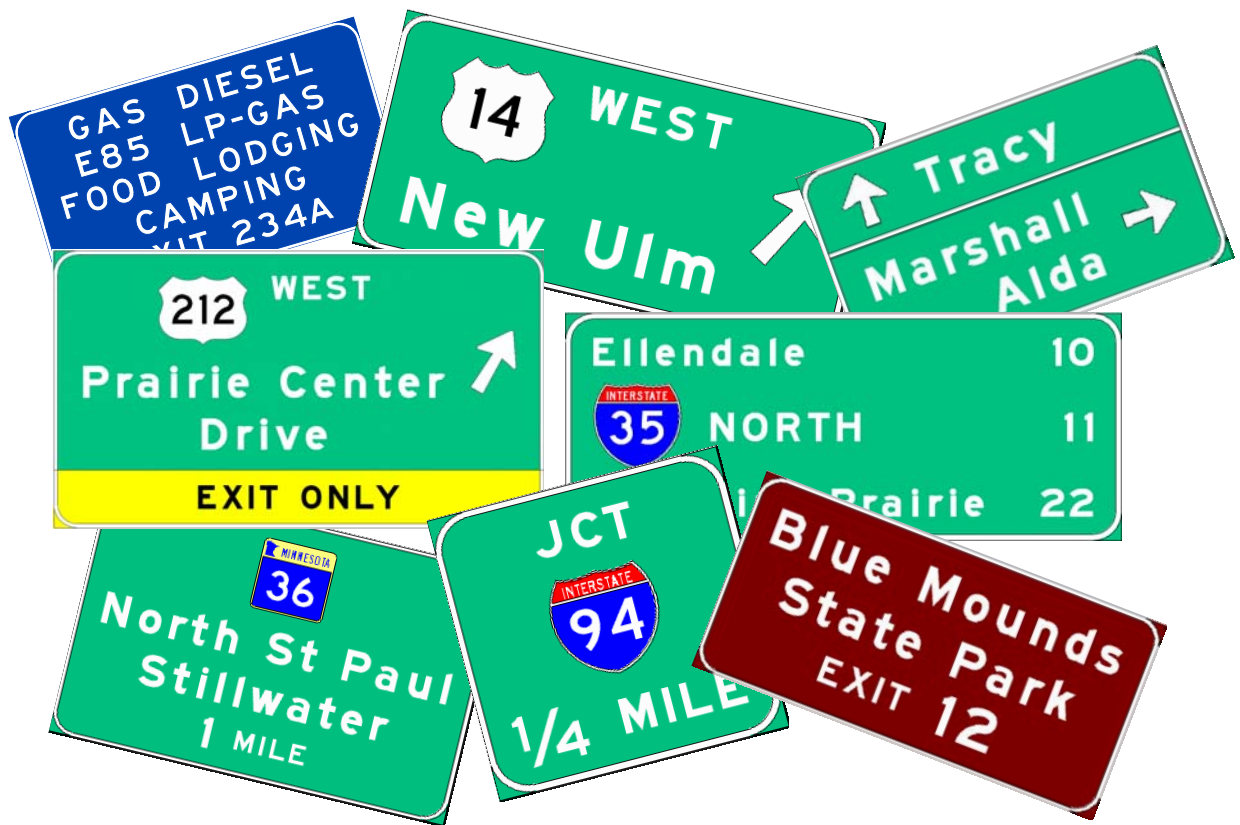


Freeway Signing Plan Design Course Manual



April 2008



Office of
Traffic,
Security, and
Operations

TABLE OF CONTENTS

1. INTRODUCTION.....	1-1
1.1 Background	1-1
1.2 Tentative Course Schedule	1-2
1.3 Instructor Information	1-2
1.4 Contact Information	1-3
1.5 Acknowledgements	1-3
1.6 Disclaimer	1-3
 2. MN MUTCD PART 2.....	2-1
 3. TEM CHAPTER 6	3-1
 4. SAMPLE PLAN SET	4-1
 APPENDIX A - 2001 ITE TRAFFIC CONTROL DEVICES HANDBOOK SIGNING PRIORITIES A-1	
 APPENDIX B - SIGN SYMBOLS OVERVIEW	B-1
 APPENDIX C – TYPE A POST SIZING CHART, TYPE C & D SIGN POST LENGTH DETERMINATION, & TYPE OH POST SIZING CHARTS	C-1

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 one-day course is designed for persons who need to acquire signing plan design skills. A sample signing plan set is provided as a reference.

This manual has been divided into six sections that contain the following information:

Section 1 – Introduction

Section 2 – MN MUTCD Part 2

Section 3 – Traffic Engineering Manual (TEM) Chapter 6

Sections 2 and 3 are annotated as follows:

Heading/Text Annotation	Description
Highlighted text	Topic will be covered in the course.
Not highlighted	Topic will not be covered in the course; however, informational material relating to the course may be contained in the text.
Red	Additions or corrections.

Note: Some of the MN MUTCD and TEM pages may not be 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.

Section 4 – Sample signing plan set

Section 5 – Slides that follow class instruction

Section 6 – Appendix material

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 Mn/DOT Office of Traffic, Security & Operations website. The website is:

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

1.2 Tentative Course Schedule

Time	Topic	Reference
8:00 a.m.	Introduction	
8:15 a.m.	General Principles	MUTCD 2A / TEM 6-4
	Regulatory Signs	MUTCD 2B / TEM 6-5
	Warning Signs	MUTCD 2C / TEM 6-6
	Guide Signs – Conventional Roads	MUTCD 2D / TEM 6-7
10:00 a.m.	Break	
10:15 a.m.	Guide Signs – Freeways and Expressways	MUTCD 2E / TEM 6-7
11:30 a.m.	Lunch	
12:30 p.m.	Guide Signs – Freeways and Expressways	MUTCD 2E / TEM 6-7
2:00 p.m.	Break	
2:15 p.m.	Plan Design	Sample Plan Set
4:00 p.m.	Adjourn*	

* Note: Instructors will be available after training to answer individual questions.

1.3 Instructor Information

Mike Weiss, PE will serve as a technical resource for the development and course instruction. Mike has been working with Mn/DOT for many years as the Mn/DOT State Signing Engineer dealing with Federal and state signing standards, policies and guidelines.

Rick Sunstrom will serve as a technical resource for the development and course instruction. Rick has been working in the field of traffic engineering at Mn/DOT. His focus of experience is primarily in the area of freeway and contract signing projects.

John Albeck, PE, PTOE will serve as facilitator for the course. John is a senior transportation engineer with Albeck Gerken, Inc.

Bryan Guy, EI will serve as co-facilitator for the course. Bryan is a transportation engineer with Albeck Gerken, Inc.

1.4 Contact Information

Mn/DOT's technical experts are listed below with contact information:

Name	Email	Phone	Fax
Mike Weiss	Mike.Weiss@dot.state.mn.us	651.234.7382	651.234.7370
Rick Sunstrom	Rick.Sunstrom@dot.state.mn.us	651.234.7381	651.234.7370

1.5 Acknowledgements

The development of this Freeway Signing Plan Design Manual has been a result of the efforts of the Mn/DOT Office of Traffic, Security & Operations and Albeck Gerken, Inc. The contributions by Mike Weiss and Rick Sunstrom are gratefully acknowledged.

1.6 Disclaimer

This workbook is disseminated under the sponsorship of the Minnesota Department of Transportation (Mn/DOT), Office of Traffic, Security & Operations. Mn/DOT and Albeck Gerken, Inc. assume no liability for its contents or use thereof.

Mn/DOT does not endorse products or manufactures. Trademarks of manufacturers' names appear herein only because they are considered essential to the object of this workbook.

2. MN MUTCD PART 2

PART 2. SIGNS

Chapter 2A. General

TABLE OF CONTENTS

Chapter 2A.	GENERAL	Page
Section 2A.1	Function and Purpose of Signs	2A-1
2A.2	Definitions	2A-1
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
2A.7	Changeable Message Signs	2A-2
2A.8	Retroreflectivity and Illumination	2A-3
2A.9	Maintaining Minimum Retroreflectivity	2A-5
2A.10	Shapes	2A-7
2A.11	Sign Colors	2A-7
2A.12	Dimensions	2A-7
2A.13	Symbols	2A-7
2A.14	Word Messages	2A-10
2A.15	Sign Borders	2A-10
2A.16	Standardization of Location	2A-10
2A.17	Overhead Sign Installations.	2A-13
2A.18	Mounting Height	2A-14
2A.19	Lateral Offset.	2A-14
2A.20	Orientation	2A-15
2A.21	Posts and Mountings	2A-15
2A.22	Maintenance.	2A-15
2A.23	Median Opening Treatments for Divided Highways with Wide Medians	2A-15

FIGURES

Figure 2A-1	Heights and Lateral Locations of Signs for Typical Installations.	2A-11
Figure 2A-2	Examples of Locations for Signs at Intersections.	2A-12

TABLES

Table 2A-1	Illumination of Sign Elements.	2A-4
Table 2A-2	Retroreflection of Sign Elements	2A-4
Table 2A-3	Minimum Maintained Retroreflectivity Levels.	2A-6
Table 2A-4	Use of Sign Shapes	2A-8
Table 2A-5	Common Uses of Sign Colors.	2A-9

MN Rev. 2

MN Rev. 2

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.

2A.6 Design of Signs

SUPPORT:

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

In the specifications for individual signs, 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 and alphabets are shown in the Mn/DOT "Standard Signs Manual" (see Map & Manual Sales Unit, page ii), the Federal "Standard Highway Signs" book (see Government Printing Office, page ii).

Section 1A.11 contains information regarding how to obtain these publications.

The basic requirements of a highway 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 or symbols, 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.

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

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

Except as stated in the Option below, Internet addresses shall not be shown on any sign, supplemental plaque, sign panel (including logo panels on logo signs) or changeable message sign.

GUIDANCE:

Unless otherwise stated in this Manual for a specific sign, and except as stated in the Option below, phone numbers of more than four characters should not be used on any sign, supplemental plaque, sign panel (including logo panels on logo signs) or changeable message sign.

OPTION:

Internet addresses or phone numbers with more than four characters may be shown on signs, supplemental plaque, sign panels, and changeable message signs that are intended for viewing only by pedestrians, bicyclists, occupants of parked vehicles, or drivers of vehicles on low-speed roadways where engineering judgment indicates that drivers can reasonably safely stop out of the traffic flow to read the message.

