENERAL NOTES:

- SEE THE FORMAT SHEET FOR FOOTING LOCATIONS, POST DESIGNATIONS, TOP OF PEDESTAL ELEVATIONS, AND BOTTOM OF FOOTING ELEVATIONS.
- ALL CONCRETE SHALL CONFORM TO CONCRETE MIX 3Y43 (MNDOT 2461).
- ALL BAR DIMENSIONS ARE CUT TO OUT OF BARS.
- ALL SPREAD FOOTINGS HAVE AN ALLOWABLE DESIGN BEARING PRESSURE OF 1 1/4 T PER SQUARE FOOT.
- DRILLED SHAFTS SHALL BE USED ONLY WHEN SPECIFIED IN THE CONTRACT PLANS.
- THE DRILLED SHAFTS HAVE AN ALLOWABLE DESIGN LATERAL BEARING PRESSURE OF 250 LBS. PER SQ. FT. PER FOOT OF DEPTH.
- UNLESS OTHERWISE NOTED, ALL REINFORCEMENT BARS SHALL BE EPOXY COATED IN ACCORDANCE WITH MNDOT 3301. SPIRAL BARS AND J, K, L, & M BARS NEED NOT BE EPOXY COATED.
- THE FOLLOWING TORQUE VALUES SHALL BE USED WHEN INSTALLING ALL ANCHOR NUTS FOR OVERHEAD SIGN STRUCTURES:
 ANCHOR NUT TORQUE (FT./LBS.)
 2 1/2" 375
 2 1/2" 450

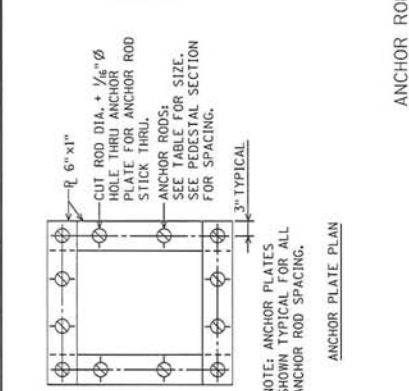
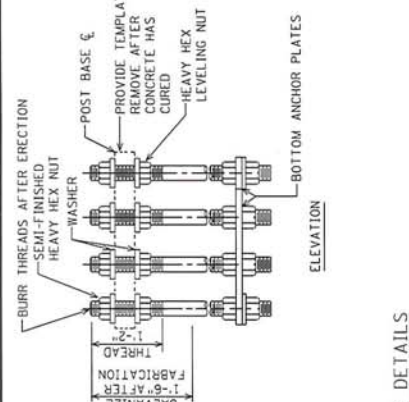
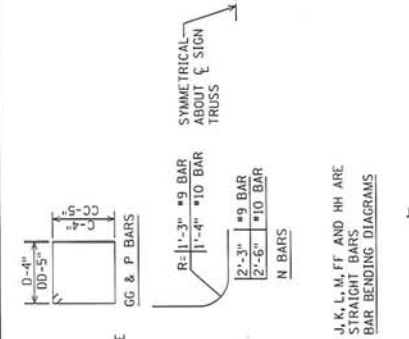
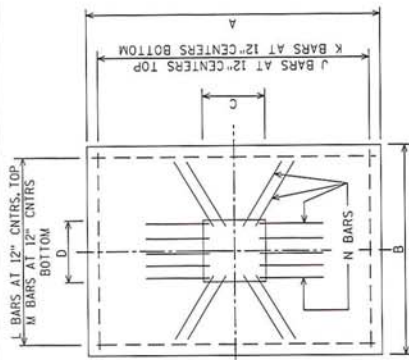
THE CONTRACTOR SHALL BURR THE THREADS OF THE ANCHOR BOLTS IN ACCORDANCE WITH MNDOT 2402.3H AFTER TORQUEING NUTS.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B

FOUNDATIONS AND ANCHOR RODS

DRAWING ST-3

SHEET NO. OF SHEETS



SPREAD FOOTINGS

SUMMARY OF ESTIMATED QUANTITIES

CONCRETE	CY (2)	REIN. STEEL LBS. (2)	ANCH. ASSM. LBS. ST. EXC. C.Y. (2)
9.3 + 0.46 G	945 + 98G	781	7.4 R
16.7 + 0.46 G	2333 + 133G	1320	12.1 R

ESTIMATED QUANTITIES (4)

CONCRETE	CY REIN. STEEL LBS.
6.9	1910
14.1	3490

SPREAD FOOTINGS

POST NO.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P
1-4	3'-0"	9'-0"	3'-6"	3'-6"	8'-6"	2'-0"	14	4	4	8'-6"	14	6	13'-6"	10	5
5-7	4'-0"	12'-6"	3'-6"	3'-6"	9'	2'-0"	12	2 1/2"	4'-0"	19	4	4	12'-0"	19	6

ANCHOR RODS

POST NO.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P
1-4	3'-0"	9'-0"	3'-6"	3'-6"	8'-6"	2'-0"	14	4	4	8'-6"	14	6	13'-6"	10	5
5-7	4'-0"	12'-6"	3'-6"	3'-6"	9'	2'-0"	12	2 1/2"	4'-0"	19	4	4	12'-0"	19	6

REINFORCING BARS

POST NO.	AA	BB	CC	DD	EE	FF	GG	HH
1-4	3'-0"	23'-0"	3'-6"	3'-6"	16'-6"	5	5	5
5-7	4'-0"	29'-0"	4'-0"	4'-0"	22'-6"	5	5	5

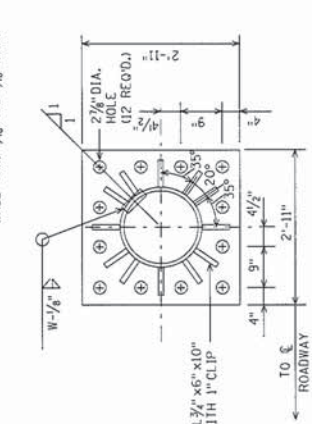
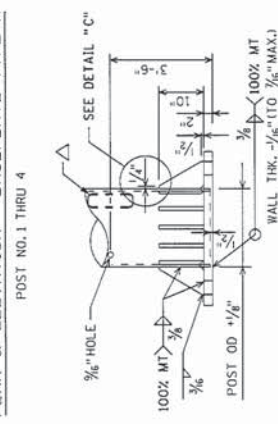
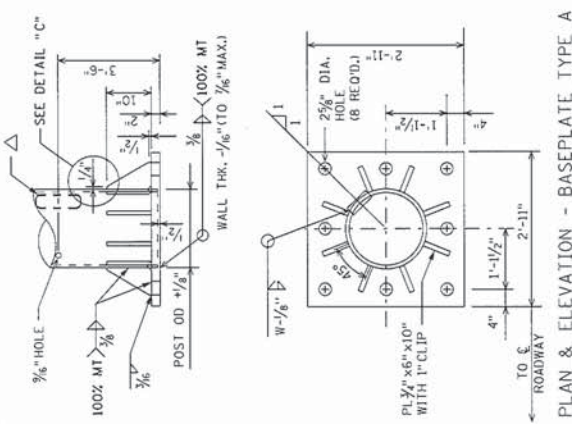
DRILLED SHAFT

POST NO.	AA	BB	CC	DD	EE	FF	GG	HH
1-4	3'-0"	9'-0"	3'-6"	3'-6"	16'-6"	5	5	5
5-7	4'-0"	12'-6"	3'-6"	3'-6"	22'-6"	5	5	5

REV. 10-2-2013

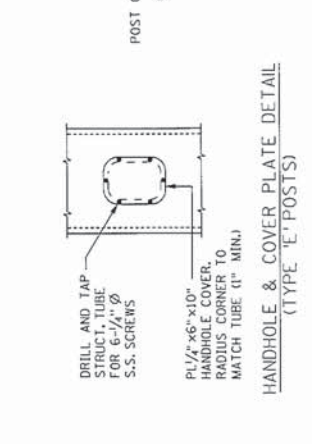
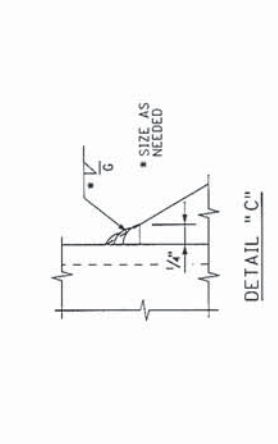
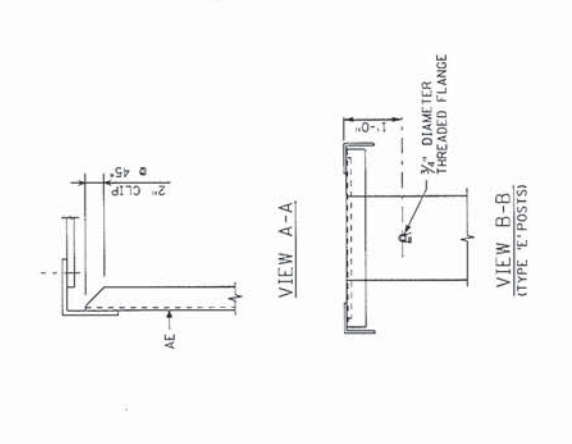
PLT NAME: ST DRAWINGS STD 4

DISTRICT: METRO



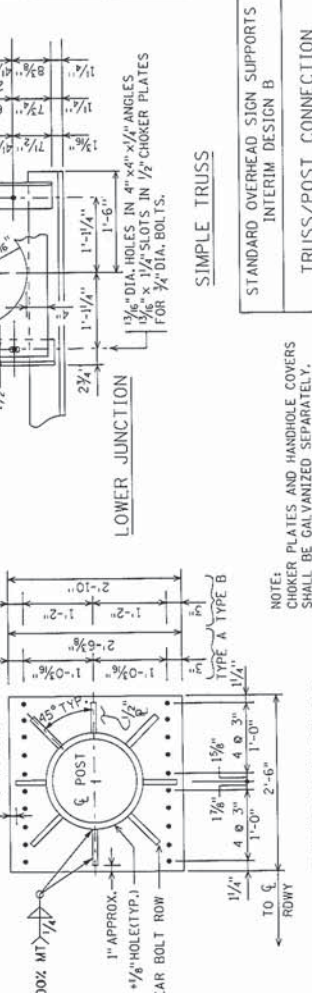
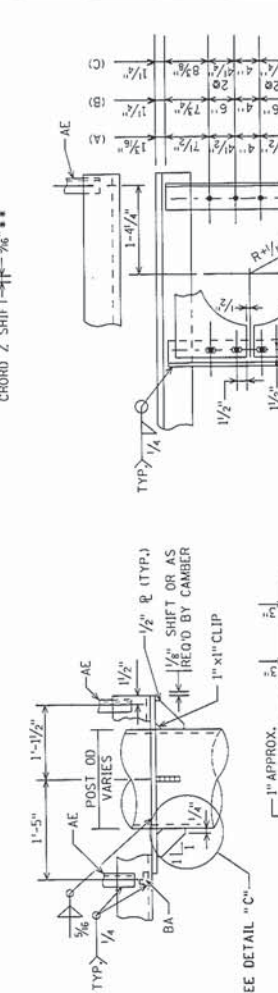
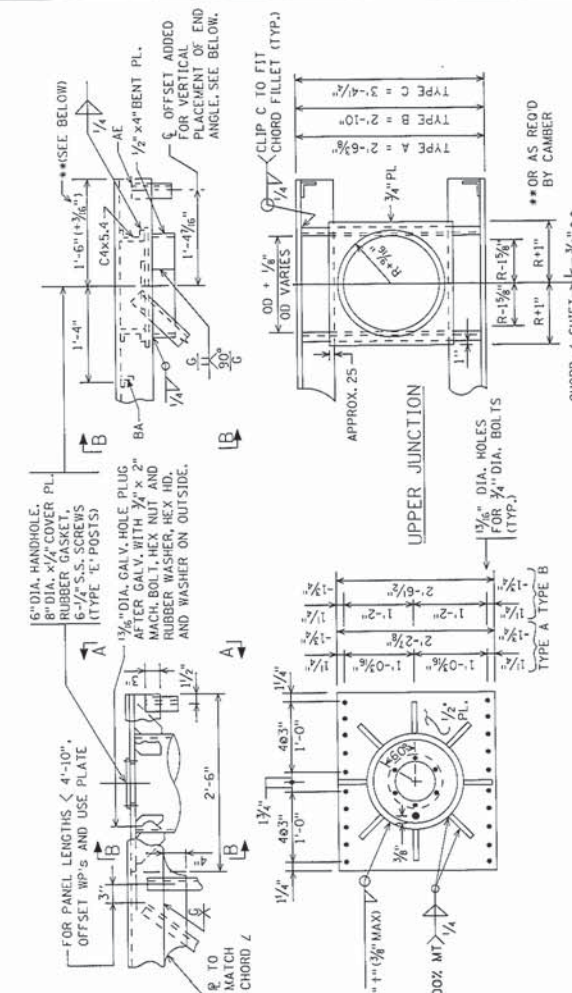
PLAN & ELEVATION - BASEPLATE TYPE A
POST NO. 1 THRU 4

PLAN & ELEVATION - BASEPLATE TYPE B
POST NO. 5 THRU 7



HANDHOLE & COVER PLATE DETAIL
(TYPE 'E' POSTS)

△ = FOR TYPE 'E' POST ONLY; LOCATE 45° AWAY FROM TRAFFIC. 10" x 6" x 1/2" x 0-2" STRUCTURAL TUBE OR EQUAL. W-1/8" RUBBER GASKET.



STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

TRUSS/POST CONNECTION & BASEPLATES

NOTE: CHOKER PLATES AND HANDHOLE COVERS SHALL BE GALVANIZED SEPARATELY.

DRAWING ST-4
SHEET NO. OF SHEETS

STATE PROJ. NO.
DRAWING ST-4
SHEET NO. OF SHEETS

NOTES:

TRUSS SECTIONS SHALL BE MADE IN MULTIPLES OF 6'-0" EXCEPT THAT THE SPAN OF THE CANTILEVER TRUSS MAY BE MADE UP TO THE NEAREST SECTION LENGTH. WELDED CHORD SPLICES ARE NOT PERMITTED EXCEPT IN CANTILEVER TRUSSES AS NOTED BELOW.

CANTILEVER TRUSSES SHALL BE SUPPLIED AS A SINGLE UNIT WHENEVER POSSIBLE. WHEN CANTILEVER TRUSSES ARE DELIVERED IN SECTIONS, THE END BRACING PANEL ONLY, CHORD SPLICE WELD SHALL BE COMPLETE PENETRATION, WITH 100% UT AND AT TESTING PER 2471.3M, UNLESS OTHERWISE SHOWN. ALL WELDS SHALL BE 1/4" FILLET WELDS ALL AROUND.

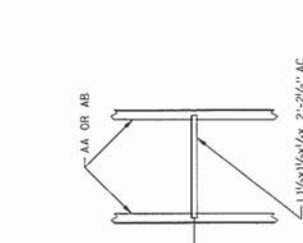
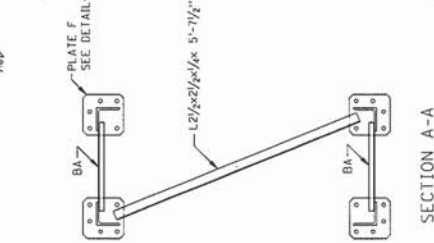
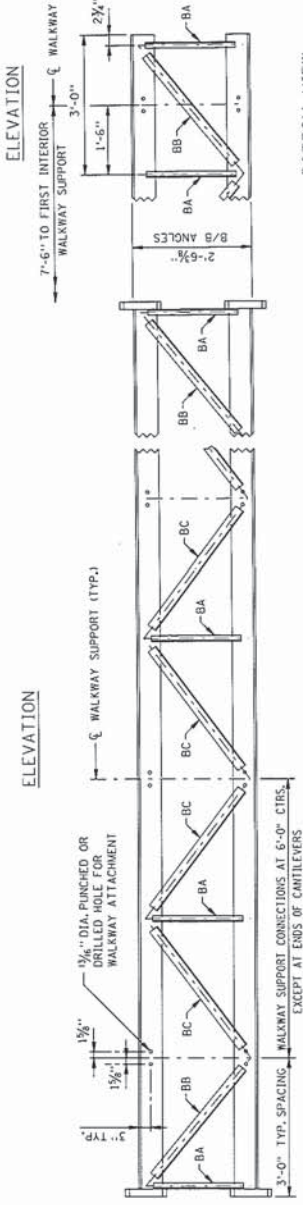
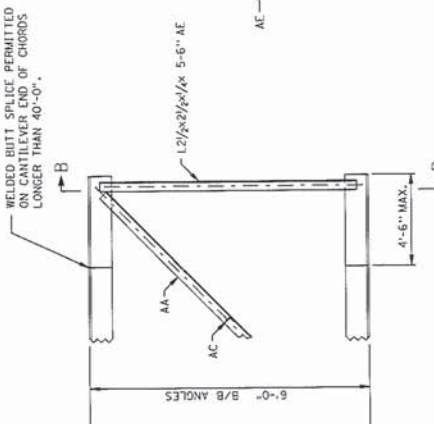
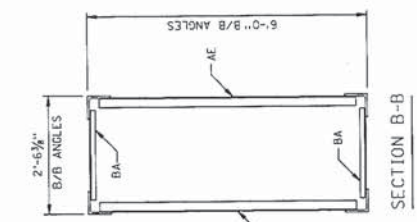
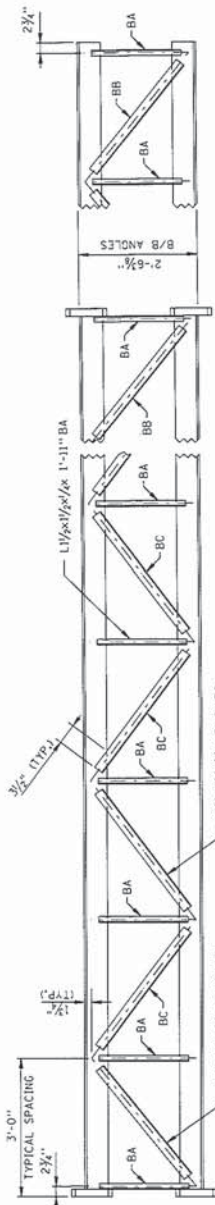
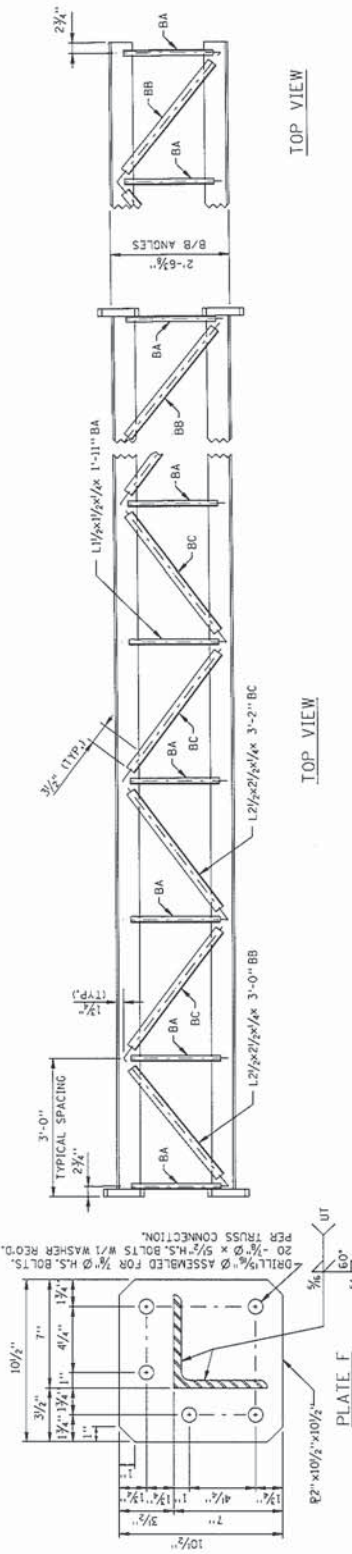
BOLTED SPLICES SHALL NOT BE LOCATED BEHIND CHORDS.

PROVIDE 2-1/2" BRASS, STAINLESS STEEL OR GALVANIZED STEEL SHIMS AT EACH FLANGE TO BRING TRUSS INTO CORRECT CAMBER AND ALIGNMENT.

TRUSSES SHALL BE SHOP ASSEMBLED AND MATCH MARKED.

ALL VIEWS OF THE TRUSSES ARE DRAWN FROM THE INTERIOR OF THE TRUSS, LOOKING OUT.

SEE DRAWING ST-4 FOR POST CONNECTION DETAILS.



CANTILEVER END

SIMPLE SPAN

DETAILS SHOWN ARE FOR THE FREE ENDS OF THE CANTILEVER SPANS. ALL OTHER DETAILS FOR CANTILEVER TRUSSES SHALL BE AS SHOWN FOR THE SIMPLE SPANS.

NOTE: THE BOTTOM VIEW IS DETAILED TO PROVIDE FOR WALKWAY ATTACHMENT. WHERE THE WALKWAY IS OMITTED, PROVIDE STRUT BA AS INDICATED IN THE TOP VIEW.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
SIGN TRUSS DETAILS TRUSS TYPE A
DRAWING ST-5
SHEET NO. OF SHEETS

STATE PROJ. NO.

NOTES:

TRUSS SECTIONS SHALL BE MADE IN MULTIPLES OF 6'-0" UNLESS OTHERWISE NOTED. THE BRACING PANEL NEAREST EACH POST MAY VARY TO MAKE UP THE NEEDED SECTION LENGTH. WELDED CHORD SPLICES ARE NOT PERMITTED EXCEPT IN CANTILEVER TRUSSES AS NOTED BELOW.

CANTILEVER TRUSSES SHALL BE SUPPLIED AS A SINGLE LENGTH IN SECTIONS 40'-0" CHORDS MAY BE SPLICED, AS SHOWN, IN THE END BRACING PANEL ONLY. CHORD SPLICE WELD SHALL BE COMPLETE PENETRATION, WITH 100% UT AND MT TESTING PER 2471.3M.

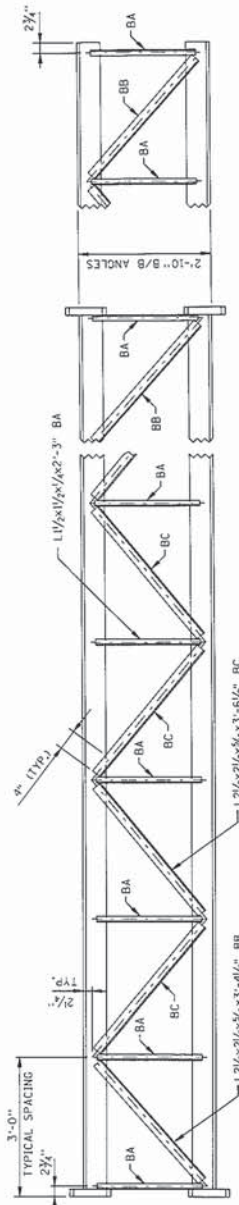
UNLESS OTHERWISE SHOWN, ALL WELDS SHALL BE 1/4" FILLET WELDS ALL AROUND.

CANTILEVER TRUSSES SHALL NOT BE LOCATED BEHIND CHORDS.

PROVIDE 2-1/2" BRASS, STAINLESS STEEL OR GALVANIZED STEEL SHIMS AT EACH FLANGE TO BRING TRUSS INTO CORRECT CAMBER AND ALIGNMENT. TRUSSES SHALL BE SHIP ASSEMBLED AND MATCH MARKED.

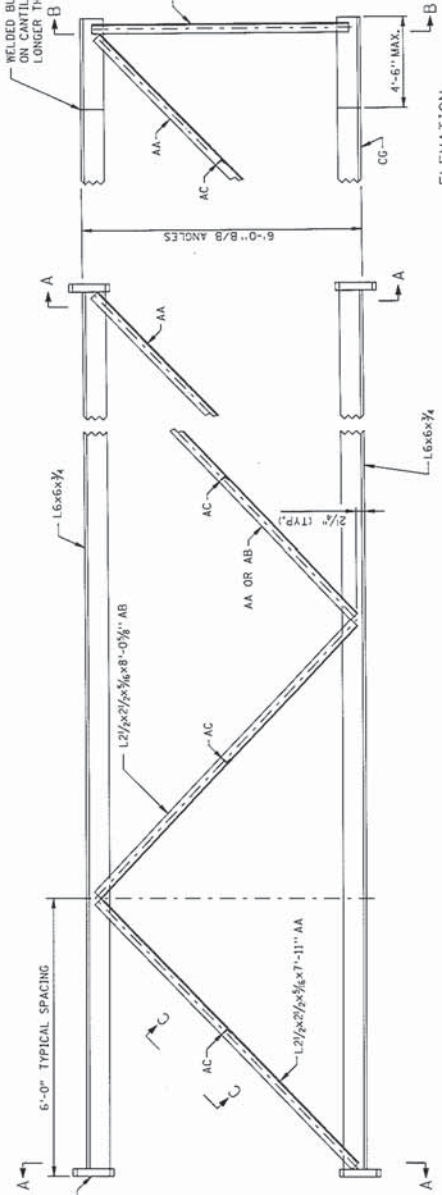
ALL MEMBERS OF THE TRUSSES ARE DRAWN FROM THE INSIDE OF THE TRUSS LOOKING OUT.

SEE DRAWING ST-4 FOR POST CONNECTION DETAILS.



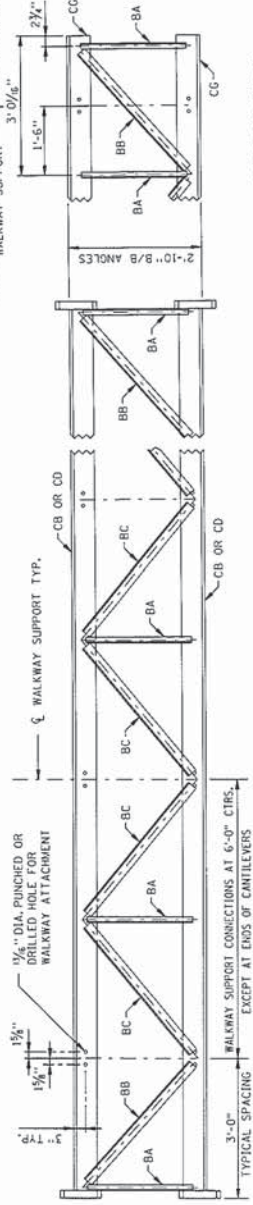
TOP VIEW

TOP VIEW



ELEVATION

ELEVATION



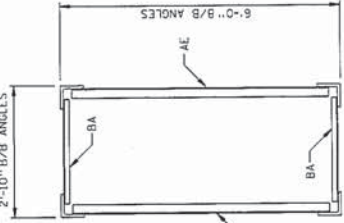
BOTTOM VIEW

BOTTOM VIEW

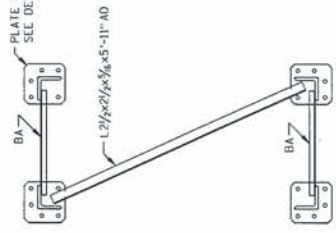
SIMPLE SPAN

NOTE: THE BOTTOM VIEW IS DETAILED TO PROVIDE FOR WALKWAY ATTACHMENT. WHERE THE WALKWAY IS OMITTED, PROVIDE STRUT BA AS INDICATED IN THE TOP VIEW.

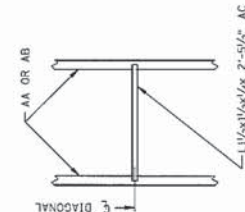
SECTION C-C



SECTION B-B



SECTION A-A



SECTION C-C

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
SIGN TRUSS DETAILS TRUSS TYPE B
DRAWING ST-6
SHEET NO. OF SHEETS

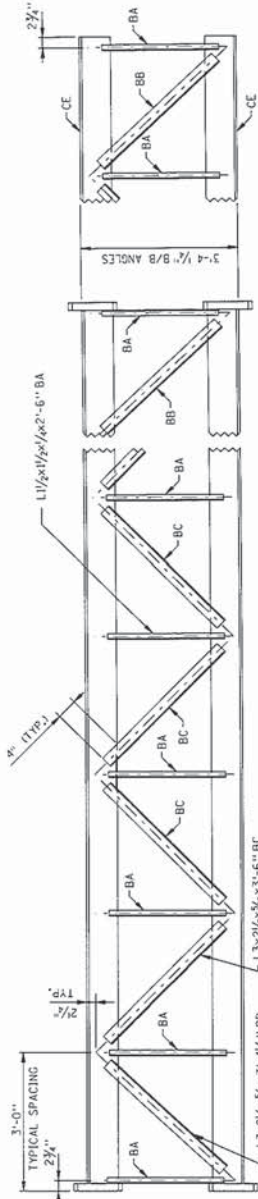
DETAILS SHOWN ARE FOR THE FREE ENDS OF THE CANTILEVER SPANS. ALL OTHER DETAILS FOR CANTILEVER TRUSSES SHALL BE AS SHOWN FOR THE SIMPLE SPANS.

STATE PROJ. NO.

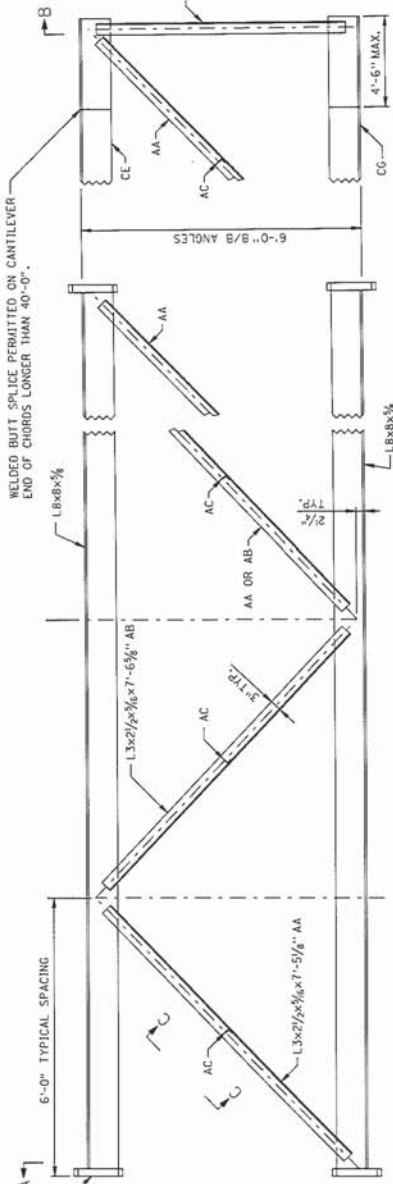
REV. 10-2-2013

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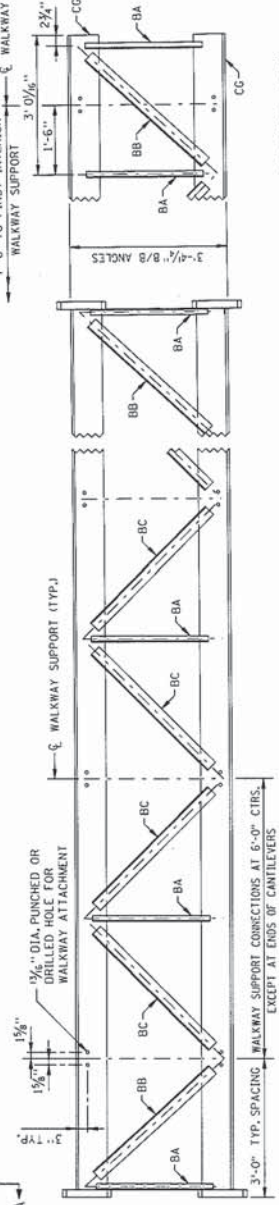
TRUSS SECTIONS SHALL BE MADE IN MULTIPLES OF 6'-0", EXCEPT THAT THE BRACING PANEL NEAREST EACH POST MAY VARY TO MAKE UP THE NEEDED SECTION LENGTH. WELDED CHORD SPLICES ARE NOT PERMITTED EXCEPT IN CANTILEVER TRUSSES AS NOTED BELOW.
 CANTILEVER TRUSSES SHALL BE SUPPLIED AS A SINGLE UNIT WHENEVER POSSIBLE. WHEN CANTILEVER TRUSS LENGTH EXCEEDS 40'-0" CHORDS MAY BE SPLICED, AS SHOWN, IN THE END BRACING PANEL ONLY. CHORD SPLICE WELD SHALL BE COMPLETE PENETRATION, WITH 100% UT AND W/ TESTING PER 247.5. ALL WELDS SHALL BE FULL PENETRATION WELDS. WELDS SHALL BE 1/4" FILLED WELDS ALL AROUND.
 BOLTED SPLICES SHALL NOT BE LOCATED BEHIND CURS SIGNS.
 PROVIDE 2-1/4" BRASS, STAINLESS STEEL OR GALVANIZED STEEL SHIMS AT EACH FLANGE TO BRING TRUSS INTO CORRECT CENTER LINE ALIGNMENT.
 TRUSSES SHALL BE SHIP ASSEMBLED AND MATCH MARKED.
 ALL VIEWS OF THE TRUSSES ARE DRAWN FROM THE INSIDE OF THE TRUSS LOOKING OUT.
 SEE DRAWING ST-4 FOR POST CONNECTION DETAILS.



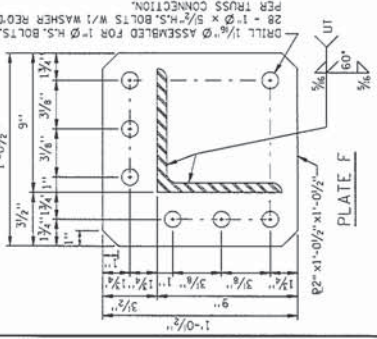
TOP VIEW



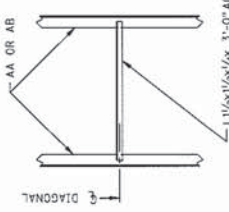
ELEVATION



BOTTOM VIEW CANTILEVER END



SECTION A-A



SECTION C-C

NOTE: THE BOTTOM VIEW IS DETAILED TO PROVIDE FOR WALKWAY ATTACHMENT, WHERE THE WALKWAY IS OMITTED, PROVIDE STRUT BR AS INDICATED IN THE TOP VIEW.

BOTTOM VIEW SIMPLE SPAN

DETAILS SHOWN ARE FOR THE FREE ENDS OF THE CANTILEVER SPANS. ALL OTHER DETAILS FOR CANTILEVER TRUSSES SHALL BE AS SHOWN FOR THE SIMPLE SPANS.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
SIGN TRUSS DETAILS TRUSS TYPE C
DRAWING ST-7
SHEET NO. OF SHEETS

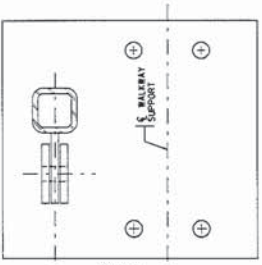
STATE PROJ. NO.

REV. 10-2-2013

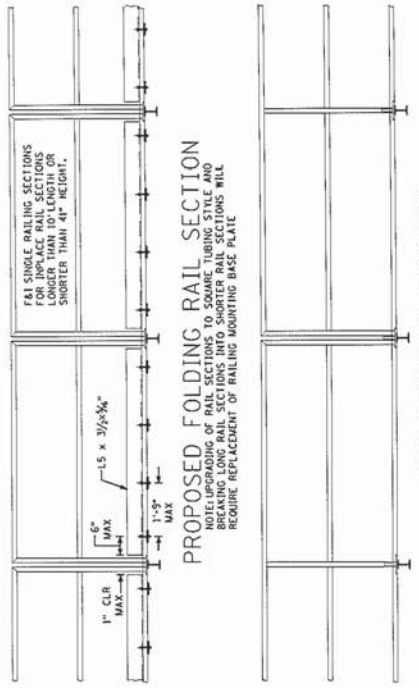
DISTRICT: METRO
 PLOT NAME: ST DRAWINGS STDB
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PLOTTED/REVISED: 10/11/2013

DISTRICT: METRO
 PATH & FILENAME: ST DRAWINGS-ST-10
 PLOT NAME: ST DRAWINGS-ST-10
 REV. 10-2-2013



BASEPLATE AND HINGE FOR FOLDING RAIL END POST
 (AS NECESSARY)

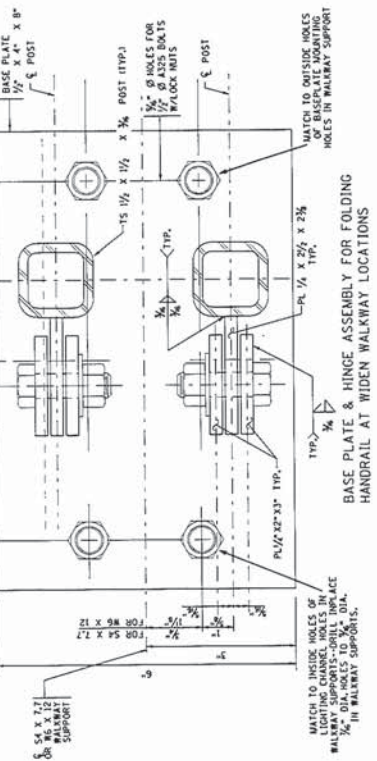


INPLACE RAIL SECTION

GENERAL NOTES:
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEASURING AND VERIFYING THE INDIVIDUAL RAIL, TOE ANGLE AND CURB ANGLE LENGTHS REQUIRED AT EACH SITE FOR INPLACE STRUCTURES PRIOR TO MANUFACTURE. REAM F&I RAILING SUPPORT BOLT AND LOCKING PIN HOLES AFTER GALVANIZING TO ENSURE BOLT AND PIN FIT. VERIFY FIT AND REAM AS NECESSARY IN FIELD ALL RAILING SUPPORT BOLT AND LOCKING PIN HOLES ON INPLACE RAILING TO REMAIN TO ENSURE BOLT AND PIN FIT.
 VERIFY & F&I AS NECESSARY 3/4" DIA. DROP-FORGED SHOULDER EYE BOLT W/ LOCK WASHER & HEX NUT AT SIGN TRUSS LOCATIONS. (HARNESSTIE OFF POINT)

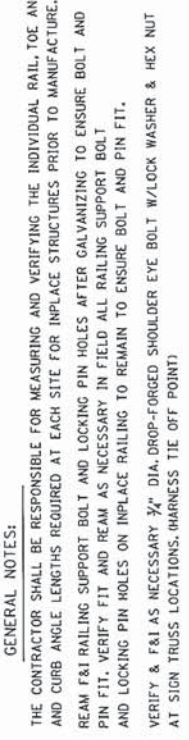
F&I SINGLE RAILING SECTIONS FOR INPLACE RAIL SECTIONS LONGER THAN 10' LENGTH OR SHORTER THAN 4' HEIGHT.
 NOT UPGRADING OR REPLACING RAIL SECTIONS TO SHORTER RAIL SECTIONS WILL REQUIRE REPLACEMENT OF RAILING MOUNTING BASE PLATE

PROPOSED FOLDING RAIL SECTION



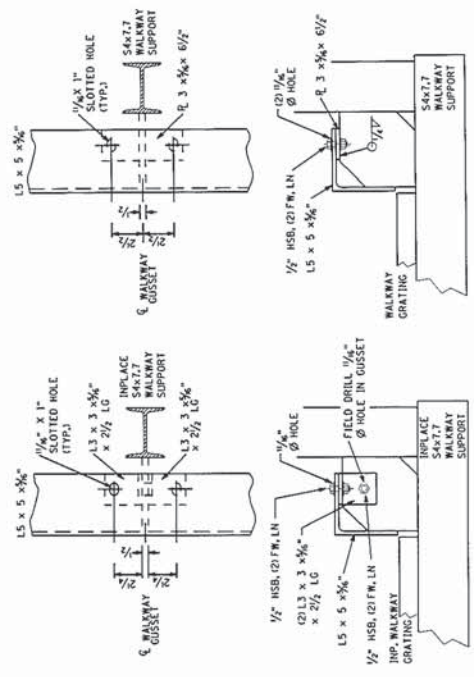
BASE PLATE & HINGE ASSEMBLY FOR FOLDING HANDRAIL AT WIDEN WALKWAY LOCATIONS

MATCH TO INSIDE HOLES OF WALKWAY SUPPORTS - DRILL INPLACE 1/2" DIA. HOLES - 3/8" DIA. IN WALKWAY SUPPORTS.
 MATCH TO OUTSIDE HOLES OF BASEPLATE MOUNTING HOLES IN WALKWAY SUPPORTS

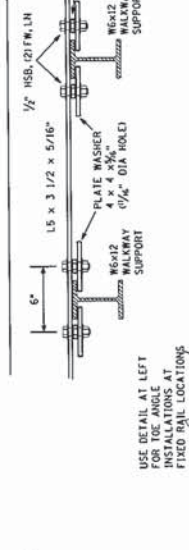


OH SIGN-FIXED RAILING TOE ANGLE-NEW CONSTRUCTION

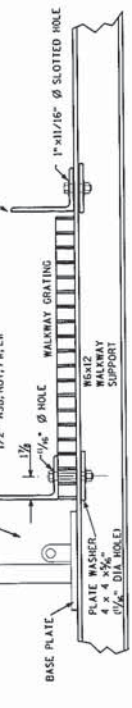
OH SIGN TRUSS SIDE CURB ANGLE-RETROFIT



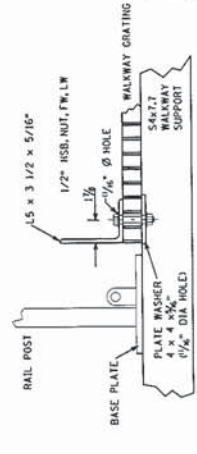
OH SIGN TRUSS SIDE CURB ANGLE-NEW CONST.



USE DETAIL AT LEFT FOR TOE ANGLE INSTALLATIONS AT FIXED RAIL LOCATIONS

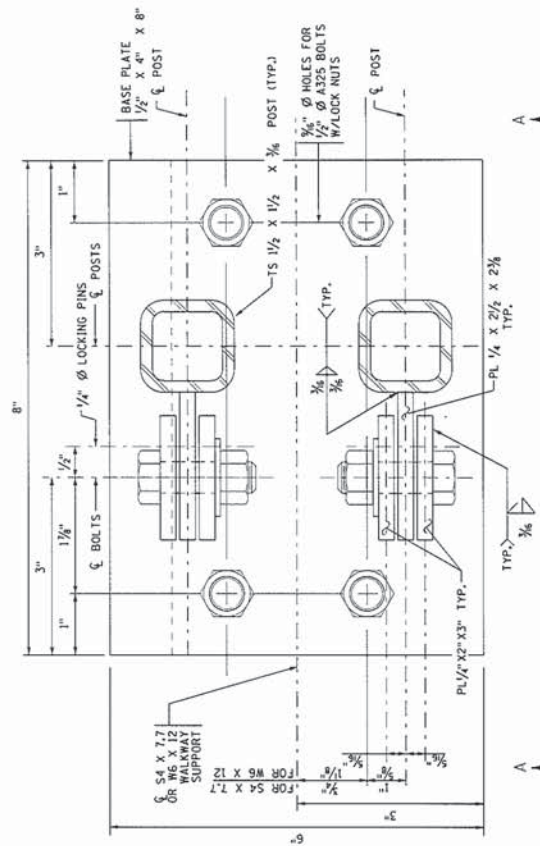


OH SIGN BRIDGE MOUNT-BRIDGE SIDE TOE ANGLE (NEW CONST. OR RETROFIT)

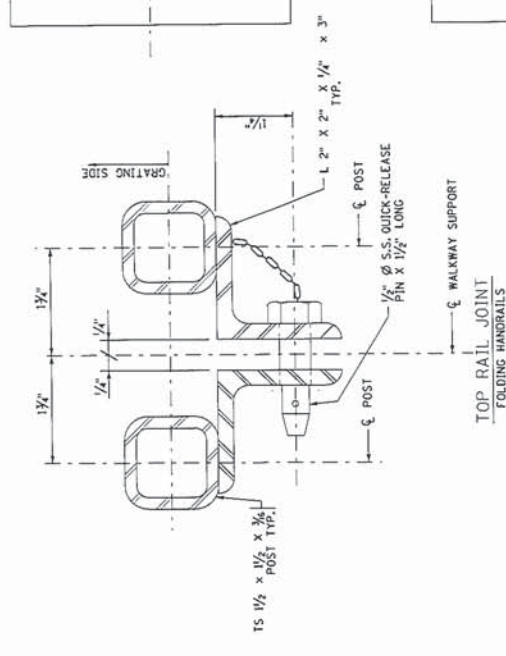


OH SIGN TRUSS-FOLDING RAIL TOE ANGLE (NEW CONST. OR RETROFIT)

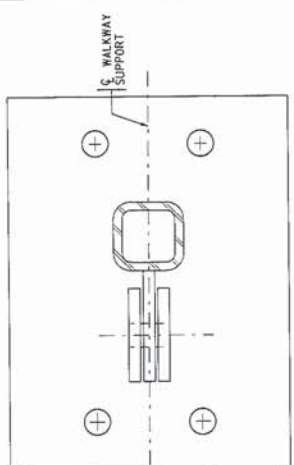
STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B	STATE PROJ. NO.	SHEET NO.	OF	SHEETS
WALKWAY TOE ANGLES- NEW CONST. & RETROFIT	DRAWING ST-8A			



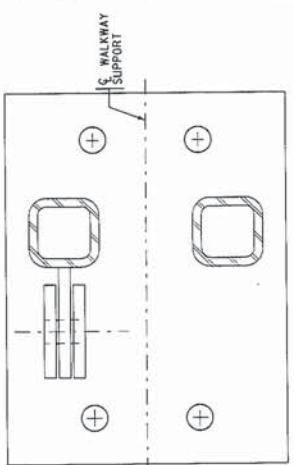
DETAIL 1
BASE PLATE & HINGE ASSEMBLY
FOR FOLDING HANDRAIL



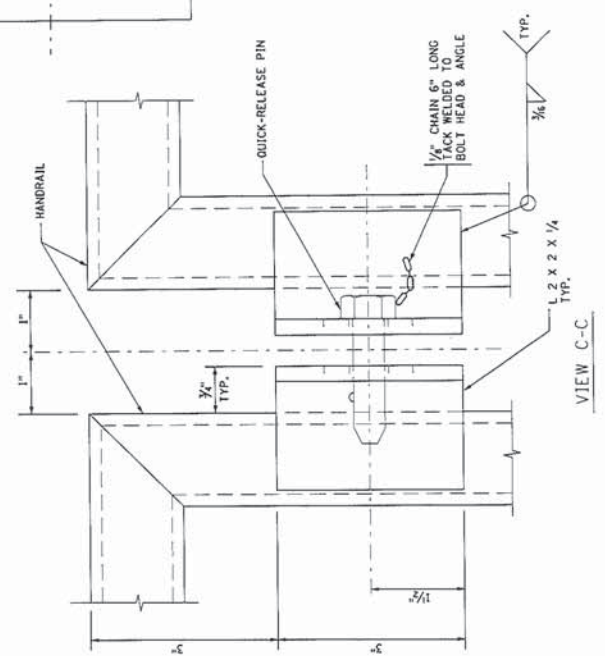
TOP RAIL JOINT
FOLDING HANDRAILS



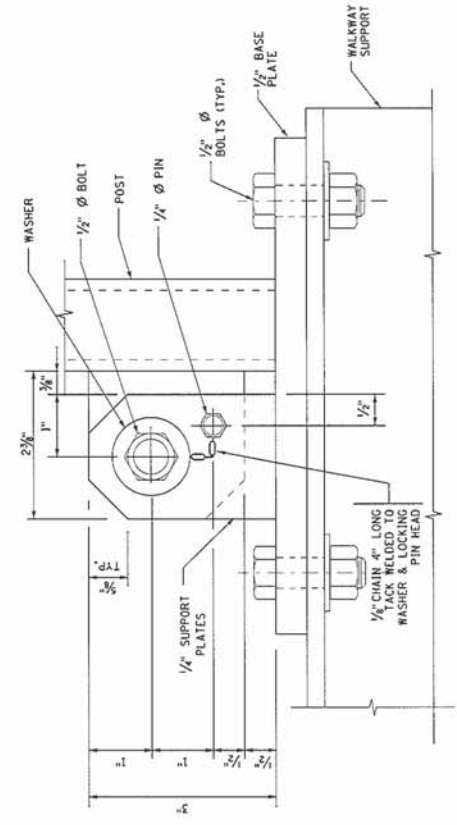
BASEPLATE AND HINGE FOR
FOLDING RAIL END POST