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.

2A.7 Changeable Message Signs

STANDARD:

Changeable message signs, which are traffic control devices designed to display variable messages, shall conform to the principles established in this Manual, and to the extent practical, with the design and applications prescribed in Sections 2E.21, 6F.2 and 6F.55.

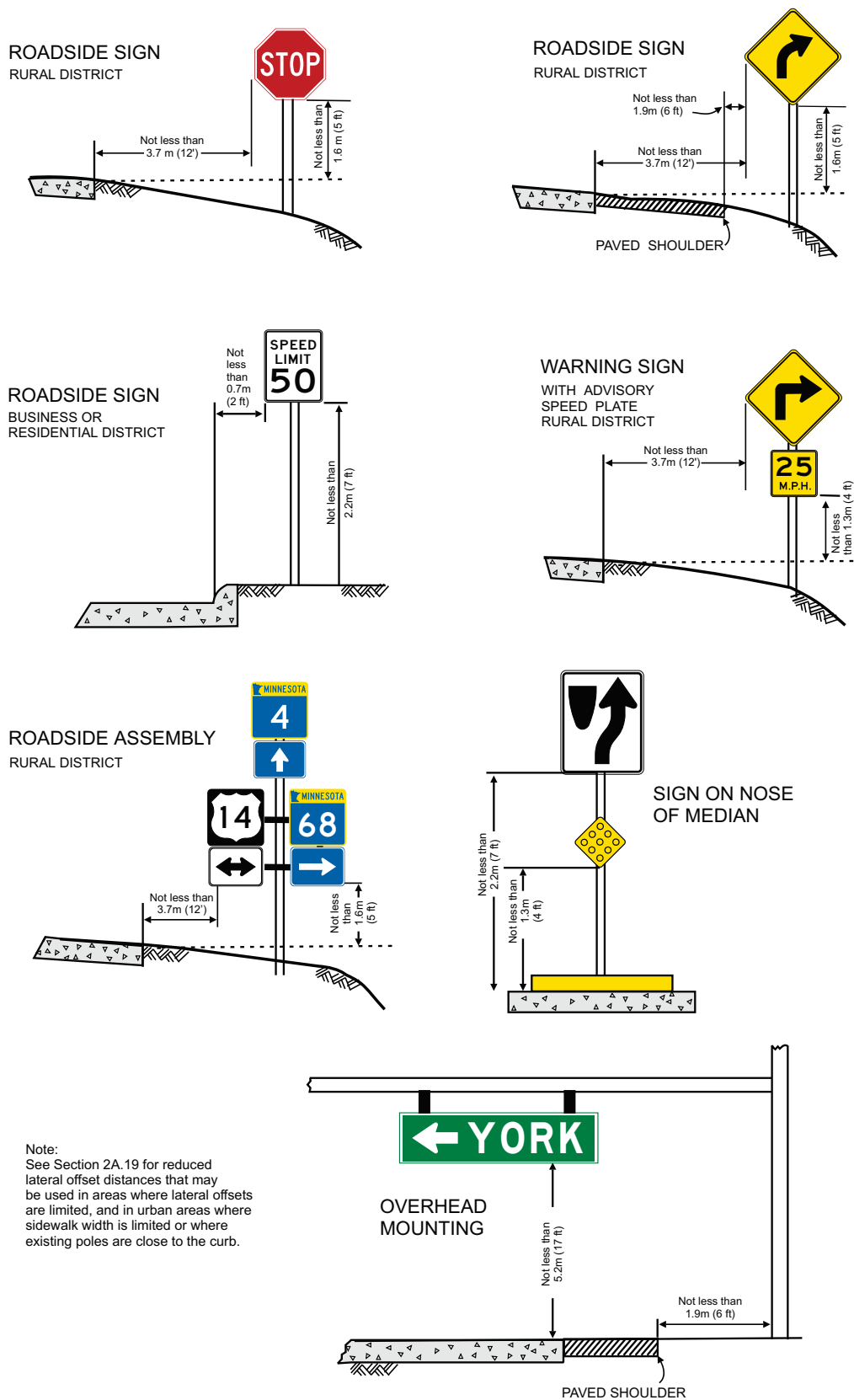
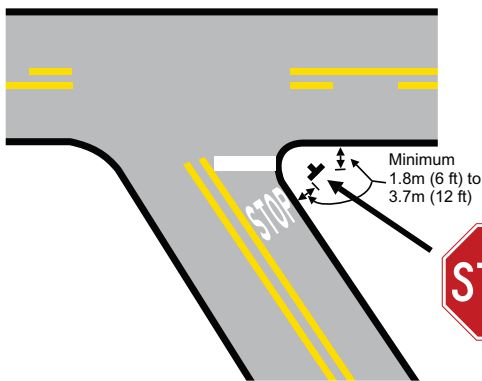
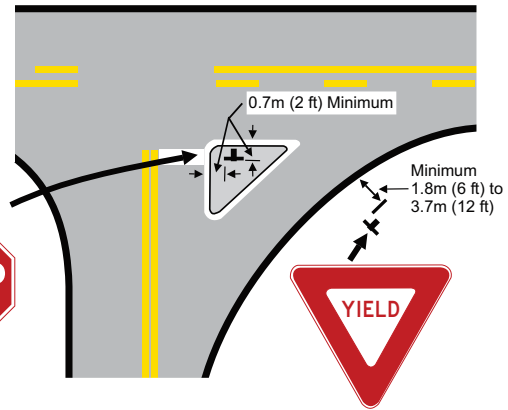


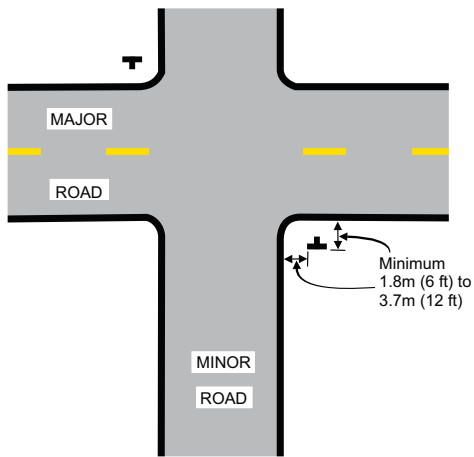
Figure 2A-1 Heights and Lateral Locations of Signs for Typical Installations



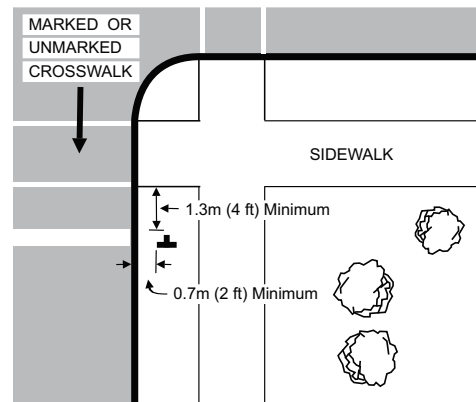
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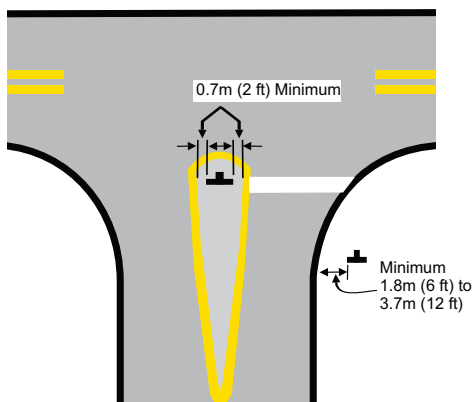
CHANNELIZED INTERSECTION



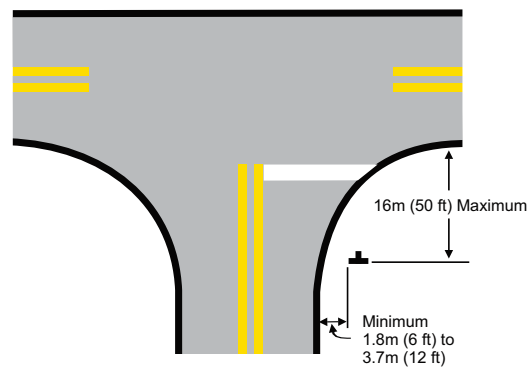
MINOR CROSSROAD



URBAN INTERSECTION



DIVISIONAL ISLAND



WIDE THROAT INTERSECTION

Figure 2A-2 Examples of Locations for Signs at Intersections

SUPPORT:

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

GUIDANCE:

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

SUPPORT:

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

GUIDANCE:

Because regulatory and warning information is more critical to the road user than guidance information, regulatory and warning signing whose location is critical should be displayed rather than guide signing in cases where conflicts occur. Information of a less critical nature should be moved to less critical locations or omitted.

OPTION:

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

At wide-throat intersections with corner radii over 12 m (40 ft), a STOP sign may be placed up to 15 m (50 ft) from the major roadway. Consider increasing the size of the STOP sign and adding a stop bar closer to the major roadway.

When the corner radii exceed 27 m (90 ft), consider redesigning the intersection in order to provide a free right turn lane and a raised island (see Figure 2A.2) with the STOP sign installed on the island.

SUPPORT:

STOP signs are typically located within 1.8 to 3.7 m (6 to 12 ft) 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 12m [40 ft]), this optimum sign

location would result in the STOP sign being placed in the paved part of the road. In these cases, the 15 m (50 ft) 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 exceed 27 m (90 ft), it is not possible to comply with both the minor and major road offsets. Redesigning the intersection in order to provide a free right turn island would provide a protected location for the STOP sign consistent with the optimum major and minor road offsets.

GUIDANCE:

In urban areas where crosswalks exist, signs should not be placed within 1.3 m (4 ft) in advance of the crosswalk.

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 ground-mounted signs;
- L. Junction of two freeways; and
- M. Left exit ramps.

Over-crossing structures may serve for the support of overhead signs, and under some circumstances, may be the only practical solution that will provide adequate viewing distance. Use of such structures as sign supports may eliminate the need for the foundations and sign supports along the roadside.

2A.18 Mounting Height

SUPPORT:

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

STANDARD:

Signs installed at the side of the road in rural districts shall be at least 1.6 m (5 ft), measured from the bottom of the sign to the near edge of the pavement. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 2.2 m (7 ft).

Directional signs on expressways and freeways shall be installed with a minimum height of 2.2 m (7 ft). If a secondary sign is mounted below another sign, the major sign shall be installed at least 2.5 m (8 ft) and the secondary sign at least 1.6 m (5 ft) above the level of the pavement edge. All route signs, warning signs, and regulatory signs on expressways and freeways shall be at least 2.2 m (7 ft) above the level of the pavement edge.

Overhead signs shall provide a vertical clearance of not less than 5.1 m (17 ft) 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. The vertical clearance to overhead sign structures or supports shall not be greater than 0.3 m (1 ft) in excess of the minimum clearance of other structures.

OPTION:

The height to the bottom of a secondary sign mounted below another sign may be 0.3 m (1 ft) less than the height specified above.

Where signs are placed 9 m (30 ft) or more from the edge of the traveled way, the height to the bottom of such signs may be 1.5 m (5 ft) above the level of the pavement edge.

A route sign assembly consisting of a route sign and auxiliary signs (see Section 2D.27) 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.

SUPPORT:

Without this flexibility regarding steep backslopes, some agencies might decide to relocate the sign closer to the road, which might be less desirable.

STANDARD:

Overhead mounted signs shall provide a vertical clearance of not less than 5.2 m (17 ft) 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 is less than 4.9 m (16 ft), the vertical clearance to overhead sign structures or supports may be as low as 0.3 m (1 ft) higher than the vertical clearance of the other structures.

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-1 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 1.9 m (6 ft). Overhead sign supports shall have a barrier or crash cushion to shield them if they are within the clear zone.

Ground-mounted sign supports shall be breakaway, yielding, or shielded with a longitudinal barrier or crash cushion if within the clear zone.

Compliance Date: January 17, 2013

GUIDANCE:

For ground-mounted signs, the minimum lateral offset should be 3.7m (12 ft) from the edge of the travel way. If a paved shoulder wider than 1.8m (6 ft) exists, the minimum lateral offset for ground-mounted signs should be 1.9 m (6 ft) from the edge of the shoulder.

SUPPORT:

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 1.9 m (6 ft) from the edge of the traveled way.

In urban areas where lateral offsets are limited, a minimum lateral offset of 0.6 m (2 ft) may be used.

A minimum offset of 0.3 m (1 ft) from the face of the curb may be used in urban areas where sidewalk width is limited or where existing poles are close to the curb.

SUPPORT:

Figure 2A-1 illustrates some of the lateral offset requirements contained in this Section.

2A.20 Orientation**GUIDANCE:**

Unless otherwise noted 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. 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 ii for AASHTO's address).

2A.22 Maintenance**GUIDANCE:**

Maintenance activities should consider proper position, cleanliness, legibility, and daytime and nighttime visibility (see section 2A.9). Damaged or deteriorated signs should be replaced.

To assure adequate maintenance, a schedule for inspecting (both day and night), cleaning, and replacing signs should be established. Employees of highway agencies, 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 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.

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 9 m (30 ft) or more, the intersection should be signed as two separate intersections. [Statute 169.01, Subd. 36, (b)] (see Figures 2B-10, 2B-13, and 2B-14)

Chapter 2B. REGULATORY SIGNS

TABLE OF CONTENTS

Chapter 2B.	Regulatory Signs	Page
Section 2B.1	Application of Regulatory Signs	2B-1
2B.2	Design of Regulatory Signs	2B-1
2B.3	Size of Regulatory Signs	2B-1
2B.4	STOP Sign (R1-1, R1-3, R1-4)	2B-1
2B.4.1	Cross Traffic Does Not Stop Sign (R1-X2)	2B-2
2B.5	STOP Sign Applications	2B-2
2B.6	STOP Sign Placement	2B-3
2B.7	Multi-way Stop Applications	2B-3
2B.8	YIELD Sign (R1-2)	2B-4
2B.9	YIELD Sign Applications	2B-4
2B.10	YIELD Sign Placement	2B-4
2B.11	This section has been removed	2B-5
2B.12	In-Street Pedestrian Crossing Sign (R1-6b)	2B-5
2B.13	Speed Limit Sign (R2-1)	2B-7
2B.13.1	Bridge Speed Limit Sign (R2-X5)	2B-8
2B.13.2	School Speed Limit Assembly	2B-8
2B.14	Truck Speed Limit Sign (R2-2)	2B-8
2B.15	Night Speed Limit Sign (R2-3)	2B-9
2B.16	Minimum Speed Limit Sign (R2-4)	2B-9
2B.16.1	End Speed Zone Sign (R2-6)	2B-9
2B.16.2	End Work Speed Zone Sign (R2-6c)	2B-9
2B.17	FINES HIGHER Plaque (R2-6)	2B-10
2B.18	Location of Speed Limit Signs	2B-10
2B.19	Turn Prohibition Signs (R3-1 through R3-4, and R3-18)	2B-10
2B.20	Intersection Lane Control Signs (R3-5 through R3-8)	2B-11
2B.21	Mandatory Movement Lane Control Signs (R3-5, R3-5a, and R3-7)	2B-12
2B.22	Optional Movement Lane Control Sign (R3-6)	2B-12
2B.23	Advance Intersection Lane Control Signs (R3-8 Series)	2B-13
2B.24	Two-Way Left Turn Only Signs (R3-9a, R3-9b)	2B-13
2B.25	Reversible Lane Control Signs (R3-9d, R3-9f through R3-9i)	2B-14
2B.26	Preferential Lane Signs (R3-10 through R3-17)	2B-17
2B.27	Preferential Only Lanes for High-Occupancy Vehicles (HOV)	2B-20
2B.28	Preferential Only Lane Sign Applications and Placement	2B-21
2B.29	DO NOT PASS Sign (R4-1)	2B-23
2B.30	PASS WITH CARE Sign (R4-2)	2B-23
2B.31	SLOWER TRAFFIC KEEP RIGHT Sign (R4-3)	2B-23
2B.32	Slow Moving Traffic Lane Signs (R4-5, R4-6)	2B-23
2B.33	Keep Right and Keep Left Signs (R4-7, R4-8)	2B-24
2B.34	DO NOT ENTER Sign (R5-1)	2B-24
2B.35	WRONG WAY Sign (R5-1a)	2B-25
2B.36	Selective Exclusion Signs	2B-26
2B.36.1	Other Selective Exclusion Signs (R5-X1)	2B-27
2B.37	ONE WAY Signs (R6-1, R6-2)	2B-27
2B.37.1	One Way Transition Signs (R6-X1)	2B-27

MN Rev. 1

Section 2B.38	Divided Highway Crossing Signs (R6-3, R6-3a)	2B-34
2B.39	Parking, Standing, and Stopping Signs (R7 and R8 Series)	2B-34
2B.40	Design of Parking, Standing, and Stopping Signs	2B-35
2B.41	Placement of Parking, Stopping, and Standing Signs	2B-36
2B.41.1	Disabled Parking Signs (R7-8m, R7-8b)	2B-36
2B.42	Emergency Restriction Signs (R8-4, R8-7, R8-8, R16-X4)	2B-37
2B.43	WALK ON LEFT FACING TRAFFIC and No Hitchhiking Signs (R9-1, R9-4, R9-4a)	2B-37
2B.44	Pedestrian Crossing Signs (R9-2, R9-3)	2B-38
2B.45	Traffic Signal Signs (R10-1 through R10-21)	2B-38
2B.45.1	Ramp Control Signal Signs (R10-X4, R10-X6, and R10-X7)	2B-41
2B.46	Photo Enforcement Signs (R10-18, R10-19)	2B-41
2B.47	KEEP OFF MEDIAN Sign (R11-1)	2B-41
2B.48	ROAD CLOSED Sign (R11-2) and LOCAL TRAFFIC ONLY Signs (R11-3 Series, R11-4)	2B-41
2B.48.1	Bridge Closed Signs (R11-2a and R11-3c)	2B-42
2B.48.2	Sidewalk Closed Signs (R9-9, R9-10)	2B-42
2B.49	Weight Limit Signs (R12-1 through R12-5)	2B-42
2B.49.1	Bridge and Structure Weight, Width and Height Restriction Signs (R12-1a, R12-5 Supplement, R12-X2, R12-X4, and R12-X4a)	2B-43
2B.50	Weigh Station Signs (R13 Series)	2B-44
2B.51	Truck Route Sign (R14-1)	2B-44
2B.52	Hazardous Material Signs (R14-2, R14-3)	2B-45
2B.53	National Network Signs (R14-4, R14-5)	2B-45
2B.54	Other Regulatory Signs	2B-45
2B.55	State Law Signs	2B-46
2B.56	Stop for Pedestrian in Crosswalk Sign (R1-X1)	2B-46

FIGURES

Figure 2B-1	This figure has been eliminated	
Figure 2B-2	Typical Placement of In-Street Pedestrian Crossing Signs	2B-6
Figure 2B-3	This figure has been eliminated	
Figure 2B-4	This figure has been eliminated	
Figure 2B-5	This figure has been eliminated	
Figure 2B-6	Location of Reversible Two-Way Left-Turn Signs	2B-15
Figure 2B-7	Examples of Preferential Only Lane Signs	2B-18
Figure 2B-8	This figure has been eliminated	
Figure 2B-9	This figure has been eliminated	
Figure 2B-10	Example of Wrong-Way Signing for Divided Highways with Medians of 9m (30 ft) or Greater	2B-25
Figure 2B-11	This figure has been eliminated	
Figure 2B-12	Examples of Locations of ONE WAY Signs	2B-28
Figure 2B-13	Examples of ONE WAY Signing for Divided Highways with Medians of 9m (30 ft) or Greater	2B-30
Figure 2B-14	Examples of ONE WAY Signing for Divided Highways with Medians Less Than 9m (30 ft)	2B-32
Figure 2B-15	Examples of ONE WAY Signing for Divided Highways with Medians Less Than 9m (30 ft) and Separated Left Turn Lanes	2B-33

TABLES

Table 2B-1	This table has been eliminated	
Table 2B-2	Meanings of Symbols and Legends on Reversible Lane Control Signs	2B-16

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 to show the same shape and similar color by both day and night, unless specifically stated otherwise in the text discussion of a particular sign or group of signs (see Section 2A.8).