BASEPLATE AND HINGE FOR
FIXED TO FOLDING TRANSITION
(MAY BE OPPOSITE HAND)



VIEW C-C

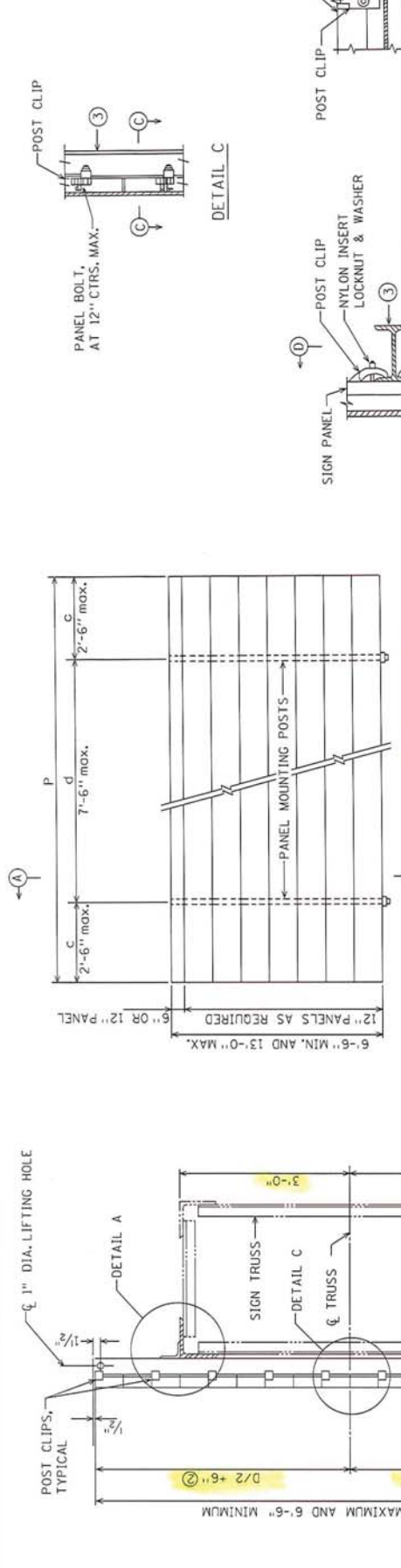


VIEW A-A

BASE PL. & HINGE FOR FOLDING HANDRAIL

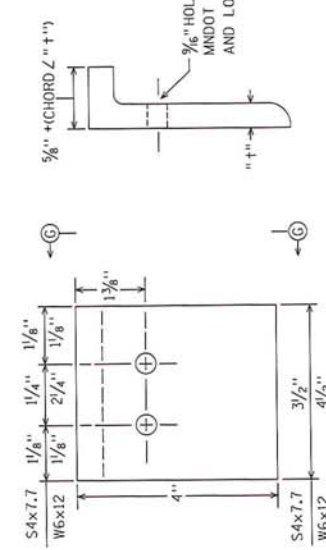
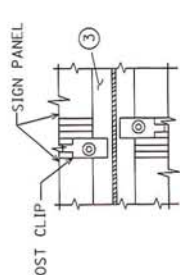
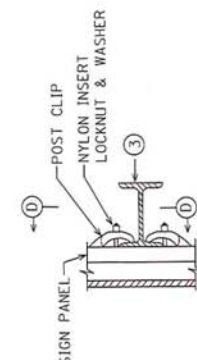
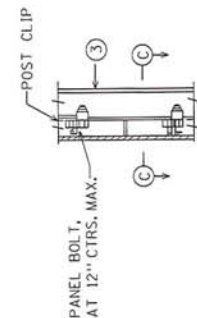
STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
FOLDING HANDRAIL
DRAWING ST-9

STATE PROJ. NO. _____ SHEET NO. _____ OF _____ SHEETS

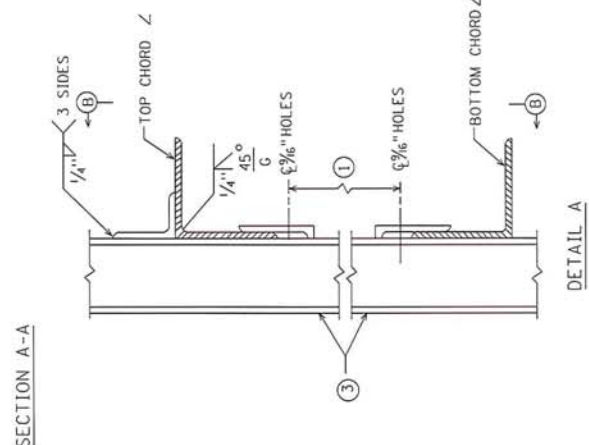
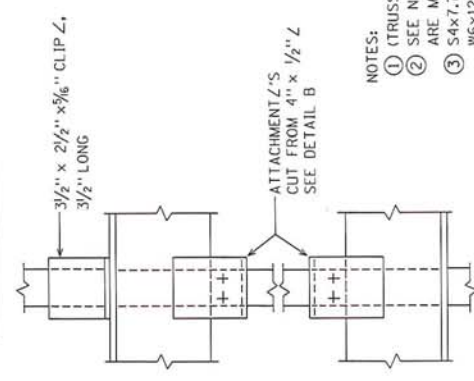


PANEL MOUNTING POST	
NO. OF POSTS	P
2	P=144" OR LESS, C=207P, d=586P
3	P=150" THRU 204", C=145P, d=355P
4	P=210" THRU 276", C=107P, d=262P
5	P=282" THRU 348", C=84P, d=208P
6	P=354" THRU 420", C=63P, d=172P
7	P=426" THRU 492", C=48P, d=147P

POST SPACING MAY BE ADJUSTED AS REQUIRED IF CONFLICT WITH TRUSS DETAILS IS ENCOUNTERED.



SIGN PANEL ELEVATION



- NOTES:
- (1) TRUSS DEPTH-TOP & BOTTOM CHORD LEGS-1/4"
 - (2) SEE NOTE 1 ON ST-1 WHEN STANDARD PANELS AND CMS ARE MOUNTED ON THE SAME SPAN
 - (3) S4x7.7 FOR SIGN HEIGHTS ≤ 11'-0"
W6x12 FOR SIGN HEIGHTS OVER 11'-0"

STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

SIGN PANEL AND PANEL
MOUNTING POST DETAILS

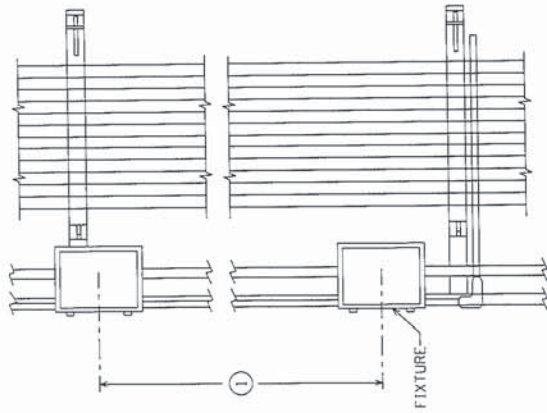
DRAWING ST-10

STATE PROJ. NO. SHEET NO. OF SHEETS

MOUNTING DETAILS FOR SIGN LIGHTING

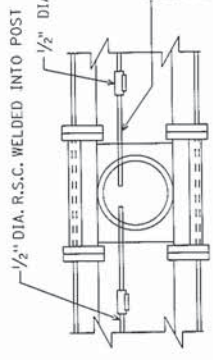
FIXTURE SPACING CHART	
W (PANEL WIDTH)	NUMBER OF FIXTURE FIXTURES SPACING
9.5' OR LESS	1
10.0' TO 16.5'	2
17.0' TO 24.5'	3
25.0' TO 32.5'	4
33.0' TO 40.5'	5
41.0' TO 48.5'	6
49.0' TO 56.5'	7
57.0' TO 64.5'	8
65.0' TO 72.5'	9
73.0' TO 80.0'	10

FIXTURES SHALL BE SYMMETRICALLY PLACED WITH RESPECT TO THE SIGN PANEL. SIGN PANELS WHICH ABOUT EACH OTHER SHALL BE TREATED AS A SINGLE SIGN PANEL FOR LIGHTING FIXTURE SPACING.

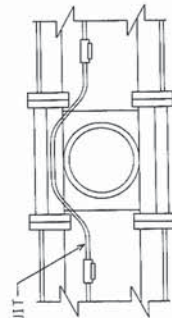


① SEE FIXTURE SPACING CHART

SECTION A-A

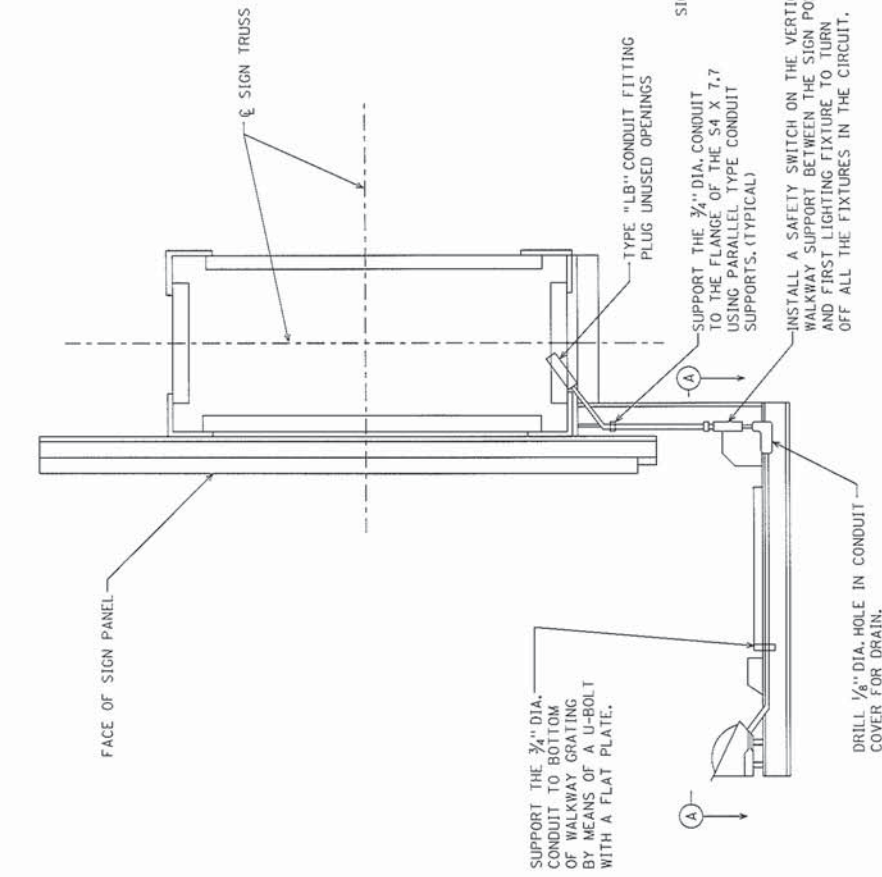


POST WITH HANDHOLES



POST WITHOUT HANDHOLES

ELECTRICAL SERVICE CONNECTION FROM POST TO TRUSS



SIDE VIEW

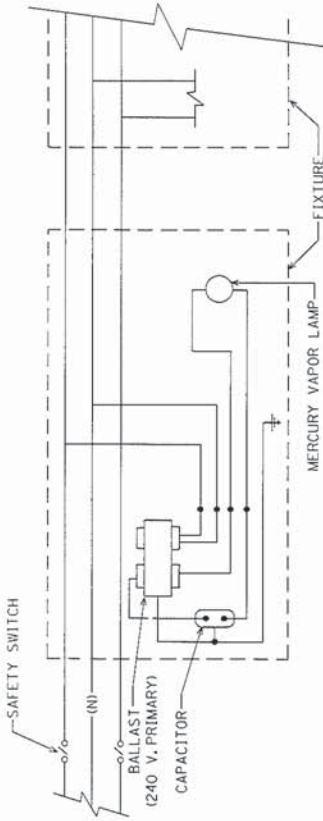
NOTES:
1. SEE SPECIAL PROVISIONS FOR SIGN LIGHTING FIXTURE REQUIREMENTS.

2. HIGH IMPACT RESISTANT POLYCARBONATE SHIELD SHALL BE PROVIDED FOR ALL SIGN LIGHTING FIXTURES INSTALLED ON TYPE OH SIGNS (BRIDGE MOUNTED).

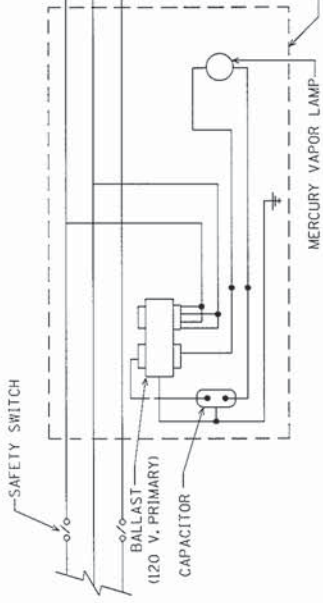
3. WIRING BETWEEN THE SIGN POST AND THE SAFETY SWITCH SHALL BE RUN IN 3/4" R.S.C.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
ELECTRICAL DETAILS
DRAWING ST-11

STATE PROJ. NO.	SHEET NO.	OF	SHEETS
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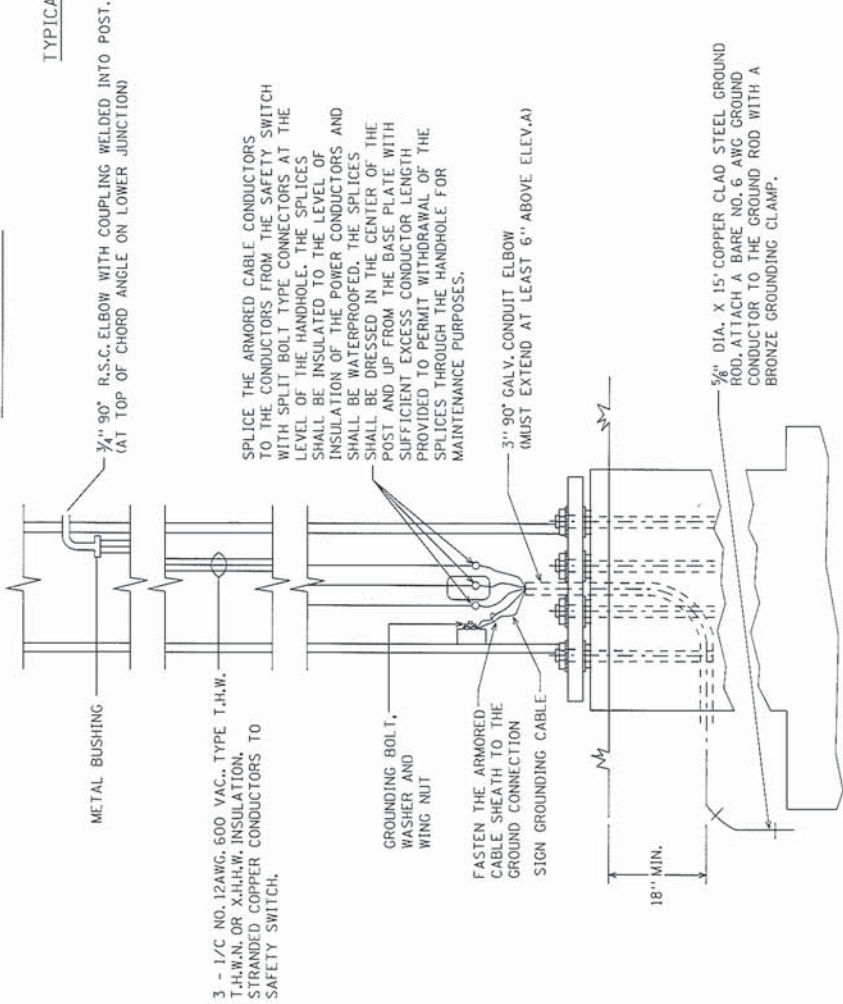


240/480 V. CIRCUIT



120/240 V. CIRCUIT

TYPICAL CIRCUIT DIAGRAMS

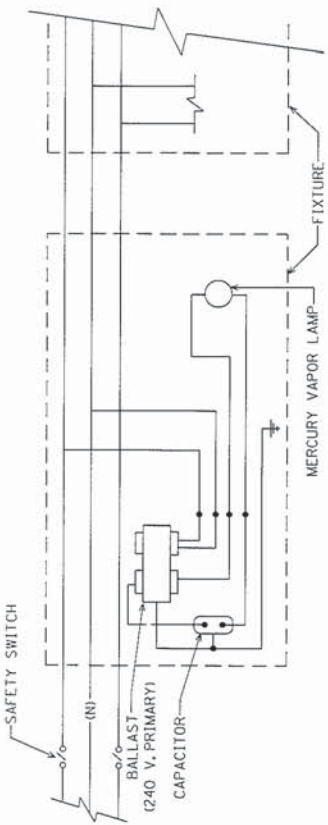


SIGN BASE DETAIL

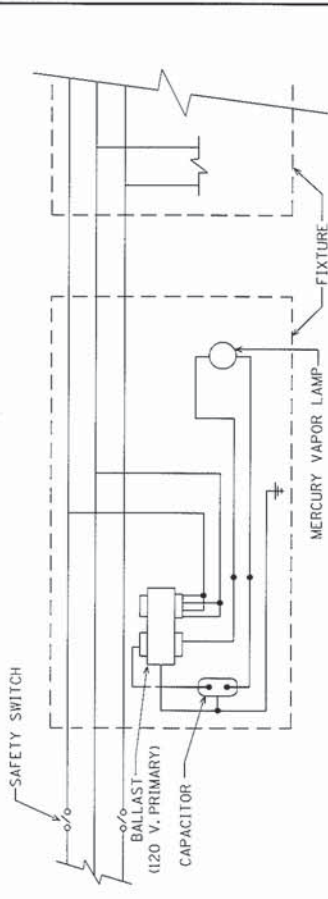
- 3 - 1/2 NO. 12AWG, 600 VAC., TYPE T.H.W. INSULATION, STRANDED COPPER CONDUCTORS TO SAFETY SWITCH.
- SPLICE THE ARMORED CABLE CONDUCTORS TO THE CONDUCTORS FROM THE SAFETY SWITCH WITH SPLIT BOLT TYPE CONNECTORS AT THE LEVEL OF THE HANDHOLE. THE SPLICES SHALL BE INSULATED TO THE LEVEL OF INSULATION OF THE POWER CONDUCTORS AND SHALL BE WATERPROOFED. THE SPLICES SHALL BE DRESSED IN THE CENTER OF THE POST AND UP FROM THE BASE PLATE WITH SUFFICIENT EXCESS CONDUCTOR LENGTH PROVIDED TO PERMIT WITHDRAWAL OF THE SPLICES THROUGH THE HANDHOLE FOR MAINTENANCE PURPOSES.
- 3" 90° GALV. CONDUIT ELBOW (MUST EXTEND AT LEAST 6" ABOVE ELEV. A)
- FASTEN THE ARMORED CABLE SHEATH TO THE GROUND CONNECTION SIGN GROUNDING CABLE.
- GROUNDING BOLT, WASHER AND WING NUT
- 18" MIN.
- 3/8" DIA. X 15' COPPER CLAD STEEL GROUND ROD. ATTACH A BARE NO. 6 AWG GROUND CONDUCTOR TO THE GROUND ROD WITH A BRONZE GROUNDING CLAMP.

- ELECTRICAL NOTES:
1. WHEN SIGN LIGHTING SYSTEMS HAVE BEEN COMPLETED, THE CONTRACTOR SHALL, WITHOUT FURTHER COMPENSATION, CONDUCT BURNING AND RESISTANCE TESTS FOR FINAL ACCEPTANCE. THE RESISTANCE TO GROUND OF EACH UNGROUNDED CONDUCTOR SHALL BE NOT LESS THAN 8 MEGOHMS.
 2. ALL FITTINGS, HUBS, UNIONS, BUSHINGS, ETC. SHALL BE SUPPLIED AS PART OF CONDUIT, CONDUIT ENTERING SIGN POSTS SHALL HAVE INSULATED GROUNDING BUSHINGS INSTALLED BEFORE PULLING WIRE.
 3. CONDUIT ON STRUCTURE SHALL BE SURFACED MOUNTED, STRAPPED AT EVERY ANGLE BRACE WITH U-BOLT TYPE CLAMPS.
 4. SUCCESSIVE LIGHTING FIXTURES SHALL BE CONNECTED ON ALTERNATE SIDES OF THE 3-WIRE CIRCUIT.
 5. THE CABLE SHEATH SHALL EXTEND AT LEAST 4" ABOVE THE TOP OF THE CONDUIT END AND THE TAPE ARMOR OF ARMORED CABLE SHALL BE CONNECTED TO THE GROUNDING BOLT IN THE SIGN POSTS.
 6. WIRING FROM THE SAFETY SWITCH TO LIGHTING FIXTURES SHALL BE 1/2 NO. 12 AWG AND SHALL BE RUN IN 3/4" R.S.C. ALL SPLICING SHALL BE ACCOMPLISHED WITH A WIRE NUT AND WATERPROOF COATING. ALL CONDUIT CONNECTIONS SHALL BE RAIN TIGHT.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
ELECTRICAL DETAILS
DRAWING ST-12
SHEET NO. OF SHEETS



240/480 V. CIRCUIT



120/240 V. CIRCUIT

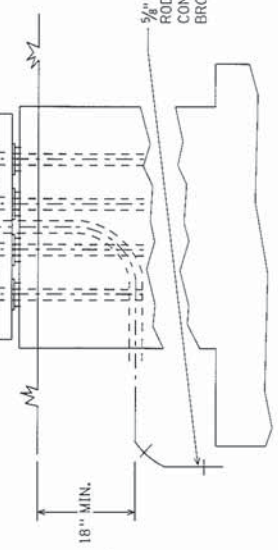
TYPICAL CIRCUIT DIAGRAMS

TWO 2" 90° R.S.C. ELBOWS WITH COUPLING WELDED INTO RIGHT POST. (APPROX. 6" BELOW CHORD ANGLE ON UPPER JUNCTION)

3 - 1/2" NO. 12 AWG, 600 VAC., TYPE T.H.W. T.H.W.N. OR X.H.H.W. INSULATION, STRANDED COPPER CONDUCTORS TO SAFETY SWITCH.

SPLICE THE ARMORED CABLE CONDUCTORS TO THE CONDUCTORS FROM THE SAFETY SWITCH WITH SPLIT BOLT TYPE CONNECTORS AT THE LEVEL OF THE HANDHOLE. THE SPLICES SHALL BE INSULATED TO THE LEVEL OF INSULATION OF THE POWER CONDUCTORS AND SHALL BE WATERPROOFED. THE SPLICES SHALL BE DRESSED IN THE CENTER OF THE POST AND UP FROM THE BASE PLATE WITH SUFFICIENT EXCESS CONDUCTOR LENGTH PROVIDED TO PERMIT WITHDRAWAL OF THE SPLICES THROUGH THE HANDHOLE FOR MAINTENANCE PURPOSES.