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

2B.2 Design of Regulatory Signs

SUPPORT:

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

SUPPORT:

The Mn/DOT "Standard Signs Manual" (see Map & Manual Sales Unit, page ii) and the Federal "Standard Highway Signs" (see Government Printing Office, page ii) book contains sign sizes and letter heights for regulatory signs.

STANDARD:

The sizes for regulatory signs used on conventional roads, expressways, freeways, and low-volume roads, and under special conditions shall be as shown in Appendix C at the back of this Manual.

Compliance Date: December 22, 2013

GUIDANCE:

The Expressway and Freeway sizes should be used for higher-speed applications to provide larger signs for increased visibility and recognition.

OPTION:

The Minimum size may be used on low-speed roadways where reduced legend size would be adequate for the regulation or where physical conditions preclude the use of the other sizes.

The Oversized size may be used for those special applications where speed, volume, or other factors result in conditions where increased emphasis, improved recognition, or increased legibility would be desirable.

Signs larger than those shown in this chapter may be used (see Section 2A.12 and Appendix C).

2B.4 STOP Sign (R1-1, R1-3, R1-4)



R1-1
750 x 750 mm
30" x 30"



R1-3
300 x 150 mm
12" x 6"



R1-4
450 x 150 mm
18" x 6"

STANDARD:

When a sign is used to indicate that traffic is always required to stop, a STOP (R1-1) sign shall be used.

The STOP sign shall be an octagon with a white legend and border on a red background. Secondary legends shall not be used on STOP sign faces. If appropriate, a supplemental plaque (R1-3 or R1-4) shall be used to display a secondary legend. Such plaques shall have a white legend and border

2B.6 STOP Sign Placement

STANDARD:

The STOP sign shall be installed on the right side of the approach lane to which it applies. When the STOP sign is installed at this required location and the sign visibility is restricted, a Stop Ahead sign (see Section 2C.29) shall be installed in advance of the STOP sign.

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

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

GUIDANCE:

There should be no sign mounted back-to-back with a STOP sign in a manner that obscures the shape of the STOP sign.

Compliance Date: December 22, 2013

SUPPORT:

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

GUIDANCE:

Stop lines when used to supplement a STOP sign, should be located at the point where the road user should stop (see Section 3B.16).

If only one STOP sign is installed on an approach, the STOP sign should not be placed on the far side of the intersection.

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

Where there is a marked crosswalk at the intersection, the STOP sign should be installed approximately 1.3 m (4 ft) in advance of the crosswalk line nearest to the approaching traffic.

OPTION:

At wide-throat intersections or where two or more approach lanes of traffic exist on the signed approach, observance of the stop control may be improved by the installation of an additional STOP sign on the left side of the road and/or the use of a stop line. At channelized intersections, the additional STOP sign may be effectively placed on a channelizing island.

SUPPORT:

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

2B.7 Multi-way Stop Applications

SUPPORT:

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

The restrictions on the use of STOP signs described in Section 2B.5 also apply to Multi-way stop applications.

GUIDANCE:

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

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

- A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.
- B. A crash problem, as indicated by 5 or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right- and left-turn collisions as well as right-angle collisions.
- C. Minimum volumes:
 1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day, and
 2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour, but
 3. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the above values.
- D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

OPTION:

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

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

2B.8 YIELD Sign (R1-2)



R1-2
900 x 900 x 900 mm
36" x 36" x 36"

STANDARD:

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

SUPPORT:

The YIELD sign assigns right-of-way to traffic on certain approaches to an intersection. Vehicles controlled by a YIELD sign need to slow down or stop when necessary to avoid interfering with conflicting traffic.

2B.9 YIELD Sign Applications

OPTION:

YIELD signs may be used instead of STOP signs if engineering judgment indicates that one or more of the following conditions exist:

Compliance Date: January 11, 2011

- A. When the ability to see all potentially conflicting traffic is sufficient to allow a road user traveling at the posted speed, the 85th-percentile speed, or the statutory speed to pass through the intersection or to stop in a reasonably safe manner.
- B. If controlling a merge-type movement on the entering roadway where acceleration geometry and/or sight distance is not adequate for merging traffic operation.

C. At the second crossroad of a divided highway, where the median width is 9 m (30 ft) or greater. A STOP sign may be installed at the entrance to the first roadway of a divided highway, and a YIELD sign may be installed at the entrance to the second roadway.

D. At an intersection where a special problem exists and where engineering judgment indicates the problem to be susceptible to correction by the use of the YIELD sign.

STANDARD:

A YIELD (R1-2) sign shall be used to assign right-of-way at the entrance to a roundabout intersection.

2B.10 YIELD Sign Placement

STANDARD:

The YIELD sign shall be installed on the right side of the approach to which it applies. YIELD signs shall be placed on both the left and right sides of approaches to roundabout intersections with more than one lane on the signed approach where raised splitter islands are available on the left side of the approach. When the YIELD sign is installed at this required location and the sign visibility is restricted, a Yield Ahead sign (see Section 2C.29) shall be installed in advance of the YIELD sign.

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

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

GUIDANCE:

There should be no sign mounted back-to-back with a YIELD sign in a manner that obscures the shape of the YIELD sign.

Compliance Date: December 22, 2013

SUPPORT:

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

GUIDANCE:

YIELD lines, when used to supplement a YIELD sign, should be located at a point where the road user should yield (see Section 3B.16).

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

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

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



R2-1
600 x 750 mm
24" x 30"



R2-1 metric
600 x 900 mm
24" x 36"

STANDARD:

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

The Speed Limit (R2-1) sign shall display the limit established by law, ordinance, regulation, or as adopted by the authorized agency. The speed limits shown shall be in multiples of 10 km/h (5 mph).

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

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

GUIDANCE:

At least once every 5 years, the road authority should reevaluate non-statutory speed limits on segments of their roadways that have undergone a significant change in roadway characteristics or surrounding land use since the last review.

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

OPTION:

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

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

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

GUIDANCE:

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

OPTION:

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

A changeable message sign that displays to approaching drivers the speed at which they are traveling may be installed in conjunction with a Speed Limit sign.

GUIDANCE:

If a changeable message sign displaying approach speeds is installed, the legend YOUR SPEED XX (MPH) or such similar legend should be shown.

The color of the changeable message legend should be a yellow legend on a black background or the reverse of these colors.

Compliance Date: December 22, 2013

SUPPORT:

Advisory Speed signs are discussed in Sections 2C.36 and 2C.46 and Temporary Traffic Control Zone Speed signs are discussed in Part 6.

2B.15 Night Speed Limit Sign (R2-3)



R2-3
600 x 600 mm
24" x 24"



R2-3 metric
600 x 750 mm
24" x 30"

STANDARD:

Where different speed limits are prescribed for day and night, both limits shall be posted.

GUIDANCE:

A Night Speed Limit (R2-3) sign should be reversed using a white retroreflectorized border and legend on a black background.

OPTION:

A Night Speed Limit sign may be combined with or installed below the standard Speed Limit (R2-1) sign.

2B.16 Minimum Speed Limit Sign (R2-4)



R2-4
600 x 750 mm
24" x 30"



R2-4b
600 x 1200 mm
24" x 48"

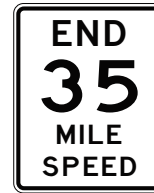
STANDARD:

A Minimum Speed Limit (R2-4) sign shall be displayed only in combination with a Speed Limit sign.

OPTION:

Where engineering judgment determines that slow speeds on a highway might impede the normal and reasonable movement of traffic, the Minimum Speed Limit sign may be installed below a Speed Limit (R2-1) sign to indicate the minimum legal speed. If desired, these two signs may be combined on the R2-4b sign.

2B.16.1 End Speed Zone Sign (R2-6)



R2-6b
600 x 750 mm
24" x 30"

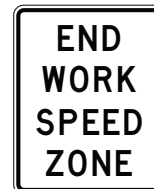
SUPPORT:

There are many secondary roads (county, township and municipal) which have had speed zones established. These zones are in and on the fringes of urban districts (as defined in Minnesota Statute, section 169.01) where the rural speed limit remains at that provided in the statutes and continuous speed zoning has not been warranted. In many instances, the posting of the statutory speed limit in order to terminate the reduced speed zone would be inappropriate because the statutory speed limit would be misleading and encourage drivers to travel too fast for conditions. Sound engineering judgement would dictate that no numerical value should be posted and that the basic rule (Minnesota Statute, section 169.14, subd. 1) should apply.

OPTION:

In order to provide for the termination of the reduced speed zone without posting another numerical speed, the END XX MILE SPEED sign may be used.

2B.16.2 END WORK SPEED ZONE Sign (R2-6c)



R2-6c
600 x 750 mm
24" x 30"

SUPPORT:

Certain street and highway construction and maintenance operations may justify the erection of regulatory signs with a recommended speed as determined by the appropriate road authority. It is necessary to install a regulatory sign to inform the motorists of the end of the regulatory speed zone.

STANDARD:

The sign shall be installed on its own structure at the end of the zone in accordance with standard signing practices for construction zone signs.

2B.17 FINES HIGHER Plaque (R2-6)



R2-6
600 x 600 mm
24" x 24"

OPTION:

The FINES HIGHER (R2-6) plaque may be used to advise road users when increased fines are imposed for traffic violations within designated roadway segments.

The FINES HIGHER plaque may be mounted below an applicable regulatory or warning sign in a temporary traffic control zone, a school zone, or other applicable designated zones.

The following may be mounted below the FINES HIGHER plaque:

- A. A supplemental plaque specifying the times that the higher fines are in effect (similar to the S4-1 plaque shown in Figure 7B-1); or
- B. A supplemental plaque WHEN CHILDREN (WORKERS) ARE PRESENT; or
- C. A supplemental plaque WHEN FLASHING (similar to the S4-4 plaque shown in Figure 7B-1) if used in conjunction with a yellow flashing beacon.

The legend FINES HIGHER may be replaced by multiple values such as FINES DOUBLE or FINES TRIPLE, or by a specific value such as \$150 FINE.

STANDARD:

The FINES HIGHER plaque shall be a rectangle with a black legend and border on a white background.

All supplemental plaques mounted below the FINES HIGHER plaque shall be rectangles with black legends and borders on white backgrounds.

The FINES HIGHER plaque shall include a SCHOOL, WORK ZONE, or other applicable designated zone plaque mounted above the applicable regulatory or warning sign. The SCHOOL supplemental plaque shall be rectangular in shape with a black legend and border on a yellow or fluorescent yellow-green background (same as the S4-3 plaque). The WORK ZONE supplemental plaque shall be rectangular in shape with a black legend and border on an orange background.

GUIDANCE:

If used, the FINES HIGHER plaque should be located at

the beginning of the temporary traffic control zone, school zone, or other applicable designated zone and just beyond any interchanges, major intersections, or other major traffic generators.

Agencies should limit the use of the FINES HIGHER plaque to locations where work is actually underway, or to locations where the roadway, shoulder, or other conditions, including the presence of a school, require a speed reduction or extra caution on the part of the road user.

2B.18 Location of Speed Limit Signs

STANDARD:

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

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

Speed Limit signs indicating the statutory speed limits shall be installed at entrances to the State and at jurisdictional boundaries of metropolitan areas.

2B.19 Turn Prohibition Signs (R3-1 through R3-4, and R3-18)



R3-1
600 x 600 mm
24" x 24"



R3-2
600 x 600 mm
24" x 24"



R3-3
600 x 600 mm
24" x 24"



R3-4
600 x 600 mm
24" x 24"



R3-18
600 x 600 mm
24" x 24"

STANDARD:

Except as noted in the Option, where turns are prohibited, Turn Prohibition signs shall be installed.

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.

OPTION:

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

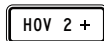
2B.23 Advance Intersection Lane Control Signs (R3-8 Series)



R3-8
750 x 750 mm
30" x 30"



R3-8b
1400 x 750 mm
54" x 30"



OPTION:

Advance Intersection Lane Control (R3-8, R3-8a, and R3-8b) 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 R3-8 sign series. The HOV 2+ (R3-5c) supplemental plaque may be installed at the top outside border of the R3-8 sign over the applicable lane. 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.

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



R3-9a
750 x 900 mm
30" x 36"



R3-9b
600 x 900 mm
24" x 36"

GUIDANCE:

Two-Way Left Turn Only (R3-9a or R3-9b) signs should be used in conjunction with the required pavement markings where a nonreversible 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 ground-mounted R3-9b sign may be used as an alternate to or a supplement to the overhead-mounted R3-9a sign. The legend BEGIN or END may be used within the border of the main sign itself, or on a 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.

OPTION:

The SLOWER TRAFFIC KEEP RIGHT sign may be used as a supplement or as an alternative to the TRUCKS USE RIGHT LANE (R4-5). Both signs may be used on multi-lane roadways to improve capacity and reduce lane changing.

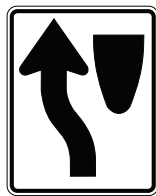
GUIDANCE:

If an extra lane has been provided for slow-moving traffic, a Lane Ends sign (see Section 2C.30) should be installed in advance of the point where the extra lane ends. Appropriate pavement markings should be installed at both the beginning and the end of the extra lane (see Section 3B.9 and Figure 3B-12).

2B.33 Keep Right and Keep Left Signs (R4-7, R4-8)



R4-7
600 x 750 mm
24" x 30"



R4-8
600 x 750 mm
24" x 30"



R4-7a
600 x 750 mm
24" x 30"



R4-7b
600 x 750 mm
24" x 30"

OPTION:

The Keep Right (R4-7) sign may be used at locations where it is necessary for traffic to pass only to the right of a roadway feature or obstruction. The Keep Left (R4-8) sign may be used at locations where it is necessary for traffic to pass only to the left of a roadway feature or obstruction.

GUIDANCE:

If used, the Keep Right sign should be installed as close as practical to approach ends of raised medians, parkways, islands, underpass piers, and at other locations where it is not readily apparent that traffic is required to keep to the right. The sign should be mounted on the face of or just in front of a pier or other obstruction separating opposite directions of traffic in the center of the highway such that traffic will have to pass to the right of the sign.

STANDARD:

The Keep Right sign shall not be installed on the right side of the roadway in a position where traffic must pass to the left of the sign.

OPTION:

The Keep Right sign may be omitted at intermediate ends of divisional islands and medians.

Word message KEEP RIGHT (LEFT) with an arrow (R4-7a or R4-7b) signs may be used instead of the R4-7 or R4-8 symbol signs.

Where the obstruction obscures the Keep Right sign, the minimum placement height may be increased for better sign visibility.

2B.34 DO NOT ENTER Sign (R5-1)



R5-1
750 x 750 mm
30" x 30"

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-10). The sign should be mounted on the right 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 side of the roadway may be used, particularly where traffic approaches from an intersecting roadway (see Figure 2B-10).

2B.35 WRONG WAY Sign (R5-1a)



R5-1a
900 x 600 mm
36" x 24"

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-10).

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 2E.50).

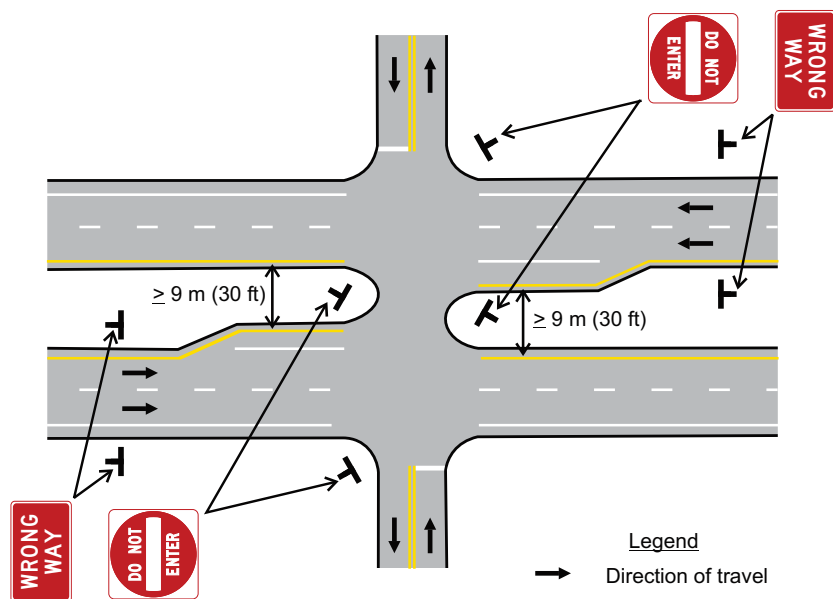


Figure 2B-10. Example of Wrong-Way Signing for a Divided Highway with Medians of 9 m (30 ft) or Greater

2B.36 Selective Exclusion Signs



R5-2
600 x 600 mm
24" x 24"



R5-3
600 x 600 mm
24" x 24"



R5-4
600 x 750 mm
24" x 30"



R5-5
600 x 750 mm
24" x 30"



R5-6
600 x 600 mm
24" x 24"



R5-7
750 x 600 mm
30" x 24"



R5-8
750 x 600 mm
30" x 24"



R5-10a
750 x 900 mm
30" x 36"



R5-10d
450 x 600 mm
18" x 24"



R5-10b
750 x 450mm
30" x 18"



R5-10c
600 x 300mm
24" x 12"

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. COMMERCIAL VEHICLES EXCLUDED (R5-4);
- D. TRUCKS (VEHICLES) WITH LUGS PROHIBITED (R5-5);
- E. No Bicycles (R5-6);
- F. NON-MOTORIZED TRAFFIC PROHIBITED (R5-7);
- G. MOTOR-DRIVEN CYCLES PROHIBITED (R5-8);
- and

H. Hazardous Material Prohibited (R14-3) (see Section 2B.52).

Compliance Date: December 22, 2013

OPTION:

Appropriate combinations or groupings of these legends into a single sign, such as PEDESTRIANS BICYCLES MOTOR-DRIVEN CYCLES PROHIBITED (R5-10a), or PEDESTRIANS AND BICYCLES PROHIBITED (R5-10b) may be used.

STANDARD:

Minnesota has adopted the PEDESTRIANS BICYCLES MOTOR-DRIVEN CYCLES 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.49) should be used instead of a Selective Exclusion sign.

The Selective Exclusion sign should be placed on the right 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 PEDESTRIANS PROHIBITED (R5-10c) sign or No Pedestrian Crossing (R9-3a) sign should be installed so as to be clearly visible to pedestrians at a location where an alternative route is available.

OPTION:

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

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

2B.36.1 Other Selective Exclusion Signs (R5-X1)



R5-X1
450 x 450mm
18" x 18"

GUIDANCE:

The No Snowmobile (R5-X1) symbol sign should be used to restrict access to highways and certain geographic areas. They should be erected at suitable locations as required to convey the appropriate message.

2B.37 ONE WAY Signs (R6-1, R6-2)



R6-1
900 x 300 mm
36" x 12"



R6-2
600 x 750 mm
24" x 30"

Compliance Date: December 22, 2013

STANDARD:

Except as noted in the 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 Figures 2B-12 through 2B-15.

Compliance Date: January 17, 2008

Where divided roadways are separated by a median width of 9 m (30 ft) or more, ONE WAY signs or a combination of ONE WAY, DO NOT ENTER, and Divided Highway Crossing signs shall be placed visible to each crossroad

approach on the near right and far left corners of each intersection with the directional roadways as shown in Figures 2B-12 and 2B-13.

OPTION:

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 (see Figure 2B-14) at intersections with divided highways that have median widths of less than 9 m (30 ft).

ONE WAY signs may be omitted from the medians at intersections with divided highways that have median widths of greater than 9 m (30 ft) when an engineering study has demonstrated that the signs may confuse motorists (see Figure 2B-3c).

STANDARD:

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.

2B.37.1 One Way Transition Signs (R6-X1)



R6-X1
600 x 750 mm
24" x 30"



R6-X1
600 x 750 mm
24" x 30"

OPTION:

The BEGIN ONE WAY sign may be installed at an urban intersection to inform motorists where a two-way roadway changes to a one-way roadway. Similarly, a END ONE WAY sign may be installed at the intersection where a one-way roadway changes to a two-way roadway. A Two-Way Traffic sign (W6-3) may be installed in advance of the intersection where the transition will occur.