3" 90° GALV. CONDUIT ELBOW (MUST EXTEND AT LEAST 6" ABOVE ELEV. A)



SIGN BASE DETAIL

- ELECTRICAL NOTES:
1. WHEN SIGN LIGHTING SYSTEMS HAVE BEEN COMPLETED, THE CONTRACTOR SHALL, WITHOUT FURTHER COMPENSATION, CONDUCT BURNING AND RESISTANCE TESTS FOR FINAL ACCEPTANCE. THE RESISTANCE TO GROUND OF EACH UNGROUNDED CONDUCTOR SHALL BE NOT LESS THAN 8 MEGOHMS.
 2. ALL FITTINGS, HUBS, UNIONS, BUSHINGS, ETC., SHALL BE SUPPLIED AS PART OF CONDUIT, CONDUIT ENTERING SIGN POSTS, SHALL HAVE INSULATED GROUNDING BUSHINGS INSTALLED BEFORE PULLING WIRE.
 3. CONDUIT ON STRUCTURE SHALL BE SURFACED MOUNTED, STRAPPED AT EVERY ANGLE BRACE WITH U-BOLT TYPE CLAMPS.
 4. SUCCESSIVE LIGHTING FIXTURES SHALL BE CONNECTED ON ALTERNATE SIDES OF THE 3-WIRE CIRCUIT.
 5. THE CABLE SHEATH SHALL EXTEND AT LEAST 4" ABOVE THE TOP OF THE CONDUIT END AND THE TAPE ARMOR OF ARMORED CABLE SHALL BE CONNECTED TO THE GROUNDING BOLT IN THE SIGN POSTS.
 6. WIRING FROM THE SAFETY SWITCH TO LIGHTING FIXTURES SHALL BE 1/2" NO. 12 AWG AND SHALL BE RUN IN 3/4" R.S.C. ALL SPLICING SHALL BE ACCOMPLISHED WITH A WIRE NUT AND WATERPROOF COATING. ALL CONDUIT CONNECTIONS SHALL BE RAIN TIGHT.

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
MODIFIED ELECTRICAL DETAILS
DRAWING ST-13
STATE PROJ. NO. OF SHEETS

INTERIM DESIGN B STRUCTURE COMPUTATION SHEET

*** NO WALKWAY**
(SEE GENERAL NOTE 1)

REVISED
1-20-2016

LOW S.P. _____ OH SIGN NO. _____

DESIGNED BY: _____ DATE: _____ CHECKED BY: _____ DATE: _____

REVISED BY: _____ DATE: _____ CHECKED BY: _____ DATE: _____

SIGN PANEL AREA: _____

EO PANEL AREA: _____

TOTAL SIGN PANEL AREA  **SQ FT**
SIGN PANEL AREA + EO PANEL AREA

PANEL MOUNTING POST STEEL: NO. OF POSTS _____ X _____ = _____ POUNDS
POSTS REQUIRED (BASED ON PANEL WIDTH) SEE CHART ON ST-10 POST WEIGHT (BASED ON PANEL HEIGHT) SEE CHART ON ST-2

PANEL MOUNTING POST STEEL: NO. OF POSTS _____ X _____ = _____ POUNDS
POSTS REQUIRED POST WEIGHT

PANEL MOUNTING POST STEEL: NO. OF POSTS _____ X _____ = _____ POUNDS
POSTS REQUIRED POST WEIGHT

TOTAL PANEL MOUNTING POST STEEL _____ POUNDS

SPAN LENGTH: _____ TRUSS TYPE A B C

TRUSS STEEL: _____ FT x [123(A)] [168 (B)] [196 (C)] (CIRCLE ONE) = _____ POUNDS
SPAN LENGTH

	LEFT POST		RIGHT POST	
	ORIGINAL	REVISED	ORIGINAL	REVISED
LOW STEEL (1)	_____	_____	_____	_____
ELEV A	- _____	_____	- _____	_____
Y DIMENSION	+ _____	_____	+ _____	_____
(DISTANCE FROM CENTER OF TRUSS TO TOP OF TRUSS)	+ 3.00	_____	+ 3.00	_____
(2)	- 1.33	_____	(2) - 1.33	_____
POST HEIGHT =	_____	_____	_____	_____
		POST TYPE		POST TYPE

POST STEEL: _____ (_____ + _____) + _____ + _____ = _____ POUNDS
LBS/FT from ST-2 CHART LEFT POST HT RIGHT POST HT LEFT POST CONSTANT CONSTANT PER POST (from ST-2 CHART) RIGHT POST CONSTANT

CONCRETE FOOTING QUANTITIES:

SHAFT FOOTING (LEFT): _____ CUBIC YARDS SHAFT FOOTING (RIGHT): _____ CUBIC YARDS
BASED ON POST TYPE SEE CHART ON ST-3 BASED ON POST TYPE SEE CHART ON ST-3

SPREAD FOOTING (LEFT): _____ + (0.46 x _____) = _____ CUBIC YARDS
CONSTANT OF 9.3 or 16.7 BASED ON POST TYPE, SEE CHART ON ST-3 "G" PEDESTAL HEIGHT

SPREAD FOOTING (RIGHT): _____ + (0.46 x _____) = _____ CUBIC YARDS
"G"

MEDIAN FOOTING (LEFT) _____ EACH MEDIAN FOOTING (RIGHT) _____ EACH

(1) LOW STEEL (WHEN DESIGNING FOR FUTURE WALKWAYS) IS BOTTOM OF PANEL MOUNTING POST ON THE TALLEST SIGN PANEL.

(2) WHEN DESIGNING STRUCTURE WHICH WILL ACCOMMODATE A FUTURE WALKWAY, YOU MUST SUBTRACT THIS DISTANCE (1.33 FEET)

(FROM BOTTOM OF PANEL MOUNTING POST TO BOTTOM OF FUTURE WALKWAY) WHEN COMPUTING POST HEIGHT. * SEE SECTION DRAWING ON ST-1

GENERAL NOTES:

- CURRENT MnDOT POLICY IS TO DESIGN ALL OH SIGN STRUCTURES TO BE EASILY RETROFITTED WITH A WALKWAY MEETING 17'-4" CLEARANCE ABOVE ROADWAY.
- FOR DETAILS ON "Y DIMENSION" SEE SHEET ST-1. FOR DETAILS ON "G" (SPREAD FOOTING PEDESTAL HEIGHT) SEE ST-3.
- PANEL MOUNTING POSTS EXTEND 3 INCHES BELOW THE BOTTOM EDGE OF SIGN PANELS (as per SECTION A-A DRAWING ON ST-10)
- FOR SINGLE POST STRUCTURES (CANTILEVERS) DESIGNATE OH POST AS "LEFT POST" FOR CONSISTENCY WITH TABULATION CHART DIAGRAM
- ELEV A = ELEVATION AT BOTTOM OF OH POST'S BASE PLATE. FOR COMPUTATION, POST HEIGHT IS MEASURED FROM ELEV. A TO TOP OF TRUSS.

INTERIM DESIGN B STRUCTURE COMPUTATION SHEET

1/20/2016

LOW S.P. _____ OH SIGN NO. _____

DESIGNED BY: _____ DATE: _____ CHECKED BY: _____ DATE: _____

REVISED BY: _____ DATE: _____ CHECKED BY: _____ DATE: _____

SIGN PANEL AREA: _____

EO PANEL AREA: _____

TOTAL SIGN
PANEL AREA _____ SQ FT

PANEL MOUNTING POST STEEL: _____ WT OF POSTS x _____ POSTS = _____ POUNDS
BASED ON PANEL HEIGHT SEE CHART ON ST-2 BASED ON PANEL WIDTH SEE CHART ON ST-10

PANEL MOUNTING POST STEEL: _____ WT OF POSTS x _____ POSTS = _____ POUNDS

PANEL MOUNTING POST STEEL: _____ WT OF POSTS x _____ POSTS = _____ POUNDS

TOTAL PANEL MOUNTING POST STEEL = _____ POUNDS

SPAN LENGTH: _____ TRUSS TYPE: A B C

TRUSS STEEL _____ FT x [123(A)] [168 (B)] [196 (C)] (CIRCLE ONE) = _____ POUNDS
SPAN LENGTH

ADDITIONAL TRUSS STEEL FOR LEDSTAR SIGNS: _____ POUNDS
SEE NOTES AT BOTTOM OF PAGE

TOTAL TRUSS STEEL = _____ POUNDS

	<u>LEFT POST</u>		<u>RIGHT POST</u>	
	ORIGINAL	REVISED	ORIGINAL	REVISED
LOW STEEL	_____	_____	_____	_____
ELEV A -	_____	_____	_____	_____
Y DIMENSION +	_____	_____	_____	_____
(<small>DISTANCE FROM CENTER OF TRUSS TO TOP OF TRUSS</small>) +	3.00	_____	3.00	_____
POST HEIGHT =	_____	_____	_____	_____
		<small>POST TYPE</small>		<small>POST TYPE</small>

POST STEEL _____ (_____ + _____) + _____ + _____ = _____ POUNDS
LBS/FT from ST-2 CHART LEFT POST HT RIGHT POST HT LEFT POST CONSTANT RIGHT POST CONSTANT

WALKWAY SUPPORT STEEL: NO OF SUPPORTS: _____ x _____ LBS = _____ POUNDS
BASED ON WALKWAY LENGTH WEIGHT PER SUPPORT SEE CHART ON ST-2

(FIXED HAND RAIL) WALKWAY GRATING STEEL: _____ LF x 64 LBS = _____ POUNDS

(FOLDING HAND RAIL) WALKWAY GRATING STEEL: _____ LF x 60 LBS = _____ POUNDS

*SEE ST-2 FOR WALKWAY GRATING STEEL NOTES

TOTAL WALKWAY GRATING STEEL = _____ POUNDS

CONCRETE

SHAFT FOOTING (LEFT): _____ CUBIC YARDS SHAFT FOOTING (RIGHT): _____ CUBIC YARDS
BASED ON POST TYP SEE CHART ON ST-1 BASED ON PANEL WIDTH SEE CHART ON ST-10

SPREAD FOOTING (LEFT): _____ + (0.46 x _____) = CUBIC YARDS
CONSTANT OF 9.3 or 16.7 BASED ON POST TYPE, SEE CHART ON ST-1 G (PEDESTAL HEIGHT) IN FEET

SPREAD FOOTING (RIGHT): _____ + (0.46 x _____) = CUBIC YARDS
CONSTANT OF 9.3 or 16.7 BASED ON POST TYPE, SEE CHART ON ST-3 G (PEDESTAL HEIGHT)

FOUNDATION SPECIAL: _____ LEFT FOOTING _____ RIGHT FOOTING _____ MEDIAN FOOTING

NEW LEDSTAR DYNAMIC MESSAGE SIGN (31'-8 1/4" x 8'-0")
2-6" x 6" x 3/8 x 31'-8 1/4" ANGLES @ 14.9 pounds/foot = 944 POUNDS
MOUNTED 3'-3" (.99 m) above and below the center of the sign box.

*DMS do not use Panel Mounting Posts. They are mounted to the truss with ANGLES & Z bars. The weight of the ANGLES (944 lbs) gets added to the truss steel quantity.



13. TYPE A SIGN STRUCTURE DESIGN STEPS

The following is a handout of the Type A sign structure design steps. This sample plan can be downloaded from the OTST Signing website, <http://www.dot.state.mn.us/trafficeng/signing/plans.html>.

GET ENGINEERING APPROVAL FOR SIGN PANEL DESIGN AND INSTALLATION LOCATION BEFORE BEGINNING TYPE A CROSS SECTION DESIGN.

-USE MNDOT CELL XSECA FROM MNDOT CELL LIBRARY FOR SHEET BORDER
 SET SCALE TO 1:1

1. BRING THE GROUNDLINE INTO THE CROSS SECTION GRID

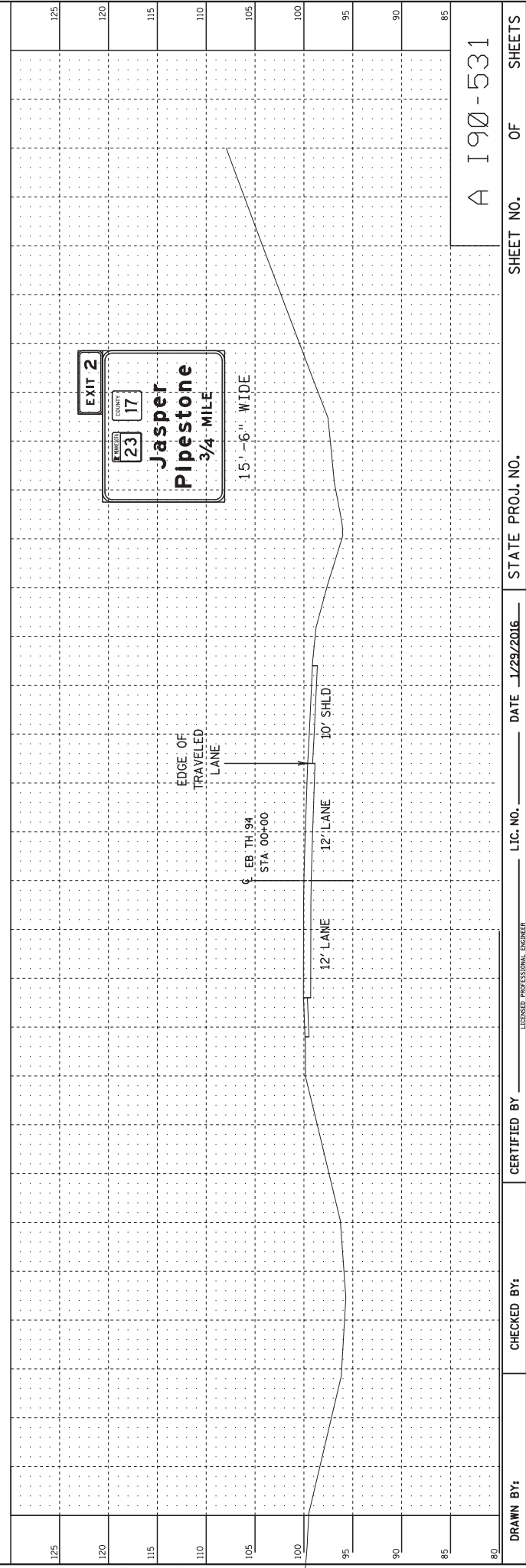
- SETTING ϕ ELEVATION AT 100 WILL USUALLY GIVE ENOUGH SPACE FOR PANEL AND POSTS TO FIT WELL INTO THE GRID.

2. DETERMINE WHERE EDGE OF TRAVELED LANE IS.

- LABEL CENTER LINE, LANES, SHOULDER(S) AND EDGE OF TRAVELED LANE.

3. IMPORT SIGNCAD FILES

- MAKE SURE SCALE IS ACCURATE. (1 FT = 1 FT)



"H" AND "X" DIMENSIONS

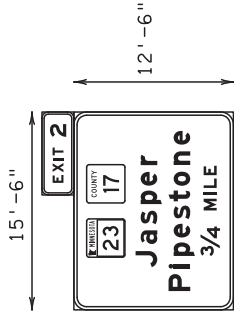
- H: HEIGHT OF PANEL ABOVE EDGE OF TRAVELED ROADWAY
- X: OFFSET DISTANCE FROM EDGE OF TRAVELED LANE TO CENTER OF NEAREST POST (L)
- WHERE "X" IS LESS THAN 30', "H" SHALL BE 7' ± 6".
- WHERE "X" IS 30' OR GREATER, MINIMUM AND PREFERRED "H" IS 5'.

STANDARD

H = 5' - 0"
 X = 30' - 0"

4. DRAW IN CENTER LINE OF POSTS.

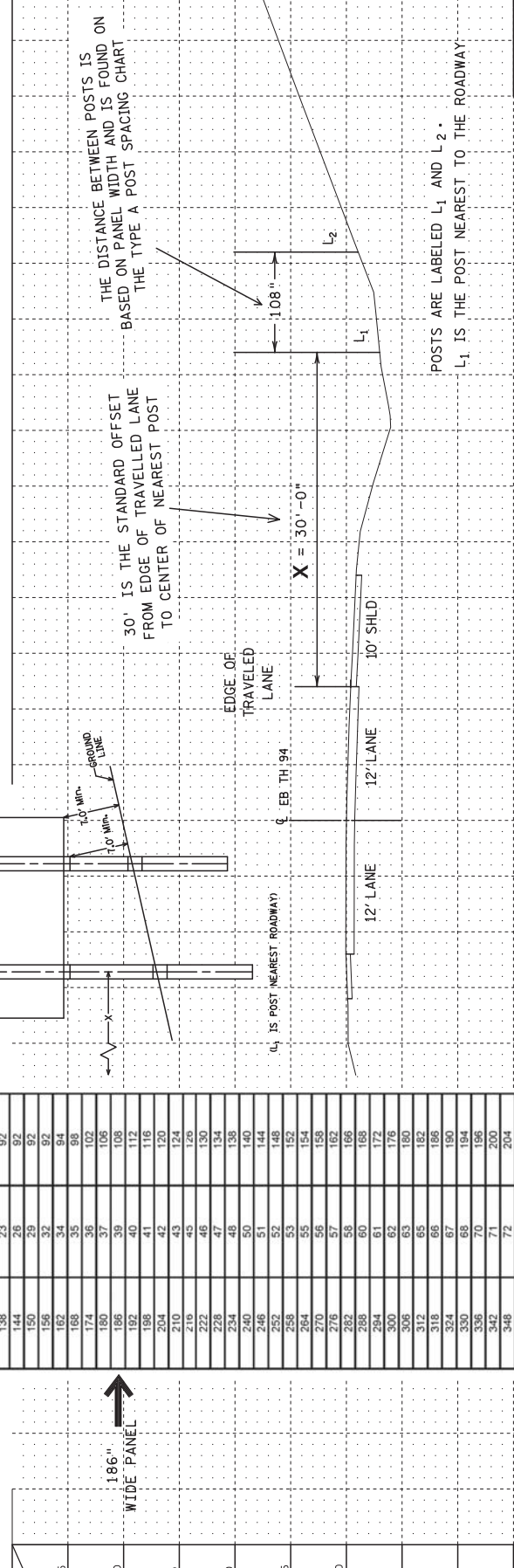
- USE STANDARD "X" OFFSET DISTANCE OF 30'
- USE "TYPE A POST SPACING CHART" FOR DIMENSIONS BETWEEN POSTS AND PANEL EDGES.
- PANEL WIDTH DETERMINES POST SPACING.



15' - 6" = 186"

THE PANEL IS 186" WIDE
 ACCORDING TO THE TYPE A POST SPACING CHART
 THE DISTANCE BETWEEN POSTS IS 108 INCHES (CENTER TO CENTER)
 D = 108 INCHES OR 9 FEET

PANEL WIDTH (INCHES)	TYPE A SIGN POST SPACING (c) (INCHES)	POST SPACING (d) (INCHES)
96	4	88
102	6	90
108	8	90
114	12	90
120	15	90
126	18	90
132	20	92
138	23	92
144	26	92
150	29	92
156	32	92
162	34	94
168	35	98
174	36	102
180	37	106
186	38	108
192	40	112
198	41	116
204	42	120
210	43	124
216	45	126
222	46	130
228	47	134
234	48	138
240	50	140
246	51	144
252	52	148
258	53	152
264	55	154
270	56	158
276	57	162
282	58	166
288	60	168
294	61	172
300	63	176
306	65	180
312	68	182
318	68	186
324	67	190
330	68	194
336	70	196
342	71	200
348	72	204



See MnDOT website <http://www.dot.state.mn.us/trafficeng/signing/plans.html> for TYPE A SIGN POST SPACING CHART

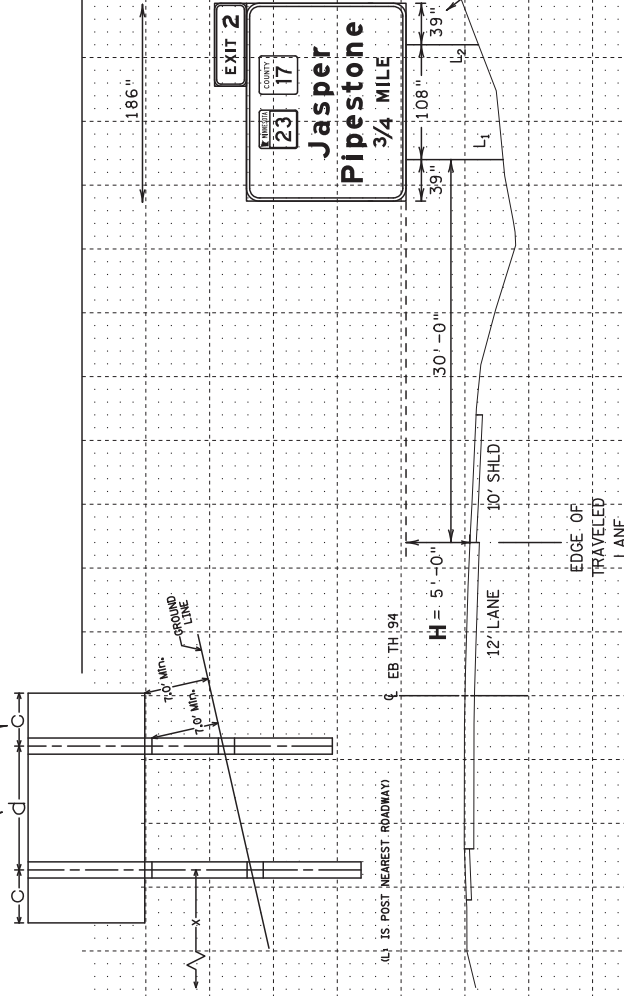
5. PLACE PANEL ON THE POSTS

- USE "C" AND "D" DIMENSIONS FROM TYPE A SIGN POST CHART.
- BEGIN WITH THE STANDARD "H" DIMENSION OF 5 FEET.