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.

A sign posted for the purpose of this section must be visible from inside a vehicle parked in the space, be kept clear of snow or other obstructions which block its visibility, and be non-movable or only movable by authorized persons.

Where parking spaces are designated to accommodate wheelchair vans, the Van Accessible plaque (R7-8b) 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.42 Emergency Restriction Signs (R8-4, R8-7, R8-8, R16-X4)



R8-4
750 x 6050 mm
30" x 24"



R8-7
600 x 750 mm
24" x 30"



R8-8
600 x 750 mm
24" x 30"



R16-X4
900 x 900 mm
36" x 36"

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, even though turnout or rest areas have not been provided.

The DO NOT STOP ON TRACKS (R8-8) sign may be used to discourage or prohibit parking or stopping on railroad tracks (see Section 8B.7).

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



R9-1
450 x 600 mm
18" x 24"



R9-4
450 x 600 mm
18" x 24"



R9-4a
450 x 450 mm
18" x 18"

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 side of the road where pedestrians walk on the pavement or shoulder in the absence of pedestrian pathways or sidewalks.

OPTION:

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

PART 2. SIGNS

Chapter 2C. Warning Signs

TABLE OF CONTENTS

Chapter 2C.	WARNING SIGNS	Page
Section 2C.1	Function of Warning Signs	2C-1
2C.2	Application of Warning Signs	2C-1
2C.3	Design of Warning Signs	2C-1
2C.4	Size of Warning Signs	2C-1
2C.5	Placement of Warning Signs	2C-3
2C.6	Horizontal Alignment Signs (W1-1 through W1-5, W1-11, W1-15)	2C-6
2C.7	Combination Horizontal Alignment/Advisory Speed Signs (W1-1a, W1-2a)	2C-7
2C.8	Combination Horizontal Alignment/Intersection Sign (W1-10)	2C-7
2C.9	One-Direction Large Arrow Sign (W1-6)	2C-8
2C.10	Chevron Alignment Sign (W1-8)	2C-8
2C.11	Truck Rollover Warning Sign (W1-13)	2C-9
2C.12	Hill Signs (W7-1, W7-1a, W7-1b)	2C-9
2C.13	Truck Escape Ramp Signs (W7-4 Series)	2C-10
2C.14	HILL BLOCKS VIEW Sign (W7-6)	2C-10
2C.15	ROAD NARROWS Sign (W5-1)	2C-10
2C.16	NARROW BRIDGE Sign (W5-2)	2C-11
2C.17	ONE LANE BRIDGE Sign (W5-3)	2C-11
2C.18	Divided Highway (Road) Sign (W6-1)	2C-11
2C.19	Divided Highway (Road) Ends Sign (W6-2)	2C-11
2C.20	Double Arrow Sign (W12-1)	2C-12
2C.21	DEAD END/NO OUTLET Signs (W14-1, W14-1a, W14-2, W14-2a)	2C-12
2C.22	Low Clearance Signs (W12-2, W12-2p, W12-X2)	2C-12
2C.23	BUMP and DIP Signs (W8-1, W8-2)	2C-13
2C.24	SPEED HUMP Sign (W17-1)	2C-14
2C.25	PAVEMENT ENDS Sign (W8-3)	2C-14
2C.26	Shoulder Signs (W8-4, W8-9, W8-9a, W5-X1)	2C-14
2C.27	Slippery When Wet Sign (W8-5)	2C-15
2C.27.1	Miscellaneous Road Condition Signs (W8-7, W8-8, and W8-X2)	2C-15
2C.28	BRIDGE ICES BEFORE ROAD Sign (W8-13)	2C-15
2C.29	Advance Traffic Control Signs (W3-1, W3-2, W3-3, W3-4, W3-X2, W3-X4)	2C-16
2C.29.1	RAMP METER AHEAD Sign (W3-X1)	2C-16
2C.30	Speed Reduction Signs (W3-5, W3-5a)	2C-17
2C.31	Merge Sign (W4-1, W4-5)	2C-17
2C.32	Added Lane Sign (W4-3, W4-6)	2C-17
2C.33	Lane Ends Signs (W4-2, W9-1, W9-2)	2C-18
2C.34	Two-Way Traffic Sign (W6-3)	2C-18
2C.35	NO PASSING ZONE Sign (W14-3)	2C-18
2C.36	Advisory Exit, Ramp, and Curve Speed Signs (W13-2, W13-3, W13-5)	2C-20
2C.37	Intersection Warning Signs (W2-1 through W2-6)	2C-20
2C.38	Two-Direction Large Arrow Sign (W1-7)	2C-21
2C.39	This section has been removed	

2C.40	Vehicular Traffic Signs (W8-6, W11-1, W11-5, W11-5a, W11-6, W11-8, W11-10, W11-11, W11-12p, W11-14, W11-X3)	2C-21
2C.41	Nonvehicular Signs (W11-2, W11-3, W11-4, W16-7, W16-7p)	2C-22
2C.42	Playground Sign (W15-1)	2C-23
2C.43	Use of Supplemental Plaques	2C-23
2C.44	Design of Supplemental Plaques	2C-23
2C.45	Distance Plaques (W16-2 series, W16-3 series, W16-4, W7-3a)	2C-24
2C.46	Advisory Speed Plaque (W13-1)	2C-24
2C.47	Supplemental Arrow Plaques (W16-5p, W16-6p, W16-7p)	2C-24
2C.48	Hill-Related Plaques (W7-2 series and W7-3 series)	2C-25
2C.49	Advance Street Name Plaque (W16-8, W16-8a)	2C-25
2C.50	CROSS TRAFFIC DOES NOT STOP Plaque (W4-4p)	2C-25
2C.51	SHARE THE ROAD Plaque (W16-1)	2C-25
2C.52	High-Occupancy Vehicle (HOV) Plaque (W16-11)	2C-26
2C.53	PHOTO ENFORCED Plaque (W16-10)	2C-26

FIGURES

Figure 2C-1	This figure has been eliminated	
Figure 2C-2	This figure has been eliminated	
Figure 2C-3	This figure has been eliminated	
Figure 2C-4	This figure has been eliminated	
Figure 2C-5	This figure has been eliminated	
Figure 2C-6	This figure has been eliminated	
Figure 2C-7	Example of Advisory Speed Signing for an Exit Ramp	2C-19

TABLES

Table 2C-1	Categories of Warning Signs	2C-2
Table 2C-2	This table has been eliminated	
Table 2C-3	Minimum Size of Supplemental Warning Plaques	2C-3
Table 2C-4	Guidelines for Advance Placement of Warning Signs (metric)	2C-4
	Guidelines for Advance Placement of Warning Signs (English)	2C-5
Table 2C-5	Horizontal Alignment Sign Usage	2C-6

PART 2. SIGNS

Chapter 2C. Warning Signs

2C.1 Function of Warning Signs

SUPPORT:

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

2C.2 Application of Warning Signs

STANDARD:

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

GUIDANCE:

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

SUPPORT:

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

Warning signs specified herein 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, bicycle facilities, and highway-light rail transit grade crossings are discussed in Parts 5 through 10, respectively.

OPTION:

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

2C.3 Design of Warning Signs

STANDARD:

All warning signs shall be diamond-shaped (square with one diagonal vertical) with a black legend and border on a

yellow background unless specifically designated otherwise. Warning signs shall be designed in accordance with sizes, shapes, colors, and legends contained in the Mn/DOT "Standard Signs Manual" (see Map & Manual Sales Unit, page ii), and the FHWA "Standard Highway Signs" book (see Government Printing Office, page ii).

OPTION:

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

2C.4 Size of Warning Signs

STANDARD:

The sizes for warning signs shall be as shown in Appendix C at the back of this Manual.

GUIDANCE:

The Conventional Road size should be used on conventional roads.

The Expressway and Freeway sizes should be used for higher-speed applications to provide larger signs for increased visibility, legibility, and recognition.

OPTION:

The Minimum size may be used on low-speed roadways where the reduced legend size would be adequate for the warning or where physical conditions preclude the use of other sizes.

Oversized signs and larger sizes may be used for those special applications where speed, volume, or other factors result in conditions where increased emphasis, improved recognition, or increased legibility would be desirable.

STANDARD:

The minimum size for supplemental warning plaques shall be as shown in Table 2C-3.

OPTION:

Signs larger than those shown in Appendix C and Table 2C-3 may be used (see Section 2A.12).

Size of Warning Sign		Size of Supplemental Plaque							
		Rectangular						Square	
		1 Line		2 Lines		Arrow			
		mm	in	mm	in	mm	in	mm	in
600 x 600 750 x 750	24 x 24 30 x 30	600 x 300	24 x 12	600 x 450	24 x 18	600 x 450	24 x 12	450 x 450	18 x 18
900 x 900 1200 x 1200	36 x 36 48 x 48	750 x 450	30 x 18	750 x 600	30 x 24	750 x 450	30 x 18	600 x 600	24 x 24

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

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

2C.5 Placement of Warning Signs

SUPPORT:

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

The total time needed to perceive and complete a reaction to a sign is the sum of the times necessary for Perception, Identification (understanding), Emotion (decision making), and Volition (execution of decision), and is called the PIEV time. The PIEV time can vary from several seconds for general warning signs to 6 seconds or more for warning signs requiring high road user judgment.

Table 2C-4 lists suggested sign placement distances for two conditions. This table is provided as an aid for determining warning sign location.

GUIDANCE:

Warning signs should be placed so that they provide adequate PIEV time. 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 PIEV time 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.

2C.29 Advance Traffic Control Signs (W3-1, W3-2, W3-3, W3-4, W3-X3, W3-X4)



W3-1
900 x 900 mm
36" x 36"



W3-2
900 x 900 mm
36" x 36"



W3-3
900 x 900 mm
36" x 36"



W3-4
900 x 900 mm
36" x 36"



W3-X2
900 x 600 mm
36" x 24"



W3-X4
1650 x 1050 mm
66" x 42"

STANDARD:

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

SUPPORT:

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

GUIDANCE:

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

OPTION:

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

Word messages (W3-1a, W3-2a, W3-3a) may be used as alternates to the Advance Traffic Control symbol signs.