H: HEIGHT OF PANEL ABOVE EDGE OF TRAVELED ROADWAY

PANEL WIDTH (INCHES)	TYPE A SIGN POST SPACING (C) (INCHES)	POST SPACING (D) (INCHES)
96	4	88
102	6	90
108	9	90
114	12	90
120	15	90
126	18	90
132	20	92
138	23	92
144	26	92
150	29	92
156	32	92
162	34	94
168	35	98
174	36	102
180	37	106
186	39	108
192	40	112
198	41	116
204	42	120
210	43	124
216	45	126
222	46	130
228	47	134
234	48	138
240	50	140
246	51	144
252	52	148
258	53	152
264	55	154
270	56	158
276	57	162
282	58	166
288	60	168
294	61	172
300	62	176
306	63	180
312	65	182
318	66	186
324	67	190
330	68	194
336	70	196
342	71	200
348	72	204

THE PANEL IS 186" WIDE
 ACCORDING TO THE TYPE A POST SPACING CHART
 C = 39 INCHES
 D = 108 INCHES



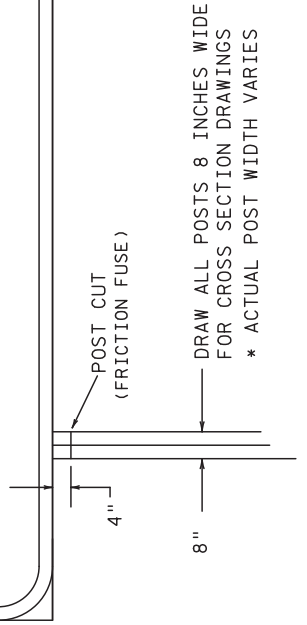
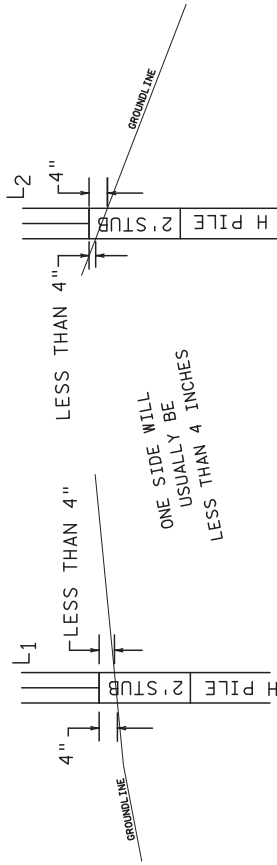
THIS OVERHANG OR 'C' DIMENSION COMES FROM THE TYPE A POST SPACING CHART

See MnDOT website: <http://www.dot.state.mn.us/traffic/signing/plans.html> for TYPE A SIGN POST SPACING CHART

Pipestone 3/4 MILE

6. DRAW IN POST WIDTHS, PILES, STUBS AND POST CUT (FRICTION FUSE) LINES.

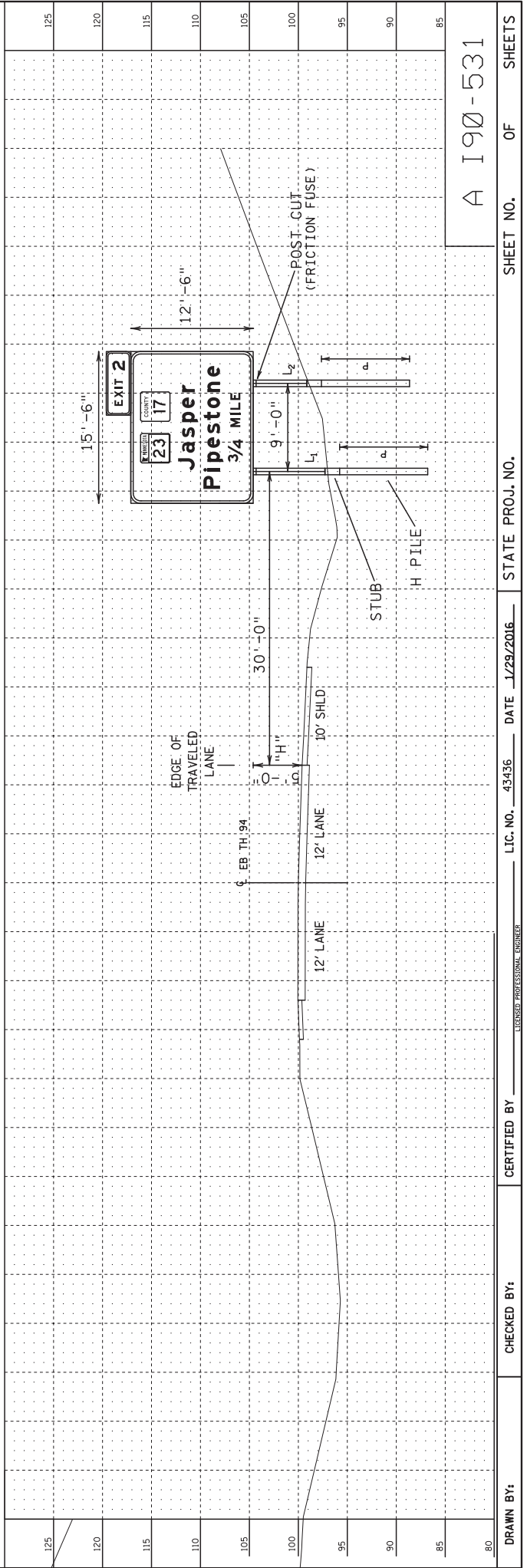
- PILES ARE 12' DEEP. (MNDOT CELL "HPOST" IS AVAILABLE FOR POSTS)
- THE STUB BETWEEN THE PILE AND THE POST IS 2 FEET IN LENGTH.
- TOP OF STUBS MUST BE NO MORE THAN 4 INCHES ABOVE GROUNDLINE.
- POST CUT IS 4" BELOW SIGN PANEL.



DRAW ALL POSTS 8 INCHES WIDE
FOR CROSS SECTION DRAWINGS
* ACTUAL POST WIDTH VARIES

PLOTTED/REVISED: 1/29/2016

DISTRICT #: METRO
PLOT NAME: 4
PATH & FILENAME: P:\PMP\177853A sign STEPS.dgn



DRAWN BY:

CHECKED BY:

CERTIFIED BY:

LIC. NO. 43436

DATE 1/29/2016

STATE PROJ. NO.

SHEET NO. OF

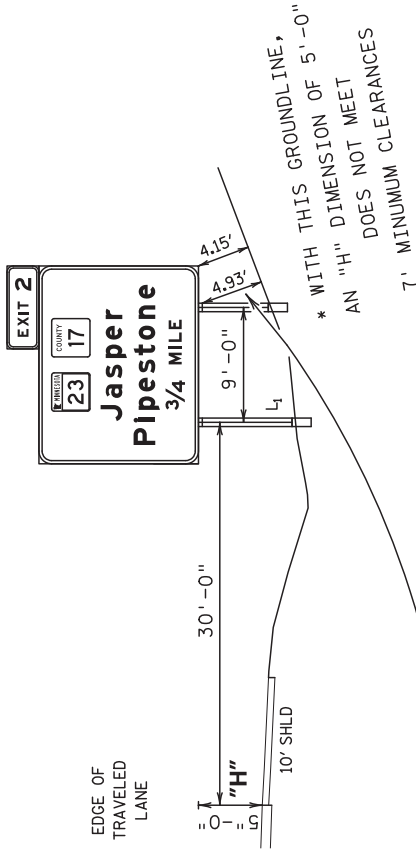
SHEETS

A 190-531

7. ADJUST "H" DIMENSION/POST LENGTHS (IF NEEDED) TO INSURE CLEARANCES.

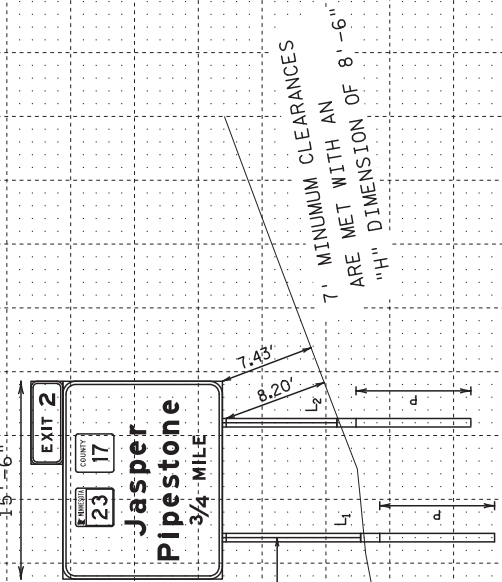
H: HEIGHT OF PANEL ABOVE EDGE OF TRAVELED ROADWAY

- H PILE AND STUB LENGTHS ARE CONSTANTS. POST LENGTH WILL VARY
- MUST HAVE 7' OF CLEARANCE BETWEEN GROUNDLINE AND PANEL
- MUST HAVE 7' OF CLEARANCE BETWEEN GROUNDLINE AND FRICTION FUSE.
- MOVE "H" UP OR DOWN IN 6 INCH INCREMENTS TO ACHIEVE CLEARANCES.



- LATERAL CLEARANCES GIVEN APPLY TO RIGHT AND LEFT SIDE OF INSTALLATION.

ADJUST PANEL HEIGHT "H" TO ACHIEVE MINIMUM CLEARANCES. * KEEP "H" IN 6 INCH INCREMENTS.



DRAWN BY:

CHECKED BY:

CERTIFIED BY:

LIC. NO. 43436

DATE 1/29/2016

STATE PROJ. NO.

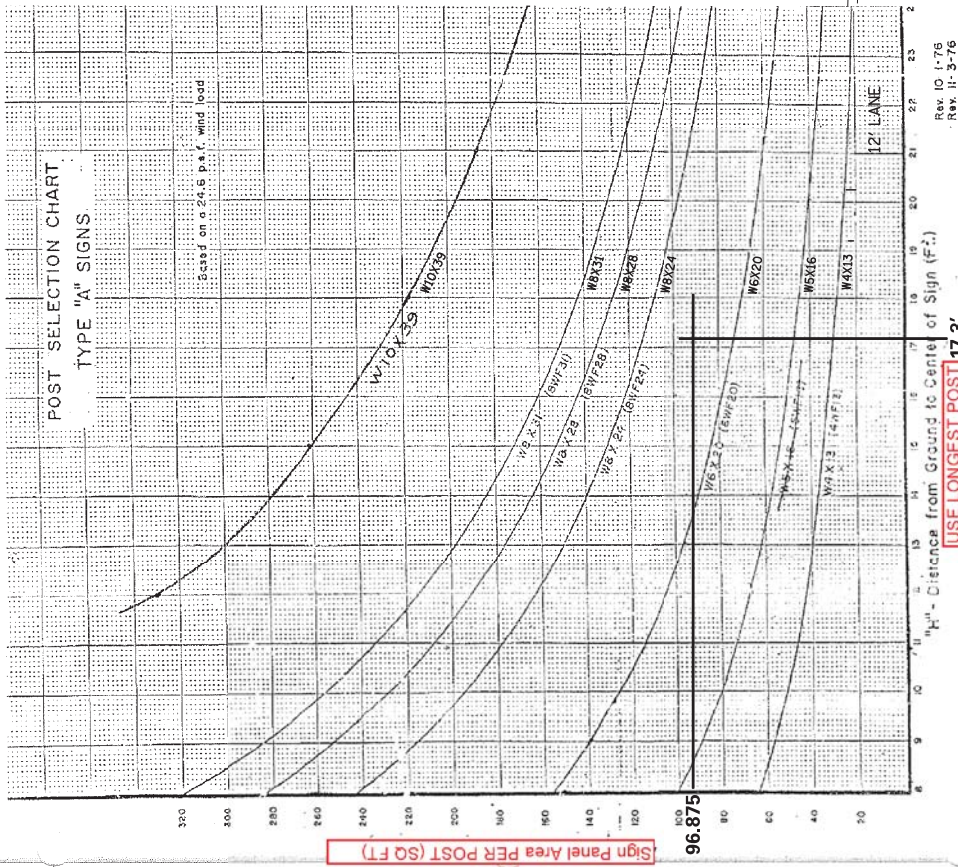
SHEET NO.

OF SHEETS

A 190-531

8. DETERMINE POST TYPE

- USE POST SELECTION CHART.



Distance (in FEET) from Ground to Center of Sign Panel

See MnDOT website <http://www.dot.state.mn.us/traffic/signing/plans.html> for TYPE A POST SELECTION CHART

PANEL AREA PER POST

- DIVIDE TOTAL SQUARE FOOTAGE OF PANEL BY THE NUMBER OF POSTS

15.5' X 12.5' = 193.75 TOTAL SQ FT

193.75 SQ FT DIVIDED BY 2 POSTS = **96.875** SQ FT PER POST

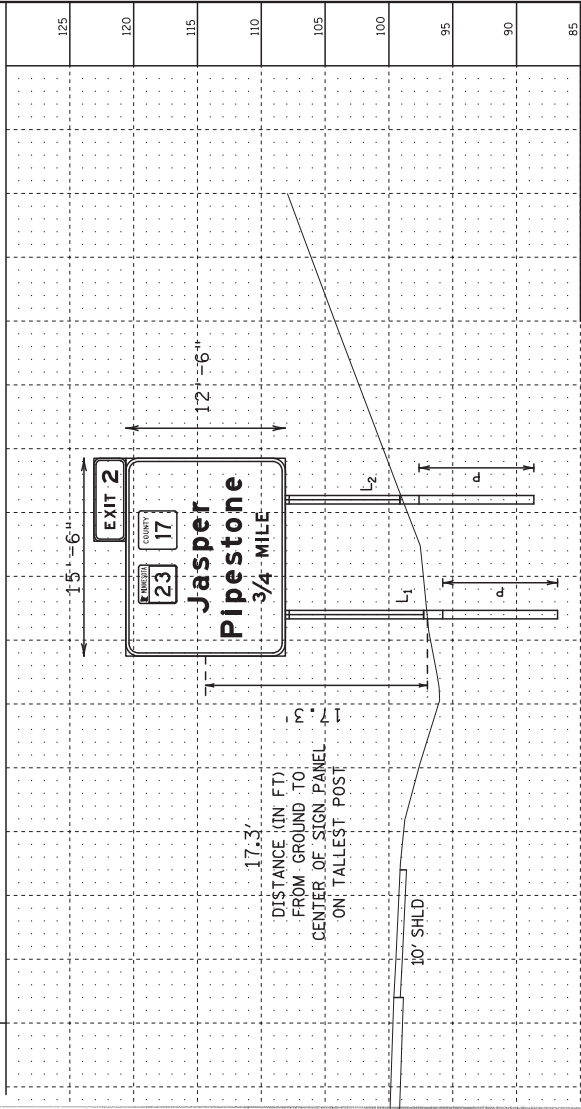
DISTANCE IN FT FROM GROUND TO CENTER OF SIGN PANEL.

- USE THE SIGNS' TALLEST POST.

17.3' (AS MEASURED IN CAD)

* THE CHART CALLS FOR CALLS FOR A POST TYPE W8X24 FOR THIS SIGN.

POST TYPE W8X24
 POST LENGTH L₁ FT.
 POST LENGTH L₂ FT.
 PILE FOOTING P FT.



A 190-531

9. DETERMINE POST LENGTHS

- ROUND POST LENGTHS TO THE NEAREST 6 INCH INCREMENT
- L₁ IS POST NEAREST THE ROADWAY.

L₁ MEASURED AT 23.33 FT. ROUNDS TO 23.5'
 L₂ MEASURED AT 21.47 FT. ROUNDS TO 21.5'

10. PILE FOOTING

- 12' IS STANDARD FOR A SIGN POST PILES

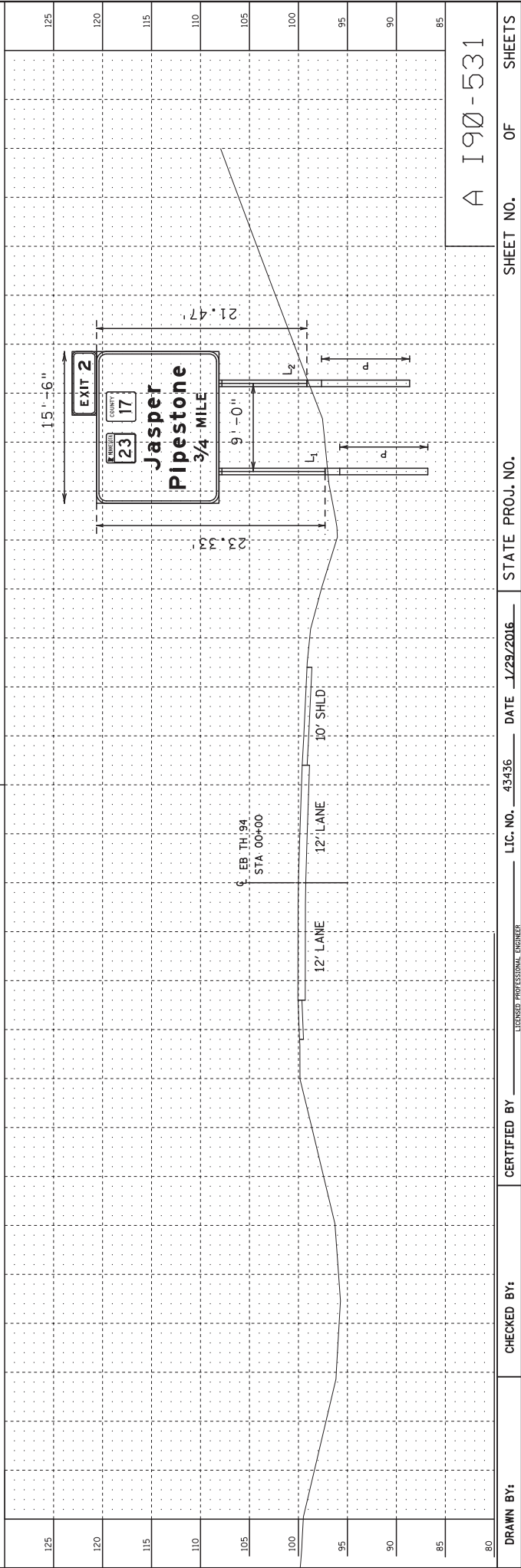
SIGN A I90-531

E.B. TH 90

POST TYPE W8X24
 POST LENGTH L₁ 23.5 FT.
 POST LENGTH L₂ 21.5 FT.
 PILE FOOTING P 12.0 FT.

PLOTTED/REVISED: 1/29/2016

DISTRICT: METRO
 PLOT NAME: 7
 PATH & FILENAME: P:\PMP\177853\A sign STEPS.dgn

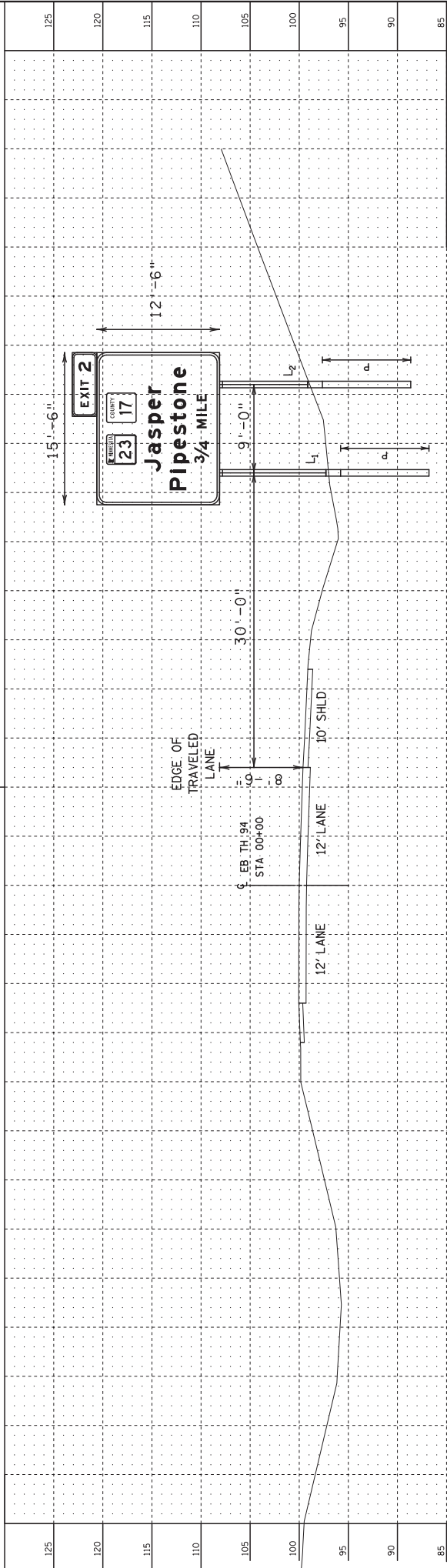


11. LABEL AND DIMENSION AS SHOWN.

SIGN A I90-531

E.B. TH 90

POST TYPE W8X24
 POST LENGTH L₁ 23.5 FT.
 POST LENGTH L₂ 21.5 FT.
 PILE FOOTING P 12.0 FT.



A I90-531

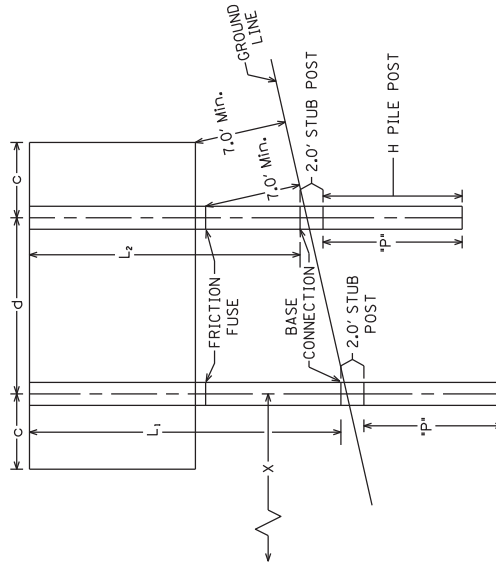
DRAWN BY: _____ CHECKED BY: _____ CERTIFIED BY: _____ LIC. NO. 43436 DATE 1/29/2016 STATE PROJ. NO. _____ SHEET NO. OF SHEETS

SIGN TYPE A (H PILE FOOTINGS)

SIGN NO	LOCATION	PANEL		SIZE	AREA	QTY	POST		WEIGHT	PILE				TOTAL WEIGHT STRUCTURAL STEEL	"X"	"H"
		SIZE	INCH				INCH	INCH		INCH	INCH	FEET	FEET			
A 190-531	00+00 EB	186	x	150	193.75	2	23.5	21.5	118	1316.00	39	108	12	576.00	30	8.5
TOTAL																
193.75																
1892.00																

SEE SHEET FOR PANELS

XX



BREAKAWAY POSTS-H-PILE FOOTING

(L1 IS POST NEAREST ROADWAY)

TYPE A SIGNS

POST QUANTITIES			
POST SIZE	QUANTITY (1)	POST SIZE	QUANTITY (1)
W4X13	59+13 LBS/FT	W8X28	143+28 LBS/FT
W5X16	67+16 LBS/FT	W8X31	173+31 LBS/FT
W6X20	104+20 LBS/FT	W10X39	195+39 LBS/FT
W8X24	118+24 LBS/FT		

SPECIFIC NOTE:

- (1) CONSTANT INCLUDES STUB POST WEIGHT.

GENERAL NOTES:

1. PILE SHALL BE THE SAME SIZE AS THE SIGN POST AND IS TO BE DRIVEN TO A 12 TO 14 TON BEARING CAPACITY.
2. SEE SHEETS AND FOR STRUCTURAL DETAILS.
3. POST LENGTHS ARE APPROXIMATE.
4. "X" IS THE DISTANCE FROM THE EDGE OF THE THRU LANE TO THE FIRST POST.
5. "H" IS THE HEIGHT ABOVE THE THRU LANE EDGE TO THE BOTTOM OF SIGN PANEL.
6. "P" IS THE LENGTH OF THE H PILE POST.
7. SEE SHEETS AND FOR CROSS SECTIONS.
8. SEE SHEETS AND FOR SIGN PANELS.

DRAWN BY:

CHECKED BY:

CERTIFIED BY:

LIC. NO. _____

DATE 1/29/2016

STATE PROJ. NO.

SHEET NO.