A supplemental street name plaque (see Section 2C.49) may be installed above or below an Advance Traffic Control sign.

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

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

STANDARD:

When a BE PREPARED TO STOP sign is used in advance of a traffic control signal, it shall be used in addition to a Signal Ahead sign.

OPTION:

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

STANDARD:

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

2C.29.1 RAMP METER AHEAD Sign (W3-X1)



W3-X1
900 x 900 mm
36" x 36"

OPTION:

The RAMP METER AHEAD (W3-X1) sign may be used on a freeway entrance ramp having a ramp control signal which is not visible for a sufficient distance to allow a motorist adequate time to bring his vehicle to a stop at the signal. The obstruction(s) causing the limited visibility may be either permanent or intermittent.

2C.30 Speed Reduction Signs (W3-5, W3-5a)



W3-5
900 x 900 mm
36" x 36"



W3-5a
900 x 900 mm
36" x 36"

GUIDANCE:

A Speed Reduction (W3-5a) sign should be used to inform road users of a reduced speed zone when engineering judgment indicates the need for advance notice to comply with the posted speed limit ahead.

STANDARD:

If used, Speed Reduction 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 Speed Reduction sign shall be identical to the speed limit displayed on the subsequent Speed Limit sign.

Compliance Date: December 22, 2018

2C.31 Merge Sign (W4-1)



W4-1
900 x 900 mm
36" x 36"

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.

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 where lanes of traffic moving on a single roadway must merge because of a reduction in the actual or usable pavement width (see Section 2C.33).

2C.32 Added Lane Sign (W4-3, W4-6)



W4-3
900 x 900 mm
36" x 36"



W4-6
900 x 900 mm
36" x 36"

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.

Compliance Date: December 22, 2013

2C.33 Lane Ends Signs

(W4-2, W9-1, W9-2)



W4-2
750 x 750 mm
30" x 30"



W9-1
750 x 750 mm
30" x 30"



W9-2
750 x 750 mm
30" x 30"

Compliance Date: December 22, 2013

GUIDANCE:

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

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 side and the other on the left side or median.

The reduction in the number of traffic lanes may also be delineated with roadway edge lines (see Section 3B.9) and/or roadway delineation (see Chapter 3D).

GUIDANCE:

Where an extra lane has been provided for slower moving traffic (see Section 2B.32), a Lane Ends (W9-2) word sign, or a Lane Ends (W4-2) symbol sign should be installed in advance of the end of the extra lane.

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

2C.34 Two-Way Traffic Sign (W6-3)



W6-3
900 x 900 mm
36" x 36"

GUIDANCE:

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

A Two-Way Traffic (W6-3) sign with an AHEAD (W16-9p) plaque should be used to warn road users of a transition from a one-way street to a two-lane, two-way section of roadway (see Figure 2B-12, Sheet 2 of 2).

Compliance Date: December 22, 2008

OPTION:

The Two-Way Traffic sign may be used at intervals along a two-lane two-way roadway and may be used to supplement the Divided Highway (Road) Ends (W6-2) sign discussed in Section 2C.19.

2C.35 NO PASSING ZONE Sign (W14-3)



W14-3
900 x 1200 x 1200 mm
36" x 48" x 48"

STANDARD:

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

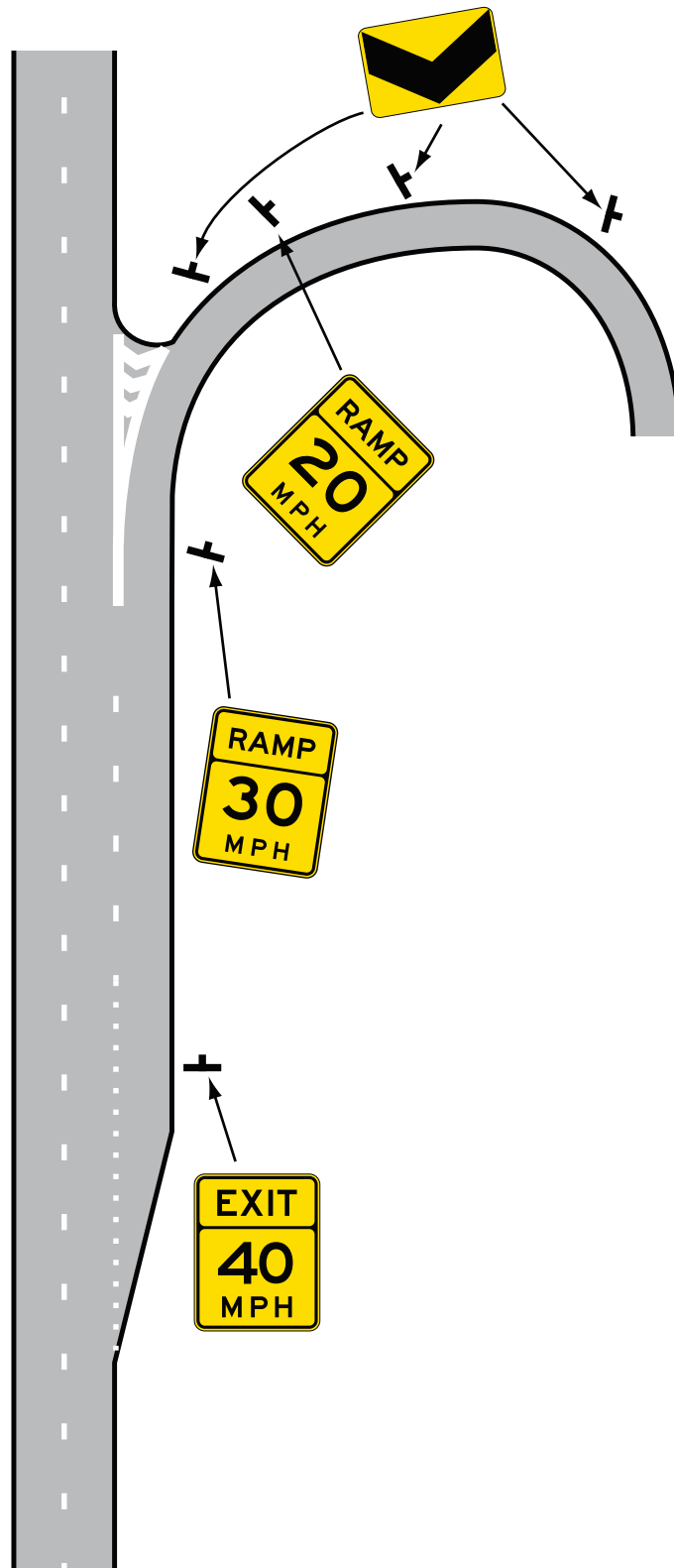
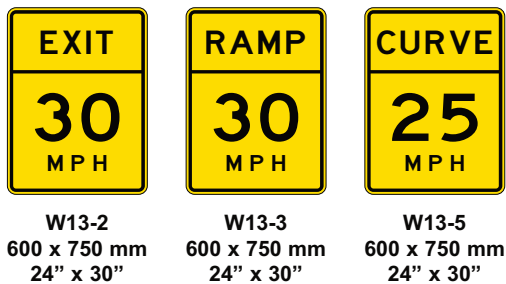


Figure 2C-7. Example of Advisory Speed Signing for an Exit Ramp

2C.36 Advisory Exit, Ramp, and Curve Speed Signs (W13-2, W13-3, W13-5)



STANDARD:

Advisory Exit, Ramp, and Curve Speed signs shall be vertical rectangles. The advisory Exit Speed (W13-2), Ramp Speed (W13-3), or Curve Speed (W13-5) signs shall be used where engineering judgment indicates the need to advise road users of the recommended speed on an exit, a ramp, or a curve.

GUIDANCE:

When used, the Exit Speed sign should be installed along the deceleration lane.

The Exit Speed sign should be visible in time for the road user to make a reasonably safe slowing and exiting maneuver.

The Ramp Speed sign should be visible in time for the road user to reduce to the recommended speed.

OPTION:

One or more Ramp Speed signs may be used beyond the gore (see Figure 2C-7). Based on engineering judgment, the Ramp Speed sign may be installed on the inside or outside of the curve to enhance its visibility.

A Turn (W1-1) or Curve (W1-2) sign with an Advisory Speed (W13-1) plaque may be used in place of a Ramp Speed sign if it is located such that it clearly does not apply to drivers on the main roadway.

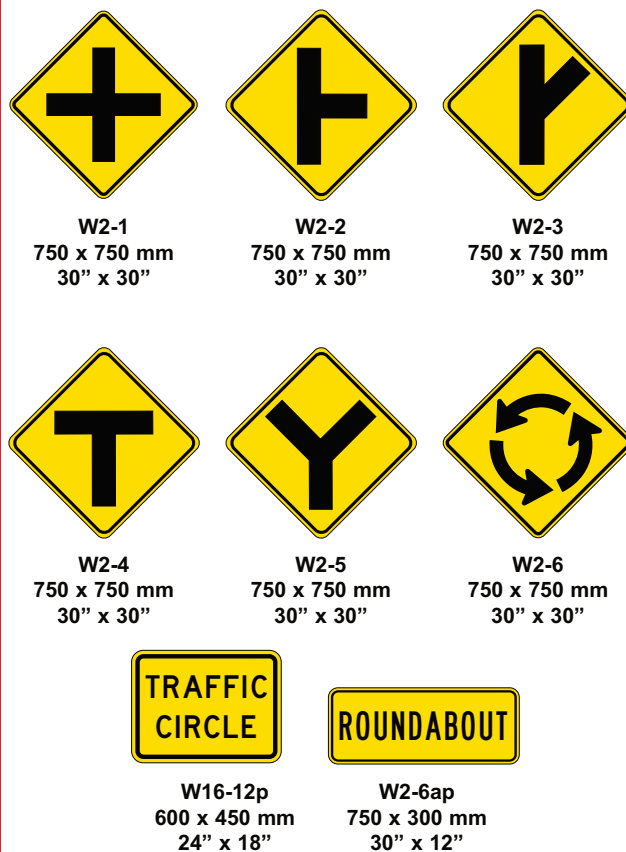
A Curve Speed sign may be used at and beyond the beginning of a curve following a Horizontal Alignment and Advisory Speed sign combination. When there is a need to remind road users of the recommended speed, or where the recommended speed changes because of a change in curvature, install the first Curve Warning sign with Advisory Speed plaque in advance of the curve (see Table 2C-4). Based on engineering judgment, the Curve Speed sign may be installed on the inside or outside of the curve to enhance its visibility.