OF

SHEETS

STANDARD H PILE LENGTH "P" IS 12' (SEE NOTE 6 BELOW)

EACH PILE WEIGHS 288 LBS
 • A W8X24 PILE WHICH WEIGHS 24 LBS PER FOOT AND IS 12' LONG
 2 PILES AT 288 LBS = 576 LBS

SIGN TYPE A (H PILE FOOTINGS)		SEE SHEET FOR PANELS		POST		ADDITIONAL STEEL PER POST		PILE		TOTAL			
SIGN NO	LOCATION	SIZE INCH	AREA SQ.FT	LENGTH L1 FEET	LENGTH L2 FEET	QTY	SIZE	WEIGHT LBS	WEIGHT LBS	"P" FEET	TOTAL WEIGHT STRUCTURAL STEEL LBS	"X" FEET	"H" FEET
A 190-531	00+00 EB	186 x 150	193.75	23.5	21.5	2	8 x 24	118	1316.00	12	576.00	30	8.5
		TOTAL						193.75	1316.00		1892.00		

SEE NOTE 4 BELOW

SEE NOTE 5 BELOW

STUB WEIGHT (FROM CHART BELOW)

WEIGHT PER FOOT FOR POST TYPE W8X24 (FROM CHART BELOW)

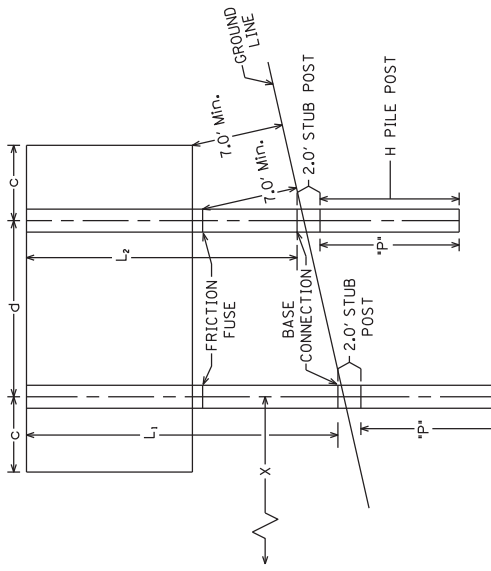
W8X24 STUB WEIGHT (FROM CHART BELOW)

WEIGHT OF L1.....23.5 X 24= 564
 WEIGHT OF L1 STUB.....118
 + WEIGHT OF L2.....21.5 X 24= 516
 TOTAL POST WEIGHT.....1316

WEIGHT OF L2.....21.5 X 24= 516
 + WEIGHT OF L2 STUB.....118
 TOTAL POST WEIGHT.....1316

THESE DIMENSIONS "C" & "D" COME FROM THE TYPE A POST SPACING CHART

L1 PILE WEIGHT.....288
 L2 PILE WEIGHT.....288
 + WEIGHT OF POSTS & STUBS + 1316
 TOTAL STRUCTURAL STEEL 1892



BREAKAWAY POSTS-H-PILE FOOTING
 (L1 IS POST NEAREST ROADWAY)

TYPE A SIGNS

POST SIZE	QUANTITY (1)	POST SIZE	QUANTITY (1)
W4X13	59+13 LBS/FT	W8X28	143+28 LBS/FT
W5X16	67+16 LBS/FT	W8X31	173+31 LBS/FT
W6X20	104+20 LBS/FT	W10X39	195+39 LBS/FT
W8X24	118+24 LBS/FT		

POST QUANTITIES

STUB WEIGHT

WEIGHT PER FOOT
















- SPECIFIC NOTE:
 (1) CONSTANT INCLUDES STUB POST WEIGHT.
- GENERAL NOTES:
 1. PILE SHALL BE THE SAME SIZE AS THE SIGN POST AND IS TO BE DRIVEN TO A 12 TO 14 TON BEARING CAPACITY.
 2. SEE SHEETS AND FOR STRUCTURAL DETAILS.
 3. POST LENGTHS ARE APPROXIMATE.
 4. "X" IS THE DISTANCE FROM THE EDGE OF THE THRU LANE TO THE FIRST POST.
 5. "H" IS THE HEIGHT ABOVE THE THRU LANE EDGE TO THE BOTTOM OF SIGN PANEL.
 6. "P" IS THE LENGTH OF THE H PILE POST.
 7. SEE SHEETS AND FOR CROSS SECTIONS.
 8. SEE SHEETS AND FOR SIGN PANELS.

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14. SIGN SYMBOLS OVERVIEW

The following are the signs symbols overview.

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 Button 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



15. POST SIZING & POST LENGTH DETERMINATION CHARTS

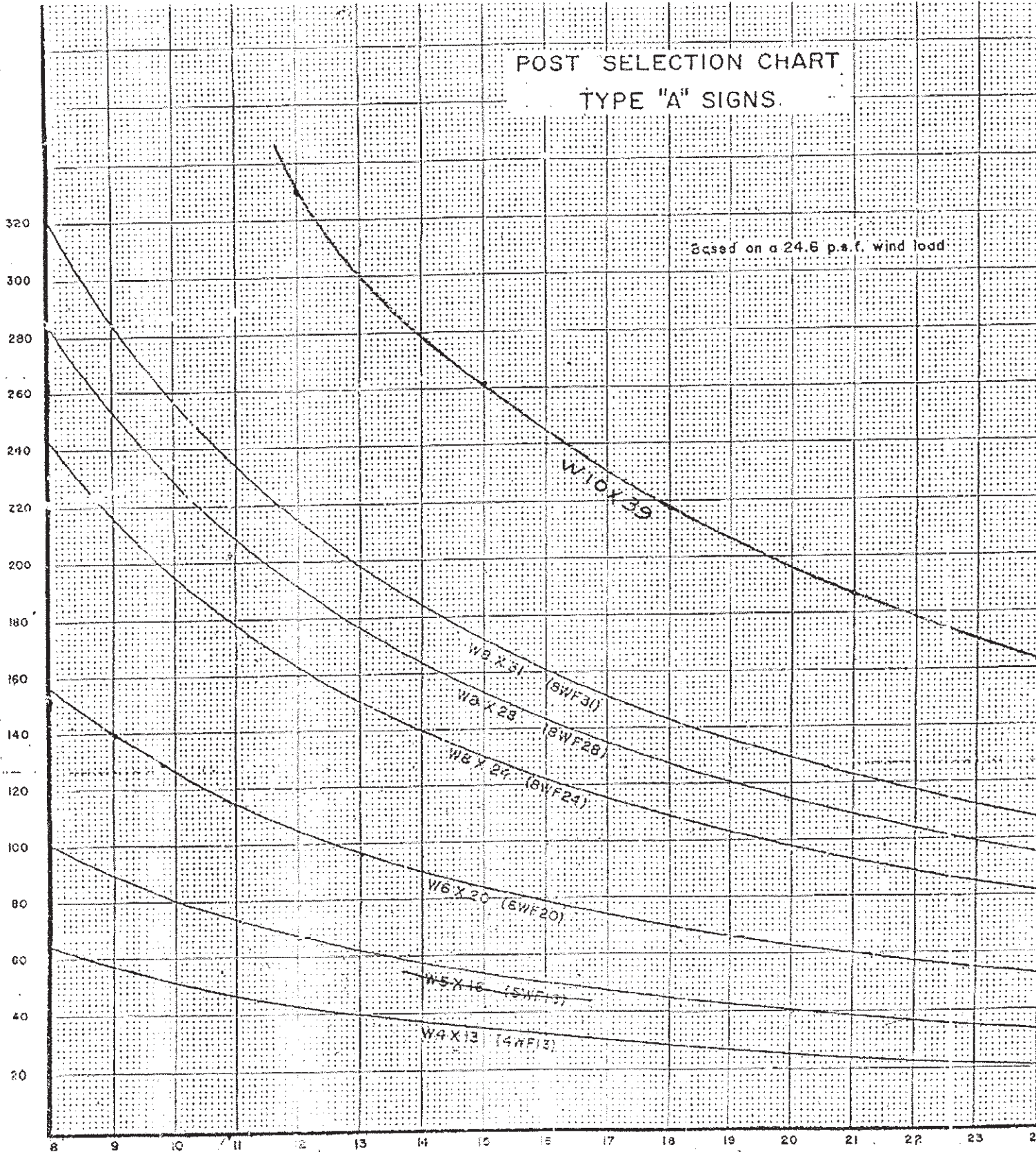
The following handouts are various post size and determination charts. This charts can be downloaded from the OTST Signing website, <http://www.dot.state.mn.us/trafficeng/signing/plans.html>.

TYPE A SIGN POST SPACING		
PANEL WIDTH (INCHES)	OVERHANG (c) (INCHES)	POST SPACING (d)
96	4	88
102	6	90
108	9	90
114	12	90
120	15	90
126	18	90
132	20	92
138	23	92
144	26	92
150	29	92
156	32	92
162	34	94
168	35	98
174	36	102
180	37	106
186	39	108
192	40	112
198	41	116
204	42	120
210	43	124
216	45	126
222	46	130
228	47	134
234	48	138
240	50	140
246	51	144
252	52	148
258	53	152
264	55	154
270	56	158
276	57	162
282	58	166
288	60	168
294	61	172
300	62	176
306	63	180
312	65	182
318	66	186
324	67	190
330	68	194
336	70	196
342	71	200
348	72	204

POST SELECTION CHART TYPE "A" SIGNS

Based on a 24.6 p.s.f. wind load

Sign Panel Area PER POST (SQ FT)



"H" - Distance from Ground to Center of Sign (FT)

USE LONGEST POST

Rev. 10-1-76
Rev. 11-3-76

Distance (in FEET) from Ground to Center of Sign Panel



Type EA and EO Sign Post Spacing Chart

Guide Sign Design Course Manual

Exhibit 3-15 Sign Post Spacing Chart for Exit Panels

Panel Length (inches)	Post Spacing (inches)		
	2 Posts	3 Posts	4 Posts
48	30		
54	30		
60	36		
66	36		
72	42		
78	48		
84	48		
90	54		
96	54		
102		36	
108		36	
114		42	
120		42	
126		48	
132		48	
138		54	
144			42
150			42
156			42
162			42
168			48
174			48
180			

TABLE 1 - TRUSS TYPE SELECTION
CANTILEVER STRUCTURE TYPE WITH
CONVENTIONAL SIGNS

SIGN AREA (SQ. FT.)	CANTILEVER LENGTH (FEET)														
	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
350	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
330	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
310	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
290	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
270	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
250	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
230	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
210	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
190	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
170	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
150	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
130	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
110	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
90	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
70	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
50	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B

"A" INDICATES TRUSS TYPE A, "B" INDICATES TRUSS TYPE B.
SEE DRAWINGS ST-5 THROUGH ST-7 FOR TRUSS DETAILS.

TABLE 2 - TRUSS TYPE SELECTION
SIMPLE SPAN STRUCTURE WITH CONVENTIONAL SIGNS

SIGN AREA (SQ. FT.)	SPAN LENGTH (FEET)																								
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	146	
1000	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA
900	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA
800	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA	
700	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA	
600	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA	
500	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA	
400	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA	
300	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA	
200	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA	
100	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	NA	

"A" INDICATES TRUSS TYPE A, "B" INDICATES TRUSS TYPE B.
"C" INDICATES TRUSS TYPE C, "NA" NOT ALLOWED.
SEE DRAWINGS ST-5 THROUGH ST-7 FOR TRUSS DETAILS.

TABLE 3 - TRUSS TYPE SELECTION
SIMPLE SPAN STRUCTURE WITH CHANGEABLE MESSAGE SIGNS (DRUM)

NO. OF CMS SIGNS	SPAN LENGTH (FEET)																							
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120					
1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

"A" INDICATES TRUSS TYPE A, "B" INDICATES TRUSS TYPE B.
"C" INDICATES TRUSS TYPE C.
* THIS ASSUMES THAT THE CMS'S ARE ON THE OPPOSITE SIDES OF THE TRUSS.

TABLE 4 - TRUSS TYPE SELECTION
SIMPLE SPAN STRUCTURE WITH CHANGEABLE MESSAGE SIGNS (LED)

NO. OF CMS SIGNS	SPAN LENGTH (FEET)																							
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	
1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

"A" INDICATES TRUSS TYPE A, "B" INDICATES TRUSS TYPE B.
"C" INDICATES TRUSS TYPE C, "NA" NOT ALLOWED.
* THIS ASSUMES THAT THE CMS'S ARE ON THE OPPOSITE SIDES OF THE TRUSS.

TABLE 5 - POST SELECTION - CHANGEABLE MESSAGE SIGN (LED) ON SIMPLE SPAN STRUCTURE

NO. OF CMS SIGNS	CMS AREA (SQ. FT.)	SPAN LENGTH (FEET)																					
		40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	
1	261	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	522	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

TYPE A TRUSS ← TYPE B TRUSS → TYPE C TRUSS

* CMS'S ATTACHED ON OPPOSITE SIDES OF THE TRUSS.

TRUSS SELECTION PROCEDURE

- THESE STANDARD PLANS ARE SUITABLE ONLY FOR SIMPLE SPAN AND CANTILEVERED OVERHEAD SIGN STRUCTURES, WITH ONLY A SINGLE TYPE OF SIGN (CMS OR CONVENTIONAL) ATTACHED TO THE STRUCTURE. THE FOLLOWING CONDITIONS ARE NOT PRESENTED IN THIS PLAN SET AND WILL REQUIRE ADDITIONAL DESIGN ATTENTION.
 - INSTALLATION OF 2 CMS'S ON THE SAME SIDE OF THE TRUSS.
 - BUTTERFLY, CONTINUOUS OR A COMBINATION OF SIMPLE AND CANTILEVERED STRUCTURES.
 - ANY COMBINATION OF CMS AND CONVENTIONAL SIGNS.
- DETERMINE THE TYPE OF STRUCTURE FOR WHICH THE TRUSS IS TO BE USED FOR. REFER TO PLANS FOR BRIDGE TYPE BC OR BRIDGE TYPE S.
 - CANTILEVERED SIGN STRUCTURE - BRIDGE TYPE BC
 - SIMPLE SPAN SIGN STRUCTURE - BRIDGE TYPE S
- DETERMINE THE TABLE WHICH CORRESPONDS TO THE STRUCTURE TYPE UNDER CONSIDERATION.
 - TABLE 1 - CANTILEVER W/CONVENTIONAL SIGNS
 - TABLE 2 - SIMPLE SPAN W/CONVENTIONAL SIGNS
 - TABLE 3 - SIMPLE SPAN W/DRUM CMS
 - TABLE 4 - SIMPLE SPAN W/LED-CMS
 THIS TABLE IS TO BE USED FOR STEPS 4 & 5.
- DETERMINE THE AREA OF ALL THE SIGNS WHICH ARE TO BE PLACED ON THE SIGN STRUCTURE. THE SIGN AREA IS DEFINED AS THE SUMMATION OF THE INDIVIDUAL SIGN HEIGHTS MULTIPLIED BY THE SIGN WIDTHS. USE THIS VALUE TO ENTER THE APPROPRIATE TABLE FROM THE LEFT COLUMN. IF THE TOTAL SIGN AREA FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. BE SURE TO INCLUDE EXIT SIGNS IN TOTAL AREA.
 - DETERMINE THE SPAN LENGTH OR CANTILEVER LENGTH AND ENTER THE APPROPRIATE TABLE ALONG THE TOP. IF THE SPAN LENGTH FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. THIS SPAN LENGTH IDENTIFIES THE VERTICAL COLUMN FROM WHICH A TRUSS WILL BE SELECTED.

EXAMPLE: SIGN AREA: 250 SQ. FT.
SPAN LENGTH: 102 FT
TYPE: SIMPLE SPAN
SIGN TYPE: CONVENTIONAL
TRUSS TYPE: B

STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

POST/TRUSS SELECTION
TABLES

STATE PROJ. NO.

SHEET NO. OF

SHEETS

NOTE: FOR CMS (LED) POST SELECTION SEE POST/TRUSS SELECTION TABLES (TABLE 5)

TABLE 6 - POST SELECTION - CHANGEABLE MESSAGE SIGN ORLUM ON SIMPLE SPAN SIGN STRUCTURE

NO. OF CMS UNITS	CMS AREA (SQ. FT.)	POST HT. (FT.)	SPAN LENGTH (FEET)																		
			30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120
1	252	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	504	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

TYPE A TRUSS ← TYPE B TRUSS → TYPE C TRUSS

◎ CMS'S ATTACHED ON OPPOSITE SIDES OF THE TRUSS.

TABLE 7 - POST SELECTION - SIMPLE SPAN SIGN STRUCTURE

SIGN AREA (SQ. FT.)	POST HT. (FT.)	SPAN LENGTH (FEET)																							
		30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
1000	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
900	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
800	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
700	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
600	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
500	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
400	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
300	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
200	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

TYPE A TRUSS ← TYPE B TRUSS → TYPE C TRUSS

TABLE 8 - POST SELECTION - CANTILEVER SIGN STRUCTURE

SIGN AREA (SQ. FT.)	POST HT. (FT.)	CANTILEVER LENGTH (FEET)													
		16	18	20	22	24	26	28	30	32	34	36	38	40	42
350	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
330	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
310	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
290	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
270	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
250	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
230	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
210	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
190	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
170	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
150	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
130	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
110	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
90	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
70	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1
50	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1

* USE ONLY 20" Ø x .812" WALL (42 KSI) OPTION.

TYPE B TRUSS ← TYPE A TRUSS

POST SELECTION PROCEDURE

- THESE STANDARD PLANS ARE SUITABLE ONLY FOR SIMPLE SPAN AND CANTILEVER OVERHEAD SIGN STRUCTURES. WITH ONLY A SINGLE TYPE OF SIGN (CMS OR CONVENTIONAL) ATTACHED TO THE STRUCTURE. IN THIS PLAN SET, AND WILL REQUIRE ADDITIONAL DESIGNATION OF 2 CMS'S ON THE SAME SIDE OF THE TRUSS.
 - BUTTERFLY CONTINUOUS OR A COMBINATION OF SIMPLE AND CANTILEVER STRUCTURES.
 - ANY COMBINATION OF CMS AND CONVENTIONAL SIGNS.
- DETERMINE THE TYPE OF STRUCTURE FOR WHICH THE POST(S) ARE TO BE USED FOR. REFER TO PLANS FOR BRIDGE TYPE BC OR BRIDGE TYPE S.
 - CANTILEVER SIGN STRUCTURE - BRIDGE TYPE BC
 - SIMPLE SPAN SIGN STRUCTURE - BRIDGE TYPE S
- DETERMINE THE TABLE WHICH CORRESPONDS TO THE STRUCTURE TYPE UNDER CONSIDERATION. TABLE 5, 6, 7 OR 8 IS TO BE USED FOR STEPS 4 THROUGH 7.
- DETERMINE THE AREA OF ALL THE SIGNS WHICH ARE TO BE PLACED ON THE SIGN STRUCTURE. THE SIGN AREA IS DEFINED AS THE SUMMATION OF THE SIGN INDIVIDUAL SIGN HEIGHTS MULTIPLIED BY THE SIGN WIDTHS. USE THIS VALUE TO ENTER THE APPROPRIATE TABLE FROM THE LEFT COLUMN. IF THE TOTAL SIGN AREA WILL EXCEED THE VALUES, USE THE LARGER VALUE. (BE SURE TO INCLUDE EXIT SIGNS IN TOTAL AREA.)
- DETERMINE THE POST HEIGHT APPLICABLE FOR THE STRUCTURE UNDER CONSIDERATION. THE POST HEIGHT IS DEFINED AS THE VERTICAL DISTANCE BETWEEN THE BOTTOM OF THE BASEPLATE TO THE TOP OF THE TRUSS. USING THE VALUES BRACKETED WITHIN THE SIGN AREA FROM STEP 4, LOCATE THE POST HEIGHT. IF THE ACTUAL HEIGHT FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. THIS POST HEIGHT IDENTIFIES THE HORIZONTAL ROW FROM WHICH A POST WILL BE SELECTED.
- DETERMINE THE SPAN LENGTH OR CANTILEVER LENGTH AND ENTER THE APPROPRIATE TABLE ALONG THE TOP. IF THE SPAN LENGTH FALLS BETWEEN TWO VALUES, USE THE LARGER VALUE. THIS SPAN LENGTH IDENTIFIES THE VERTICAL COLUMN FROM WHICH A POST WILL BE SELECTED.
- DETERMINED THE POST IDENTIFICATION NUMBER BY READING ACROSS THE ROW FROM THE IDENTIFIED POST HEIGHT AND DOWN THE COLUMN FROM THE IDENTIFIED SPAN LENGTH. THE INTERSECTION OF THIS ROW AND COLUMN WILL UNIQUELY IDENTIFY THE APPROPRIATE POST IDENTIFICATION NUMBER.
- USE THE POST IDENTIFICATION NUMBER TO DETERMINE THE RANGE OF PIPE REQUIREMENTS AVAILABLE FROM THE POST IDENTIFICATION TABLE (TABLE 1, DRAWING ST-2).

EXAMPLE: SIGN AREA: 250 SQ. FT.
 POST HEIGHT: 24 FT.
 SPAN LENGTH: 30 FT.
 TABLE SPAN TYPE: CONVENTIONAL
 SIGN TYPE: CONVENTIONAL
 POST IDENTIFICATION NUMBER: 3

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B

POST SELECTION TABLES

STATE PROJ. NO.

SHEET NO. OF SHEETS



16. APPENDIX

16.1 Frequently Asked Question

Source is from the MnDOT OTST Signing website

<http://www.dot.state.mn.us/trafficeng/faq/faq-signing.html>.

16.1.1 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/>.



16.1.2 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



16.1.3 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.



16.2 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 motorist 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



16.3 Standard Signs Summary

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Standard Signs Summary

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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



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R Series

No. Drawing	Color	Use & Size	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 36 x 36 O 48 x 48	R1-X3	Black on White	24 x 18 30 x 24 Use in construction areas only
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 48 x 48 x 48 F 60 x 60 x 60	R2-1	Black on White	M 18 x 24 CR-SL 24 x 30 CR-ML 30 x 36 E 36 x 48 F 48 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	R2-3P	White on Black	CR-SL 24 x 24 CR-ML 24 x 24 E, O 36 x 36 F 48 x 48
R1-3P	White on Red	CR-SL 18 x 6 CR-ML 18 x 6 O 30 x 12	R2-4b	Black on White	CR-SL 24 x 48 CR-ML 24 x 48 E, F, O 48 x 96
R1-5b	Black and Red on White	CR-SL 36 x 36 CR-ML 36 x 36 O 36 x 36	R2-4P	Black on White	CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48 F 48 x 60
R1-5c	Black and Red on White	CR-SL 36 x 48 CR-ML 36 x 48 O 36 x 48	R2-6bP	Black on White	CR-SL 24 x 18 CR-ML 24 x 18 E, F 36 x 24 O 48 x 36
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 *	R2-12	Black on White	CR-SL 24 x 36 CR-ML 24 x 36 E, F 36 x 54
R1-6c	Black, Red and White on Fluorescent Yellow-Green	* In-Street version ** Post-Mounted version	R2-X5	Black on White	CR-SL 24 x 36 CR-ML 24 x 36
R1-9b	Black 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 *	R3-1	Black and Red on White	CR-SL 24 x 24 CR-ML 36 x 36 E 36 x 36 O 48 x 48
R1-X1	Black on White	24 x 30			

R Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
R3-2	Black and Red on White	CR-SL 24 x 24 CR-ML 36 x 36 O 48 x 48	R3-9b	Black on White	CR-SL 24 x 36 * CR-ML 24 x 36 * O 36 x 48 *
R3-3	Black on White	CR-SL 24 x 24 CR-ML 36 x 36 O 48 x 48	R3-9cP	Black on White	CR-SL 30 x 12 CR-ML 30 x 12
R3-4	Black and Red on White	CR-SL 24 x 24 CR-ML 36 x 36 O 48 x 48	R3-9dP	Black on White	CR-SL 30 x 12 CR-ML 30 x 12
R3-4a	Black and Red on White	CR-SL 24 x 24 CR-ML 36 x 36 O 48 x 48	R3-17	Black on White	B/RT 24 x 18
R3-5 (R or L)	Black on White	CR-SL 30 x 36 * CR-ML 30 x 36 * O 48 x 60 *	R3-17aP	Black on White	B/RT 24 x 8
R3-5a	Black on White	CR-SL 30 x 36 * CR-ML 30 x 36 * O 48 x 60 *	R3-17bP	Black on White	B/RT 24 x 8
R3-6 (R or L)	Black on White	CR-SL 30 x 36 * CR-ML 30 x 36 * O 48 x 36 *	R3-18	Black and Red on White	CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36 O 48 x 48
R3-7 (R, L, AR, AL)	Black on White	CR-SL 30 x 30 CR-ML 36 x 36	R3-27	Black and Red on White	CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36 O 48 x 48
R3-9a	Black on White	CR-SL 30 x 36 * CR-ML 30 x 36 *	R3-33	Black on White	E, F 78 x 36
R3-X3 (R or L)	Black on White	CR-SL 30 x 36 * CR-ML 30 x 36 *	R3-X3	Black on White	RA 36 x 60

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R Series

No.	Drawing	Color	Use & Size	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	R4-8		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
R4-2		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	R4-8c		Black on White	CR-SL 18 x 30 CR-ML 18 x 30
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	R4-17a		Black on White	CR-SL 30 x 36 CR-ML 30 x 36 E, F 48 x 54
R4-3a		Black on White	F 84 x 36 Interstate use only	R4-18a		Black on White	CR-SL 30 x 36 CR-ML 30 x 36 E, F 48 x 54
R4-4		Black on White	CR/SL 36 x 30 CR/ML 36 x 30	R4-X1		Black on White	36 x 48
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-X4		Black on White	36 x 36
R4-6		Black on White	CR/SL 24 x 30 CR/ML 24 x 30 E 48 x 60	R4-X5		Black on White	CR-SL 30 x 24 CR-ML 36 x 24 E, F 48 x 36
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-X6		Black on White	78 x 42
R4-7c		Black on White	CR-SL 18 x 30 CR-ML 18 x 30	R4-X7		Black on White	42 x 48

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R Series

R3-8 LANE-USE CONTROL SIGNS

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.

EXAMPLE:

R3-8AED 54 X 30

R3-8AA 36 X 30		R3-8AF 36 X 30		R3-8DA 36 X 30	
R3-8AB 36 X 30		R3-8AG 36 X 30		R3-8DBA 54 X 30	
R3-8AC 54 X 30		R3-8AHA 48 X 30		R3-8ACC 54 X 30	
R3-8ABCA 66 X 30		R3-8AIA 54 X 30		R3-8EA 30 X 30	
R3-8ABD 54 X 30		R3-8ABA 48 X 30		R3-8EA 66 X 48	
R3-8ABCD 2 X 30		R3-8BA 36 X 30		R3-8EE 42 X 30	
R3-8ABD 54 X 30		R3-8BA 48 X 30		R3-8EA 36 X 30	
R3-8ABLA 54 X 30		R3-8CA 36 X 30		R3-8GA 36 X 30	
R3-8ABRA 54 X 30		R3-8CCA 54 X 30		R3-8HA 30 X 30	
R3-8AC 6 X 30		R3-8CEA 66 X 30		R3-8H 30 X 30	
R3-8ACA 54 X 30		R3-8CBA 66 X 30		R3-8CD 36 X 30	
		R3-8ELA 48 X 30		R3-8CEA 48 X 30	
		R3-8EBA 48 X 30			

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R Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
R4-X7P Use with R4-X7	Black on White	42 x 12 BEGIN END	R5-X2	Black on White	24 x 18 30 x 24 STATE PROPERTY KEEP OFF OUT
R4-X8	Black on White	30 x 30 BYPASS LANE	R5-X3	Black on White	24 x 18 NO RESPASSING IN DOT CROSSING HUNTING DUMPING FISHING CAMPING
R4-X8a	Black on White	30 x 36 BYPASS TURN LANE	R5-X4	Black on White	24 x 30 NO THRU TRAFFIC
R5-1	Red on White	CR-SL 30 x 30 CR-ML 36 x 36 E, O 36 x 36 F 48 x 48 DO NOT ENTER	R6-1 (R or L)	Black on White	CR-SL 36 x 12 CR-ML 54 x 18 E, F, O 54 x 18 ONE WAY Right is shown
R5-1a	Red on White	M 30 x 18 CR-SL 36 x 24 CR-ML E 42 x 30 F, O 42 x 30 WRONG WAY	R6-2 (R or L)	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 ONE WAY Right is shown
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 NO MOTOR VEHICLES	R6-3	Black on White	24 x 18 CR-SL 30 x 24 CR-ML 30 x 24 E, O 36 x 30 DIVIDED HIGHWAY
R5-3	Black on White	CR-SL 24 x 24 CR-ML 24 x 24 NO MOTOR VEHICLES	R6-3a	Black on White	24 x 18 CR-SL 30 x 24 CR-ML 30 x 24 E, O 36 x 30 DIVIDED HIGHWAY
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 NO BICYCLES	R6-4	Black on White	30 x 24 Roundabout Directional
R5-10d	Black on White	RA 18 x 24 PEDESTRIANS BICYCLES MOTOR VEHICLES MISUSE TRAFFIC PROHIBITED	R6-4a	Black on White	48 x 24 Roundabout Directional For speed zones < 45 mph and single lane approaches
R5-X1	Black and Red on White	18 x 18 NO MOTOR VEHICLES	R6-4b	Black on White	60 x 24 Roundabout Directional For speed zones < 45 mph and/or multi-lane approaches

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R Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
R6-6	Black on White	CR-SL 24 x 30 CR-ML 30 x 36 BEGIN ONE WAY	R8-8	Black on White	CR-SL 24 x 30 CR-ML 24 x 30 E 36 x 48 O 48 x 60 DO NOT STOP ON TRACKS
R6-7	Black on White	CR-SL 24 x 30 CR-ML 30 x 36 END ONE WAY	R8-41	Red on White	48 x 42 NO PARK - RIDE PARKING ONLY UNLESS SPECIAL OVERNIGHT PARKING IS PROHIBITED
R7-8m	White on Blue	12 x 18 ACCESSIBLE VARIABLE MESSAGE SIGN	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
R7-8bP Use with R7-8m	White on Blue	12 x 6 ACCESSIBLE	R9-5	Black on White	B-P, B/RT 12 x 18
R7-108 Permissive Parking Alternate legends available	Green on White	12 x 18 PERMISSIVE PARKING	R9-6	Black on White	B-P, B/RT 12 x 18
R7-X2	Red on White	18 x 24 NO TRUCK PARKING	R9-7 (R or L)	Black on White	B-P, B/RT 12 x 18
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 NO PARKING	R9-9	Black on White	30 x 18 Right is shown SIDEWALK CLOSED
R8-3mP	Red on White	M 12 x 9 CR-SL 18 x 12 CR-ML 24 x 12 BETWEEN SIGNS 10 PM TO 6 AM	R9-9a	Black on White	24 x 18 TRAIL CLOSED
Use with R8-3; alternate legends are available			R9-10	Black on White	24 x 12 48 x 24 SIDEWALK CLOSED USE OTHER SIDE
R8-4	Black on White	CR-SL 30 x 24 CR-ML, E 30 x 24 F, O 48 x 36 EMERGENCY PARKING ONLY	R9-11 (R or L)	Black on White	24 x 12 48 x 36 Right is shown SIDEWALK CLOSED AHEAD CROSS HERE
R8-7	Black on White	CR-SL 30 x 24 CR-ML, E 30 x 24 F, O 48 x 36 EMERGENCY STOPPING ONLY	R9-11a (R or L)	Black on White	24 x 12 48 x 24 Right is shown SIDEWALK CLOSED CROSS HERE

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R Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
R9-11b (R or L) Right is shown	Black on White	48 x 18 USE SIDEWALK CLOSED USE SIDEWALK OF STREET	R10-10 (R or L)	Black on White	CR-SL 30 x 36 CR-ML 30 x 36 LEFT TURN SIGNAL
R9-X1	Black on White	B-P, B/RT 12 x 18 USE HOV3+	R10-11b	Black on White	CR-SL 36 x 36 CR-ML 36 x 36 NO TURN ON RED
R9-X2	Black on White	B-P, B/RT 12 x 18 BIKE MUST NOT ENTER BAKERY	R10-12	Black and Green on White	CR-SL 30 x 36 CR-ML 30 x 36 O 36 x 48* LEFT TURN YIELD ON GREEN
R10-3	Black on White	CR-SL 9 x 12 CR-ML 9 x 12 FIRE SERVICE	* For overhead use		
R10-3b	Black and Orange on White	CR-SL 9 x 12 CR-ML 9 x 12 Alternate legends available	R10-15a	Black, Red, Fluorescent Yellow on White	CR-SL 30 x 30 CR-ML 30 x 30 E 30 x 30 TURNING VEHICLES
R10-3d	Black and Orange on White	CR-SL 9 x 12 CR-ML 9 x 12 Alternate legends available	R10-16	Black on White	CR-SL 30 x 36 CR-ML 30 x 36 U-TURN YIELD TO RIGHT TURN
R10-3e	Black and Orange on White	CR-SL 9 x 15 CR-ML 9 x 15 Alternate legends available	R10-X4	Black on White	24 x 30 RAMP METERING BEGINS FEB 25
R10-6 (R or L) Left is shown	Black on White	CR-SL 24 x 36 CR-ML 24 x 36 O 36 x 48 Alternate legend available	R10-X6	Black on White	24 x 18 1 CAR ON GREEN
R10-7	Black on White	CR-SL 30 x 30 CR-ML 30 x 30 Alternate legend available	Ramp metering use only		
R10-7a	Black on White	CR-SL 30 x 30 CR-ML 30 x 30 Alternate legend available	R10-X7	Black on White	RA 24 x 30 O 36 x 48 FORM 2 LANES WHEN METERED
			R10-X12	Black on White	CR-SL 36 x 42 CR-ML 36 x 42 O 42 x 48* LEFT TURN YIELD ON FLASHING YELLOW ARROW
			* For overhead use		
			R10-X13	Black on White	CR-SL 36 x 42 CR-ML 36 x 42 O 42 x 48* U-TURN YIELD ON FLASHING ARROW
			* For overhead use		

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R Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
R11-1	Black on White	CR-SL 24 x 30 CR-ML 24 x 30 KEEP OFF MEDIUM RAMP	R12-5a	Black on White	CR-SL 24 x 24 CR-ML 24 x 24 E 36 x 30 WEIGHT LIMIT 14 MILES AHEAD
R11-2	Black on White	48 x 30 STREET RAMP ROAD CLOSED	R12-5 Supplement	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
R11-2a	Black on White	48 x 30 BRIDGE CLOSED	R12-X2	Black on White	60 x 36 RESTRICTED BRIDGE WEIGHT LIMIT 10 TONS
R11-3a	Black on White	60 x 30 ROAD CLOSED LOCAL TRAFFIC ONLY	R12-X2a	Black on White	76 x 36 RESTRICTED BRIDGE WEIGHT LIMIT 10 TONS
R11-3b	Black on White	72 x 30 BRIDGE OUT LOCAL TRAFFIC ONLY	R12-X3	Black on White	36 x 24 TRUCKS MUST NOT MEET ON BRIDGE
R11-3c	Black on White	72 x 30 BRIDGE CLOSED LOCAL TRAFFIC ONLY	R12-X3a	Black on White	42 x 24 VEHICLES MUST NOT MEET ON BRIDGE
R11-4	Black on White	60 x 30 ROAD CLOSED THRU TRAFFIC	R12-X4	Black on White	60 x 42 RESTRICTED BRIDGE WEIGHT LIMIT 10 TONS CLEARANCE 10 FT 10"
R11-X1	Black on White	CR-SL 72 x 24 CR-ML 72 x 24 E, F 96 x 36 ROAD CLOSED WHEN FLASHING	R12-X4a	Black on White	60 x 36 RESTRICTED BRIDGE WEIGHT LIMIT 10 TONS CLEARANCE 10 FT 10"
R12-1a	Black on White	24 x 36 BRIDGE WEIGHT LIMIT 9 TONS	R12-X5	Black on White	CR-SL 90 x 36 CR-ML 90 x 36 O 120 x 48 O 150 x 60 VEHICLES OVER 9 TONS AXLE WT USE TRUCK DETOUR
R12-2	Black on White	CR-SL 24 x 30 CR-ML 24 x 30 E, O 36 x 48 AXLE WEIGHT LIMIT 5 TONS	R12-X11	Black on White	36 x 36 PERMIT WEIGHT LIMIT 45T
R12-5	Black on White	CR-SL 24 x 36 CR-ML 24 x 36 E 36 x 48 F 48 x 60 WEIGHT LIMIT 8 TONS	R14-1	Black on White	CR-SL 24 x 18 CR-ML 24 x 18 TRUCK ROUTE

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R Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
R15-3P Use with railroad crossbuck	Black on White EXEMPT	CR-SL 24 x 12 CR-ML 24 x 12	R16-X8	Black on White REST STOP NO CAMPING	CR-SL 30 x 18 CR-ML 36 x 24
R15-7	Black on White DIVIDED HIGHWAY	CR-SL 24 x 24 CR-ML 24 x 24	R16-X9	Black on White STATE LAW NO LEFT TURN ON SHOULDER	60 x 48
R15-7a	Black on White DIVIDED HIGHWAY	CR-SL 24 x 24 CR-ML 24 x 24	R16-X10	Black on White NO FISHING NO BOATING	CR-SL 18 x 24 CR-ML 18 x 24 O 24 x 30
R16-4	Black and Yellow on White FENDER BENDER MOVE VEHICLES FROM TRAVEL LINES	CR-SL 54 x 24 CR-ML 54 x 24 E, O 84 x 42 F 120 x 54	R16-X11	Black on White STATE LAW SEAT BELT USE REQUIRED	72 x 36
R16-X1	Black on White STATE LAW STOP FOR SCHOOL BUS WHEN RED LIGHT FLASHING	72 x 48	R16-X12	Black on White (VALETS)	CR-SL 18 x 18 CR-ML 18 x 18 O 36 x 36
R16-X2	Black on White STATE LAW TRUCKS AND TRAILERS MUST MAINTAIN 500 FOOT INTERVAL	78 x 48	R16-X13	Black on White VEHICLE NOISE LAWS ENFORCED	CR-SL 24 x 24 CR-ML 24 x 24 E 36 x 42
R16-X3	Black on White #11000 FINE FOR LITTERING ON HIGHWAYS	48 x 30	R16-X15	Black on White STATE LAW MOVE OVER FOR STOPPED EMERGENCY AND VEHICLES	132 x 78
R16-X4	Black on White EMERGENCY STOPPING DISTANCE	RA 36 x 36	R16-X16	Black on White DO NOT CROSS DOUBLE WHITE LINE	CR-SL 30 x 48 CR-ML 30 x 48 E, F, O 48 x 66
R16-X6	Black on White SIGNAL YOUR TURN	CR-SL 30 x 30 CR-ML 30 x 30 O 48 x 48	R16-X33	Black on White CHECK YOUR TURN SIGNAL	24 x 30
R16-X7 (R or L)	Black on White LEFT RIGHT LANE MUST EXIT	48 x 60			

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W Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
W1-1 (R or L)	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	CR-SL 48 x 24 CR-ML 48 x 24 E 72 x 36 F 96 x 48
Right is shown			W1-7	Black on Yellow	CR-SL 48 x 24 CR-ML 48 x 24 O 72 x 36 O 96 x 48
W1-1a (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 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
Right is shown			W1-10 (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-2 (R or L)	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	Right is shown		
Right is shown			W1-10a (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-2a (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 x 48	Right is shown		
Right is shown			W1-10b (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-3 (R or L)	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	Right is shown		
Right is shown			W1-10c (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-4 (R or L)	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	Right is shown		
Right is shown			W1-10d (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-4b (R or L)	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48 O 60 x 60	Right is shown		
Right is shown			W1-10e (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W1-4c (R or L)	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48 O 60 x 60	Right is shown		
Right is shown			W1-11	Black on Yellow	CR-SL 30 x 30 CR-ML 30 x 30 E 36 x 36 F, O 48 x 48
W1-5 (R or L)	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			
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".

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W Series

No. Drawing	Color	Use & Size	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	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 F 48 x 48 O 48 x 48
W1-15	Black on Yellow	CR-SL 30 x 30 CR-ML 30 x 30 F, O 48 x 48	W2-X1	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 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-X12	Black on Yellow	CR-SL 30 x 30 CR-ML 30 x 30 O 36 x 36
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	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
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	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
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	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
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	W3-4	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 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	W3-5	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F, 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	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".

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HANDOUT

W Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
W3-X4	Black on Yellow	66 x 42	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
W3-X5	Black on Yellow	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
W3-X6	Black on Yellow	72 x 24 96 x 36	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
W3-X8	Black on Yellow	66 x 42	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
W3-X8a	Black on Yellow	48 x 48	W4-5	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48
W3-X8aP	Black on Yellow	42 x 24	W4-5P	Black on Yellow	CR-SL 18 x 24 CR-ML 18 x 24 E 24 x 30
W3-X8b	Black on Yellow	36 x 36	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
W16-13P	Black on Yellow	30 x 24	W4-X1 (R or L)	Black on Yellow	E, F 48 x 48 O 60 x 60
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	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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HANDOUT

W Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
W5-2	Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W6-X2	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W5-3	Black on Yellow	M 30x30 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
W5-4a	Black on Yellow	B-P 18 x 18	W7-1a	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
W5-X1	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W7-2bP	Black on Yellow	24 x 18
W6-1	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W7-3P	Black on Yellow	24 x 18
W6-2	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W7-3aP	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	
W6-3	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W7-3bP	Black on Yellow	24 x 18
W6-4	Black on Orange	12 x 18	W7-5	Black on Yellow	B-P 18 x 18 B/RTI 30 x 30
W6-X1 (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W8-1	Black on Yellow	B-P 18 x 18 B/RTI 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 48 x 48
			W8-1a	Black on Yellow	M 24 x 24 CR-SL 30 x 30 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	No. Drawing	Color	Use & Size
W8-1b	Black on Yellow	CR-SL 30 x 30 CR-ML 36 x 36 F, O 48 x 48	W8-8	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
W8-2	Black on Yellow	B-P 18 x 18 B/RTI 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, F 36 x 36 F, O 48 x 48	W8-9	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
W8-3	Black on Yellow	B-P 18 x 18 B/RTI 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48	W8-9a	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W8-4	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E, F, O 48 x 48	W8-10	Black on Yellow	B-P 18 x 18 B/RTI 30 x 30
W8-5	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 F, O 48 x 48	W8-10P	Black on Yellow	B-P, B/RTI 12 x 9
W8-5P	Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 F, O 30 x 30	W8-11	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W8-5aP	Black on Yellow	CR-SL 24 x 12 CR-ML 24 x 12 E, F 30 x 18	W8-12	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36 F 48 x 48
W8-5bP	Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 F, O 36 x 30	W8-12a	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W8-5cP	Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 F, O 36 x 30	W8-13	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W8-7	Black on Yellow	M 24 x 24 CR-SL 36 x 36 CR-ML 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	No. Drawing	Color	Use & Size
W10-2 (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48	W10-12 (R or L)	Black on Yellow	B-P 18 x 18 CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
Right is shown			Right is shown		
W10-3 (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48	W10-X2	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
Right is shown					
W10-4 (R or L)	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48	W10-X3	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48
Right is shown					
W10-5	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 36 x 36 E, O 48 x 48
Right is shown					
W10-5P	Black on Yellow	30 x 24	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, O 48 x 48
W10-9	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48	W11-3	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, O 48 x 48
W10-9P	Black on Yellow	B-P 18 x 12 B/RT 30 x 24 CR-SL 30 x 24 CR-ML 30 x 24	W11-4	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, O 48 x 48
W10-11	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48	W11-5	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, O 48 x 48
W10-11a	Black on Yellow	CR-SL 30 x 36 CR-ML 30 x 36	W11-6	Black on Yellow	M 24 x 24 CR-SL 30 x 30 CR-ML 36 x 36 E, O 48 x 48
W10-11b	Black on Yellow	CR-SL 30 x 36 CR-ML 30 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".

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W Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
W8-14	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	W8-23	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
W8-15	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	W8-25	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
W8-15P	Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 F, O 36 x 30	W8-X13	Black on Yellow	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36
W8-16	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	W9-1 (R or L)	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
			LEFT		
W8-17 (R or L)	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	RIGHT		
Right is shown					
W8-17P	Black on Yellow	CR-SL 24 x 18 CR-ML 24 x 18 E 30 x 24 F, O 36 x 30	W9-2 (R or L)	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
W8-18	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	W9-3a	Black on Orange	48 x 48
W8-19	Black on Yellow	12 x 72	W9-7 (R or L)	Black on Yellow	132 x 72
W8-21	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	W10-1	Black on Yellow	B-P 24 Diameter B/RT 36 Diameter CR-SL 36 Diameter CR-ML 36 Diameter E, O 48 Diameter
W8-22	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	W10-1aP	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	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	W12-1	Black on Yellow	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	W12-2	Black on Yellow	B/P 18 x 18 B/RT M 30 x 30 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	W12-2a	Black on Yellow	84 x 24 Mounted on structure
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	W13-1P	Black on Yellow	35 MPH 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
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	W13-2	Black on Yellow	CR-SL 24 x 30 CR-ML 24 x 30 E 36 x 48 F, O 48 x 60
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	W13-3	Black on Yellow	CR-SL 24 x 30 CR-ML 24 x 30 E 36 x 48 F, O 48 x 60
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	W13-4P	Black on Orange	36 x 36
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	W13-6	Black on Yellow	CR-SL 24 x 42 CR-ML 24 x 42 E, F 36 x 60 O 48 x 84
W11-X3	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48	W13-7	Black on Yellow	CR-SL 24 x 42 CR-ML 24 x 42 E, F 36 x 60 O 48 x 84
W11-X3	Black on Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, O 48 x 48	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".

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W Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
W14-3	Black on Yellow	CR-SL 64 x 64 x 48 CR-ML 64 x 64 x 48	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
W14-X1	Black on Yellow	CR-SL 30 x 30 CR-ML 30 x 30 E, F 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
W14-X2	Black on Yellow	48 x 48	W16-5mP (R or L)	Black on background color matching warning sign	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 54 O 42 x 30
W14-X3	Black on Yellow	36 x 36	W16-6mP (R or L)	Black on background color matching warning sign	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
W14-X9	Black on Yellow	30 x 36	W16-7mP (R or L)	Black on background color matching warning sign	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
W14-X10	Black on Yellow	12 x 18	W16-8P	Black on Yellow	Varies x 8
W14-X11	Black on Orange	CR-SL 36 x 36 CR-ML 48 x 48 E, F 48 x 48	W16-8aP	Black on Yellow	Varies x 15
W14-X12	Black on Orange	48 x 48	W16-9P	Black on Diamond Black on Yellow-green or Yellow	Use With Diamond 30" 30" 36" 36" 48" 48" 36 x 24 30 x 24
W14-X13	Black on Orange	48 x 48	W16-13P	Black on Yellow	24 x 18 30 x 24
W14-X15	Black on Pink	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	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	No. Drawing	Color	Use & Size
W16-17P 	Black on Yellow	CR-SL 36 x 12 CR-ML 36 x 12 O 42 x 12	W20-100P 	Black on background color matching warning sign	Use w/301 diamond 24 x 18 Use w/361 diamond 30 x 24 Use w/481 diamond 42 x 18 Use w/487 diamond 42 x 24 Use w/601 diamond 48 x 36 Alternate legends available
W19-1 	Black on Yellow	F 144 x 48	W20-X3 	Black on Orange or Yellow	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W19-2 	Black on Yellow	E 144 x 48	W20-X4 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W19-5 	Black on Yellow	E, F 90 x 48	W20-X6 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-1 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W20-X9 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-1a 	Black on Orange	36 x 18	W20-X10 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-2 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W20-X11 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-3 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W20-X12 	Black on Orange	E, F 48 x 48
W20-3a 	Black on Orange	B-P 18 x 18	W20-X13 	Black on Orange	E, F 48 x 48 Right is shown
W20-4 	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			

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	No. Drawing	Color	Use & Size
W20-X16 	Black on Orange	E, F 48 x 48	W21-X4 	Black on Orange	60 x 20 90 x 26
W20-X17 	Black on Orange	CR-ML 36 x 36 E, F 48 x 48	W21-X4a 	Black on Orange	60 x 20 90 x 26
W20-X18 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W21-X5 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W20-X19 	Black on Orange	E, F 48 x 48	W21-X5a 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 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-X6 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
W21-2 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W21-X7 	Black on Orange	18 x 18 36 x 36
W21-6a 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W21-X8 	Black on Yellow	36 x 30
W21-7 	Black on Orange	CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48	W21-X9 	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)

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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M Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
M1-1		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*	M1-5b		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*
* 3 digit			Overlay use	* 3 digit	
M1-2		White on Green M 18 x 18 CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36 E, F 45 x 36*	M1-5ab		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*
Business Loop			Independent use	* 3 digit	
M1-3		White on Green M 18 x 18 CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36	M1-5bb		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*
Business Spur			Independent use	* 3 digit	
M1-4		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*	M1-6		White and Yellow on Blue 24 x 24 24 x 24 30 x 24* 30 x 24* 36 x 36 45 x 36*
Independent use	* 3 digit		Overlay use	* 3 digit	
M1-4a		Black on White 18 x 18 22.5 x 18* 24 x 24 30 x 24* 24 x 24 30 x 24* 30 x 24* 36 x 36 45 x 36*	M1-6a		White and Yellow on Blue 18 x 18 22.5 x 18* 24 x 24 30 x 24* 24 x 24 30 x 24* 30 x 24* 36 x 36 45 x 36*
Independent use	* 3 digit		Independent use		
Overlay use	* 3 digit		Overlay use	* 3 digit	
M1-4b		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*	M1-9x		White and Blue on Green CR-SL 18 x 24 CR-ML 18 x 24 E 18 x 24 B, P, B-RI 12 x 18
Independent use	* 3 digit		Independent use		
M1-4ab		White on Green 24 x 24 30 x 24* 24 x 24 30 x 24* 30 x 24* 36 x 36 45 x 36*	M1-10a		White on Blue F 36 x 36
Independent use	* 3 digit		Independent use		
Overlay use	* 3 digit		Overlay use	* 3 digit	
M1-5a		White and Gold on Blue CR-SL 24 x 24 CR-SL 30 x 24* CR-ML 24 x 24 CR-ML 30 x 24* E, F 36 x 36 E, F 45 x 36*	M1-X1		Green on White CR-SL 24 x 24 CR-ML 24 x 24 E, F 36 x 36
Independent use	* 3 digit		Independent use		
Use with M1-X1			Use with M1-X1		

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W Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
W21-X10		Black on Orange 60 x 36 72 x 42	W24-1a		Black on Orange CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
Striper Train Sign			(R or L)		
W21-X11		Black on Orange 54 x 22	W24-1b		Black on Orange CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48
Striper Train Sign			(R or L)		
Arrow is demountable			Right is shown		
W21-X12		Black on Orange 72 x 18			
Striper Train Sign					
W21-X13		Black on Orange 72 x 36 90 x 42			
Striper Train Sign					
W22-1		Black on Orange CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48			
Blasting Area Prohibition					
W22-2		Black on Orange 42 x 36			
Blasting Area Prohibition					
W22-3		Black on Orange M 36 x 30 CR-SL 42 x 36 CR-ML 42 x 36 E, F 42 x 36			
Blasting Area Prohibition					
W23-2		Black on Yellow or Orange CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48			
Blasting Area Prohibition					
W24-1		Black on Orange CR-SL 36 x 36 CR-ML 36 x 36 E, F 48 x 48			
(R or L)					
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".

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M Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
M1-X4 CARMER COUNTY 5	Black on White	CR-SL 24 x 24 CR-ML 24 x 24 E, F, O 36 x 36	M3-4a	WEST	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
Independent use			M4-1	ALTERNATE	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M1-X4a COUNTY 5	Black on White	24 x 24 24 x 24 36 x 36	M4-1a	ALT	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
Overlay use			M4-2	BY-PASS	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M1-X4b WISSE COUNTY D	White and Yellow on Blue	CR-SL 24 x 24 CR-ML 24 x 24	M4-3	BUSINESS	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M2-1	Black on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24	M4-4	TRUCK	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M2-1a	White on Blue	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24	M4-5	TO	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-1	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M4-5a	TO	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-1a	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M4-6	END	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-2	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M4-6a	END	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-2a	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M4-7	TEMPORARY	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-3	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M4-7a	TEMP	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-3a	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M4-8	DETOUR	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18
M3-4	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18			

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M Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
M4-8a	Black on Orange	CR-SL 24 x 18 CR-ML 24 x 18 E, F, O 36 x 18	M5-1a (R or L)	Right is shown	White on Blue, Brown or Green * These signs shall be white on green
M4-9m (R, L, T, R45, L45, ATR, ATR45, ATL, ATL45, ATR90, or ATL90)	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24 E, F, O 42 x 36	M5-2 (R or L)	Right is shown	Black on White or Green on White
M4-9ma (R, L, or T)	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24	M5-2a (R or L)	Right is shown	White on Blue, Brown or Green
M4-9mb (R, L, or T)	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24	M5-3	Right is shown	Black on White or Green on White
M4-9mc (R, L, or T)	Black on Orange	CR-SL 30 x 24 CR-ML 30 x 24	M5-3a	Right is shown	White on Blue, Brown or Green
M4-10 (R or L)	Black on Orange	CR-SL 48 x 18 CR-ML 48 x 18	M5-4	LEFT LANE	Black on White or Green on White
M4-14	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M5-4a	LEFT LANE	White on Blue, Brown or Green
M4-14a	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M5-5	CENTER LANE	Black on White or Green on White
M4-X1	Black on White	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M5-5a	CENTER LANE	White on Blue, Brown or Green
M4-X1a	White on Blue	CR-SL 24 x 12 CR-ML 24 x 12 E, F, O 36 x 18	M5-6	RIGHT LANE	Black on White or Green on White
M5-1 (R or L)	Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24	M5-6a	RIGHT LANE	White on Blue, Brown or Green

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M Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
M6-1 (R or L) Right is shown	Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24	M6-6 (R or L) Right is shown	Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-1a (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	M6-6a (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
M6-2 (R or L) Right is shown	Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24	M6-7 (R or L) Right is shown	Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-2a (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	M6-7a (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
M6-3 Right is shown	Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24	M6-X2	Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24
M6-3a 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	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
M6-4 Right is shown	Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24			
M6-4a 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			
M6-5 (R or L) Right is shown	Black on White or Green on White	CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24			
M6-5a (R or L) Right is shown	White on Blue, Brown or Green	B-P, B/RT 12 x 9 * CR-SL 21 x 15 CR-ML 21 x 15 E, F, O 30 x 24			

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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-X2 24 x 24 Brown on White		M1-X5k 24 x 24 Red & Black on White	
M1-X5a 24 x 24 White on Green		M1-X5l White on Brown		M1-X5d White on Brown		M1-X5m 24 x 24 Blue on White	
M1-X5b White on Brown		M1-X5p 24 x 24 White on Blue		M1-X5e White on Brown		M1-X5n White on Brown	
M1-X5c White on Brown		M1-X5q White on Brown		M1-X5f White on Brown		M1-X5o Various on White	
M1-X5d White on Brown		M1-X5r White on Brown		M1-X5g 24 x 24 White on Green		M1-X5p 24 x 24 White on Blue	
M1-X5e White on Brown		M1-X5s White on Brown		M1-X5h White on Green		M1-X5q White on Brown	
M1-X5f White on Brown		M1-X5t 24 x 24 White on Green		M1-X5i White on Brown		M1-X5r White on Brown	
M1-X5g White on Brown		M1-X5u White on Brown		M1-X5j White on Brown		M1-X5s White on Brown	
M1-X5h White on Brown		M1-X5v White on Brown		M1-X5k White on Brown		M1-X5t White on Green	
M1-X5i White on Brown		M1-X5w White on Brown		M1-X5l White on Brown		M1-X5u White on Brown	
M1-X5j White on Brown		M1-X5x White on Brown		M1-X5m 24 x 24 Blue on White		M1-X5v White on Brown	
M1-X5k White on Brown		M1-X5y White on Brown		M1-X5n White on Brown		M1-X5w White on Brown	
M1-X5l White on Brown		M1-X5z White on Brown		M1-X5o Various on White		M1-X5x White on Brown	
M1-X5m White on Brown				M1-X5p 24 x 24 White on Blue		M1-X5y White on Brown	
M1-X5n White on Brown				M1-X5q White on Brown		M1-X5z White on Brown	
M1-X5o Various on White				M1-X5r White on Brown			
M1-X5p 24 x 24 White on Blue				M1-X5s White on Brown			
M1-X5q White on Brown				M1-X5t 24 x 24 White on Green			
M1-X5r White on Brown				M1-X5u White on Brown			
M1-X5s White on Brown				M1-X5v White on Brown			
M1-X5t White on Green				M1-X5w White on Brown			
M1-X5u White on Brown				M1-X5x White on Brown			
M1-X5v White on Brown				M1-X5y White on Brown			
M1-X5w White on Brown				M1-X5z White on Brown			
M1-X5x White on Brown							
M1-X5y White on Brown							
M1-X5z White on Brown							

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M Series

No., Size & Color	Drawing	No., Size & Color	Drawing
M1-X5nn White on Brown		M1-X5tt White on Brown	
M1-X5oo 24 x 24 White, Red & Black on Green		M1-X5vv White on Brown	
M1-X5pp White on Brown		M1-X5xx 66 x 66 White on Blue	
M1-X5rr 24 x 24 Yellow & Black on White		M1-X5yy 24 x 24 Violet, Red & Green on White	
M1-X5ss White on Brown		M1-X514 24 x 36 Black on White and Yellow	

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-X5vv 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 Skalmann Mem. Hwy.
 M1-X520 Sergeant Joseph Bergeron Mem. Hwy.
 M1-X521 Officer Scott Patrick Mem. Hwy.

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G Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
G20-1 	Black on Orange	CR-SL 60 x 24 CR-ML 84 x 36 E, F	G20-X7 	Black on Orange	E, F 48 x 48
G20-2a 	Black on Orange	48 x 24	Variable arrow angle		
G20-4 	Black on Orange	36 x 18	G20-X8 	Black on Orange	42 x Var. 60 x Var. 72 x Var. 84 x Var. 96 x Var.
G20-5aP 	Black on Orange	CR-SL 24 x 36 CR-ML 24 x 36 E, F 36 x 24 O 48 x 36			
G20-X1 	Black on Orange	M 36 x 30 CR-SL 54 x 48 CR-ML, E 72 x 60 F 90 x 78	G20-X9 	Black on Orange	30 x 36
Closure Notice 	Black on Orange	DETOURED	Variable arrow angle		
G20-X2 	Black on Orange	M 66 x 60 CR-SL 96 x 84 CR-ML, E 132 x 108 F 168 x 132	G20-X10 	Black on Orange	48 x 60
G20-X3 	Black on Orange	60 x 24	G20-X11 	Black on Orange	48 x 24 78 x 30
Mount under G20-1			G20-X12 	Black on Orange	60 x 18 84 x 24
G20-X4 	Black on Orange	72 x 18	To be used over W21-X4A		
Zone Sign 	Black on Orange	60 x 24	G20-X13 	Black on Orange	42 x 24
Business Sign 	Black on Orange	60 x 24	G20-X14 	Black on Orange	96 x 48
Identification Sign 	Black on Orange	60 x 30	G20-X15 	Black on Orange	48 x 54
G20-X6 	Black on Orange	CR-SL 36 x 24 CR-ML, E 48 x 36 O 66 x 48	G20-X16 	Black on Orange	48 x 18
G20-X5 	Black on Orange	60 x 24	G20-X17 	Black on Orange	96 x 48

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S Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
S1-1	Black on Fluorescent Yellow-Green	M 30 x 30 CR-SL 36 x 36 CR-ML 36 x 36 O 48 x 48	S5-2	Black on White	CR-SL 24 x 30 CR-ML 24 x 30 O 36 x 48
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			

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D Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
D1-1 (R or L)	White on Green	CR-SL Var. x 24 CR-ML Var. x 24 E Var. x 30	D1-X4 (R or L)	White on Green	CR-SL 48 x 12 CR-ML 48 x 12 E 60 x 18
D1-1a (R or L)	White on Green	CR-SL Var. x 24 CR-ML Var. x 24 E Var. x 30	D1-X5 (R or L)	White on Green	M 48 x 24 CR-SL 72 x 36 CR-ML 72 x 36 E 96 x 48
D1-2	White on Green	CR-SL Var. x 42 CR-ML Var. x 42 E Var. x 54	D1-X6 (R or L)	White on Green	M 54 x 24 CR-SL 78 x 36 CR-ML 78 x 36 E 108 x 48
D1-2a	White on Green	CR-SL Var. x 42 CR-ML Var. x 42 E Var. x 54	D1-X7 (R, L or T)	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
D1-2d	White on Green	CR-SL Var. x 42 CR-ML Var. x 42	D1-X8 (R, L or T)	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
D1-3	White on Green	CR-SL Var. x 60 CR-ML Var. x 60 E Var. x 72	D1-X9 (R or L)	White on Green	CR-SL 30 x 36 CR-ML 30 x 36 E 42 x 48
D1-3a	White on Green	CR-SL Var. x 60 CR-ML Var. x 60 E Var. x 72	D2-1	White on Green	CR-SL Var. x 18 CR-ML Var. x 18 E Var. x 24
D1-3d	White on Green	CR-SL Var. x 60 CR-ML Var. x 60	D2-2	White on Green	CR-SL Var. x 30 CR-ML Var. x 30 E Var. x 36
D1-X1 (R or L)	White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 54 x 48	D2-3	White on Green	CR-SL Var. x 42 CR-ML Var. x 42 E Var. x 48
D1-X1a (R, L or T)	White on Green	M 30 x 18 CR-SL 54 x 24 CR-ML 54 x 24 E 66 x 36	D3-X1	White on Green	Var. x 24
D1-X2 (R, L or DH)	White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 66 x 48	D3-X2	White on Green	Var. x 24
D1-X3 (R or L)	White on Green	M 36 x 24 CR-SL 54 x 36 CR-ML 54 x 36 E 66 x 48	D3-X3	White on Green	Var. x 48

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D Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
D4-1	Green on White	30 x 24	D5-X1a	White on Blue	36 x 12
D4-2 (R or L)	White on Green	CR-SL 30 x 36 CR-ML 30 x 36 E 36 x 48 O 54 x 72	For use with D5-X1		
Right is shown Transit logo to be specified			D5-X1b	White on Brown	36 x 18
D4-2a	White on Green	36 x 42	D5-X1c	White on Brown	36 x 18
For on site use			D5-X2 (R or L)	White on Blue	36 x 30
D5-1	White on Blue	CR-SL 78 x 36 CR-ML 78 x 36 E 114 x 48 F 132 x 60	Right is shown		
D5-1a	White on Blue	CR-SL 78 x 36 CR-ML 78 x 36 E 114 x 48 F 132 x 60	D6-2a	White on Blue	36 x 36
D5-1c	White on Blue	F 138 x 114	D6-3a (R or L)	White on Blue	36 x 30
D5-2a	White on Blue	CR-SL 42 x 48 CR-ML 42 x 48 E 66 x 72 F 78 x 78	Right is shown		
D5-6	White on Blue	CR-SL 78 x 54 CR-ML 78 x 54 E 108 x 66 F 132 x 78	D7-X1 (R or L)	White on Brown	36 x 36
D5-X1 (R or L)	White on Blue	36 x 36	D7-X2 (R or L)	White on Brown	36 x 30
Right is shown			D7-X5 (R or L)	White on Brown	36 x 36

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D Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
D7-X6a (R or L)	White on Brown	36 x 36	D7-X11a (R, L or T)	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 54 x 48
Right is shown			Right is shown		
D7-X6 (R or L)	White on Brown	36 x 30	D7-X12 (R, L or T)	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 54 x 48
Right is shown			Right is shown		
D7-X7 (R or L)	White on Brown	Var. x 30	D7-X13	White on Brown	24 x 24
Public Boat Launch			Right is shown		
D7-X7a (R or L)	White on Brown	Var. x 30	D7-X14	White on Brown	24 x 24
Right is shown			Right is shown		
D7-X8	White on Brown	24 x 24	D7-X15 (R, L or T)	White on Brown	M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 48 x 48
Public Boat Launch Trailblazer			Right is shown		
D7-X8a	White on Brown	24 x 24	D7-X15a (R or L)	White on Brown	CR-SL 48 x 36 CR-ML 48 x 36 E 66 x 48
Public Canoe Access Trailblazer			Right is shown		
D7-X9 (R, L or T)	White on Brown	M 18 x 24 CR-SL 30 x 36 CR-ML 30 x 36 E 42 x 48	D7-X16 (R, L or T)	White on Green	M 36 x 24 CR-SL 54 x 36 CR-ML 54 x 36 E 66 x 48
Right is shown			Right is shown		
D7-X10 (R, L or T)	White on Brown	M 18 x 24 CR-SL 30 x 36 CR-ML 30 x 36 E 42 x 48	D7-X17 (R, L or T)	White on Green	M 36 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 66 x 48
Right is shown			Right is shown		
D7-X11 (R, L or T)	White on Brown	M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 60 x 48	D7-X18 (R, L or T)	White on Green	M 36 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 66 x 48
Right is shown			Right is shown		
D7-X11a (R, L or T)	White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 54 x 48	D7-X19 (R, L or T)	White on Green	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 54 x 48
Right is shown			Right is shown		

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D Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
D7-X20 (R, L or T) Right is shown	White on Brown	PICNIC GROUNDS M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36	D9-1P TTY Symbol	White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
D7-X21 (R, L or T) Right is shown	White on Brown	GOLF COURSE M 24 x 24 CR-SL 36 x 36 CR-ML 36 x 36 E 36 x 36	D9-2 H	White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
D7-X22 (R, L or T) Right is shown	White on Brown	DISC GOLF COURSE M 30 x 24 CR-SL 48 x 36 CR-ML 48 x 36 E 48 x 36	D9-2a (R, L, T, or ALT) Hospital Trailblazer Right is shown	White on Blue	24 x 48
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	D9-2b (R or L) For non-freeway use Right is shown	White on Blue	CR-SL 48 x 24 CR-ML 48 x 24 E 60 x 30
BICYCLE RS-261			D9-6 Wheelchair Accessible Right is shown	White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30
CAMPING RS-279			D9-10a (R or L) Right is shown	White on Blue	M 30 x 24 CR-SL 42 x 36 CR-ML 42 x 36 E 60 x 48
CROSS COUNTRY SKIING RS-246			D9-X1 (R or L) Use with freeway services Right is shown	White on Blue	48 x 24
EMERGENCY INFORMATION RS-204			D9-X3 (R &/or L)	White on Blue	66 x 12
SHOULDER WORKING RS-278			D9-X4 (R &/or L)	White on Blue	66 x 12
D9-1	White on Blue	CR-SL 24 x 24 CR-ML 24 x 24 E, F 30 x 30			

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D Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
D9-X6 (R or L) Specific Service	White on Blue	72 x 18	D10-X2 Highway Number Plate	White on Green	10 x 10
ISLAND RESORT			D11-1	White on Green	24 x 18
ROUND LAKE CAMPGROUND			D12-2a	White on Blue	CR-SL 60 x 30 CR-ML 60 x 30 E, F 114 x 48
CLOSED 15 x 10 plate 18 x 12 logo			D12-2b	White on Blue	102 x 36
FREDDIE'S FEEDS			D12-4m	White on Blue	CR-SL 66 x 24 CR-ML 66 x 24 E 90 x 36 F 114 x 48
48 x 12 logo			D12-X5	White on Blue	CR-SL 90 x 36 CR-ML 90 x 36 E, F 114 x 48
NEXT RIGHT					
72 x 12 for mainlines at interchanges					
D10-1 Reference Location For one digit use	White on Green	CR-SL 10 x 18 CR-ML 10 x 18 E, F 12 x 24			
D10-2 Reference Location For two digit use	White on Green	CR-SL 10 x 27 CR-ML 10 x 27 E, F 12 x 36			
D10-3 Reference Location For three digit use	White on Green	CR-SL 10 x 36 CR-ML 10 x 36 E, F 12 x 48			
D10-5a Enhanced Reference Location	White on Green	18 x 48			
Route marker colors shall be as shown in the M Series					

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E Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
E1-5aP	Black on Yellow	E, F 72 x 30 	E10-1	White on Blue	E, F 144 x 84
E1-5bP	Black on Yellow and White on Green	E, F Var. x 54 	Motorist Services		Variable legends. Overlays may be used.
E1-5P	White on Green	E, F Var. x 30 	E10-1 Supplement	White on Blue	Var. x 12
E1-6	White on Green	RA 36 x 18 	Overlays for use on E10-1		
E3-X1	White on Blue	E, F 90 x 16 	E10-3	White on Blue	E, F 120 x 48 E, F 132 x 48
E5-1	White on Green	E 72 x 60 	E10-4 (R or L)	White on Blue	78 x 36
E5-1a	White on Green	E, F 72 x 60 	E10-5 (R &/or L)	White on Blue	RA 48 x 12
E5-1b	White on Green	E, F Var. x 84 	E10-6 (R &/or L)	White on Blue	RA 48 x 12
E5-1bP	White on Green	E, F 42 x 30 	E10-7 (R &/or L)	White on Blue	RA 48 x 12
		E, F 72 x 30 	E10-8 (R &/or L)	White on Blue	RA 48 x 12
		E, F 120 x 30 	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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I Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
I1-1	White on Green	CR-SL 24 x 36 CR-ML 24 x 36 	I-11m	White on Green	CR-SL 24 x 24 CR-ML 24 x 24
I2-3	White on Green	CR-SL Var. x 24 CR-ML Var. x 54 CR-SL Var. x 56* CR-ML Var. x 36* E, F Var. x 36* E, F Var. x 48* * For use with two line names 	I-12	White on Green	CR-SL 24 x 24 CR-ML 24 x 30 O 30 x 30
I2-5	White on Green	CR-SL Var. x 24 CR-ML Var. x 24 E, F Var. x 36 	I-X1	White on Blue	42 x 24 CR-SL 60 x 36 CR-ML 60 x 36 E, F 60 x 36
I2-10	Various	66 x 42 	Rest Area and Ramp signs to be made in 42 x 24 size only		
I2-12	Various	66 x 42 	I-X1P	White on Blue	24 x 24
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 			

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E Series

No. Drawing	Color	Use & Size	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 Overlay	Black on Yellow ONLY	CR-ML 42 x 14 E, F 52 x 16			
E11-2 Overlay	Black on Yellow LEFT	CR-ML 44 x 16 E, F 54 x 18			
E11-X2 Overlay	White on Red PROHIBITED VEHICLES	M 114 x 10 CR-SL 150 x 14 CR-ML 150 x 14 E, F 186 x 16			
E13-1P	Black on Yellow 35 MPH	E, F 72 x 24			

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X Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
X1-1	Black on White 	60 x 36	X4-3 Type 2 Object Marker	Yellow 	6 x 12
X1-2	Black on White 	60 x 36	X4-4 (R, L, or C) Type 3 Object Marker	Black on Yellow 	12 x 24 * 12 x 36 CR-ML 12 x 36 E, F 18 x 36 12 x 12 ** 12 x 18 ** 12 x 18 ** 18 x 18 **
X1-3	Black on White 	24 x 18	X4-5 Snowplow Marker	Black on Yellow 	6 x 12
X1-5	Black on White 	CR-SL 42 x 30 CR-ML 42 x 30 E, F 72 x 48	X4-6 Guide Delineator	Black on White or Yellow 	8 x 24
X3-1	Green on White 	9.5 x 12.75	X4-8 One-Tenth Mile Delineator	White 	4 x 4
X3-2	Black on White 	12 x 8	X4-11 Type 4 Object Marker	Red on Black or Red 	18 x 18
X3-3	Green on White 	9.5 x 12.75	Used for end of roadway		
X3-4	Black on White 	12 x 8	X4-12a Bridge Number	Black on White 	6 x 15 * 6 x 18 **
Used for scenic easement			X4-13 Cylinder Style Delineator	White or Yellow on Black 	9 - 12 high 6 - 8 diameter
X3-6a	Black on Yellow 	18 x 12			
X4-2 Type 1 Object Marker	Yellow on Black or Yellow 	18 x 18			




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HANDOUT

HANDOUT

X Series

No. Drawing	Color	Use & Size	No. Drawing	Color	Use & Size
X4-24 Fire Hydrant Marker		Red on White CR-SL 8 x 12 CR-ML 8 x 12 E, F 12 x 18			
X5-1		White on Green			12 x 6
X5-2		Black on Yellow			8 x 9

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HANDOUT