The advisory speed may be the 85th-percentile speed of free-flowing traffic, the speed corresponding to a 10-degree ball bank indicator reading, or the speed otherwise determined by an engineering study because of unusual circumstances.

SUPPORT:

A 10-degree ball-bank indicator reading, used in determining advisory speeds, is based on research from the 1930s. In modern passenger vehicles, the 85th-percentile speed on curves approximates a 16-degree reading.

2C.37 Intersection Warning Signs (W2-1 through W2-6)



OPTION:

A Cross Road (W2-1) symbol, Side Road (W2-2 or W2-3) symbol, T-Symbol (W2-4), or Y-Symbol (W2-5) sign may be used in advance of an intersection to indicate the presence of an intersection and the possibility of turning or entering traffic. The Circular Intersection (W2-6) symbol sign accompanied by an educational TRAFFIC CIRCLE (W16-12p) plaque may be installed in advance of a circular intersection.

PART 2. SIGNS

Chapter 2D. Guide Signs - Conventional Roads

TABLE OF CONTENTS

Chapter 2D.	GUIDE SIGNS - CONVENTIONAL ROADS	Page
Section 2D.1	Scope of Conventional Road Guide Sign Standards.	2D-1
2D.2	Application	2D-1
2D.3	Color, Retroreflection, and Illumination	2D-1
2D.4	Size of Signs	2D-1
2D.5	Lettering Style	2D-2
2D.6	Size of Lettering	2D-2
2D.7	Amount of Legend.	2D-2
2D.8	Arrows	2D-2
2D.9	Numbered Highway Systems	2D-3
2D.10	Route Signs and Auxiliary Signs.	2D-4
2D.11	Design of Route Signs.	2D-4
2D.12	Design of Route Sign Auxiliaries	2D-6
2D.13	Junction Auxiliary Sign (M2-1)	2D-6
2D.14	Combination Junction Sign (M2-2).	2D-6
2D.15	Cardinal Direction Auxiliary Signs (M3-1 through M3-4).	2D-7
2D.16	Auxiliary Signs for Alternative Routes (M4 Series).	2D-7
2D.17	ALTERNATE Auxiliary Signs (M4-1, M4-1a).	2D-7
2D.18	BY-PASS Auxiliary Sign (M4-2a).	2D-7
2D.19	BUSINESS Auxiliary Sign (M4-3).	2D-8
2D.20	TRUCK Auxiliary Sign (M4-4)	2D-8
2D.21	TO Auxiliary Sign (M4-5, M4-5a)	2D-8
2D.21.1	BEGIN Auxiliary Sign (M2-X1, M2-X1a).	2D-8
2D.22	END Auxiliary Sign (M4-6, M4-6a).	2D-8
2D.23	TEMPORARY Auxiliary Sign (M4-7, M4-7a).	2D-9
2D.24	Temporary Detour and Auxiliary Signs	2D-9
2D.25	Advance Turn Arrow Auxiliary Signs (M5-1, M5-2).	2D-9
2D.26	Directional Arrow Auxiliary Signs (M6 Series)	2D-10
2D.27	Route Sign Assemblies	2D-10
2D.28	Junction Assembly.	2D-11
2D.29	Advance Route Turn Assembly.	2D-15
2D.30	Directional Assembly	2D-15
2D.31	Confirming or Reassurance Assemblies	2D-16
2D.32	Trailblazer Assembly.	2D-16
2D.33	Destination and Distance Signs.	2D-17
2D.34	Destination Signs (D1 Series).	2D-17
2D.35	Location of Destination Signs.	2D-18
2D.36	Distance Signs (D2 Series)	2D-18
2D.37	Location of Distance Signs	2D-19
2D.38	Street Name Sign (D3-1).	2D-19
2D.39	Advance Street Name Signs (D3-2)	2D-20
2D.40	Parking Area Sign (D4-1)	2D-21
2D.41	PARK & RIDE Sign (D4-2)	2D-21

2D.42	Rest Area Signs (D5 Series)	2D-22
2D.43	Scenic Area Signs (D6 Series)	2D-22
2D.43.1	Public Water Access Signs (D7-X7, D7-X7a, and DNR sign)	2D-23
2D.44	Weigh Station Signing (D8 Series)	2D-23
2D.45	General Service Signs (D9 Series)	2D-23
2D.45.1	Hospital Signs (D9-2a, D9-2b, E10-3, E10-4, E10-8)	2D-27
2D.46	Reference Location Signs (D10-1 through D10-3 and Intermediate Reference Location Signs (D10-1a through D10-3a)	2D-28
2D.47	Traffic Signal Speed Sign (I1-1)	2D-29
2D.48	General Information Signs (I Series)	2D-29
2D.48.1	Recycling Collection Center Signs (D1-X6, I-11)	2D-30
2D.48.2	County/City Name Marker signs (I2-3, I2-5)	2D-31
2D.48.3	Lake and Stream Name sign (I3-1)	2D-31
2D.49	Signing of Named Highways	2D-32
2D.50	Trail Signs	2D-32
2D.50.1	Other Guide Signs (D Series)	2D-33
2D.51	Crossover Signs (D13 Series) has been relocated to Section 2E.61.	2D-33
2D.52	National Scenic Byways Signs (D6-4, D6-4a)	2D-33

FIGURES

Figure 2D-1	This figure has been eliminated	
Figure 2D-2	Arrows for Use on Guide Signs	2D-3
Figure 2D-3	This figure has been eliminated	
Figure 2D-4	This figure has been eliminated	
Figure 2D-5	This figure has been eliminated	
Figure 2D-6	Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only) (Sheet 1 of 3)	2D-12
Figure 2D-6	Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only) (Sheet 2 of 3)	2D-13
Figure 2D-6	Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only) (Sheet 3 of 3)	2D-14
Figure 2D-7	This figure has been eliminated	
Figure 2D-8	This figure has been eliminated	
Figure 2D-9	This figure has been eliminated	
Figure 2D-10	Example of Weigh Station Signing	2D-24

PART 2. SIGNS

Chapter 2D. Guide Signs - Conventional Roads

2D.1 Scope of Conventional Road Guide Sign Standards

STANDARD:

Standards for conventional road guide signs shall apply to any road or street other than low-volume roads (as defined in Section 5A.01), expressways, and freeways.

2D.2 Application

SUPPORT:

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

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

2D.3 Color, Retroreflection, and Illumination

SUPPORT:

Requirements for illumination, retroreflection, and color are stated under the specific headings for individual guide signs or groups of signs. General provisions are given in Sections 2A.8, 2A.9, and 2A.11.

STANDARD:

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

SUPPORT:

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

STANDARD:

Different color sign backgrounds shall not be used to provide color coding of destinations. The color coding shall be accomplished by the use of different colored square or rectangular panels on the face of the guide signs.

OPTION:

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

2D.4 Size of Signs

SUPPORT:

For most guide signs, the legends are so variable that a standardized size is not appropriate. The sign size is determined primarily by the length of the message, and the size of lettering and spacing necessary for proper legibility. However, for signs with standardized designs, such as route signs, it is practical to use the prescribed sizes that are given in Appendix C at the back of this Manual.

OPTION:

Reduced letter height, reduced interline spacing, and reduced edge spacing may be used on guide signs if sign size must be limited by factors such as lane width or vertical clearance.

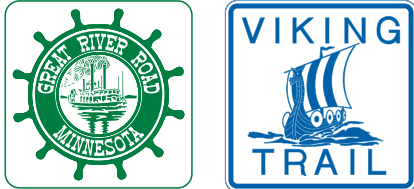
GUIDANCE:

Reduced spacing between the letters or words on a line of legend should not be used as a means of reducing the overall size of a guide sign, except where determined necessary by engineering judgment to meet unusual lateral space constraints. In such cases, the legibility distance of the sign legend should be the primary consideration in determining whether to reduce the spacing between the letters or the words or between the words and the sign border, or to reduce the letter height.

When a reduction in the standard size is necessary, the design used should be as similar as possible to the design for the standard size.

GUIDANCE:

Route markers for trails and memorial highways should be installed only on those trails or memorial highways and memorial bridges which have historical, geological, or cultural significance and which have been specifically designated by the Minnesota State legislature (State Statute 161.14, subd. 1-23). The standard size for all applications shall be 600 x 600 mm (24 x 24 in).



2D.12 Design of Route Sign Auxiliaries

STANDARD:

Route sign auxiliaries carrying word legends, except the JCT sign, shall have a standard size of 600 x 300 mm (24 x 12 in). Those carrying arrow symbols, or the JCT sign, shall have a standard size of 525 x 375 mm (21 x 15 in). All route sign auxiliaries shall match the color combination of the route sign that they supplement.

GUIDANCE:

Auxiliary signs carrying word messages and mounted with 750 x 600 mm (30 x 24 in) Interstate Route signs should be 750 x 375 mm (30 x 15 in). With route signs of larger sizes, auxiliary signs should be suitably enlarged, but not such that they exceed the width of the route sign.

OPTION:

A route sign and any auxiliary signs used with it may be combined on a single panel.

2D.13 Junction Auxiliary Sign (M2-1)



M2-1
525 x 375 mm
21" x 15"



M2-1a
525 x 375 mm
21" x 15"

STANDARD:

The Junction (M2-1) auxiliary sign shall carry the abbreviated legend JCT and shall be mounted at the top of an assembly (see Section 2D.27) either directly above the

route sign or above a sign for an alternative route (see Section 2D.16) that is part of the route designation. The minimum size of the Junction auxiliary sign shall be 525 x 375 mm (21 x 15 in) for compatibility with auxiliary signs carrying arrow symbols.

2D.14 Combination Junction Sign (M2-2)

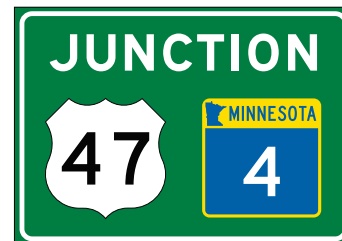
OPTION:

As an alternative to the standard Junction assembly where more than one route is to be intersected or joined, a rectangular sign may be used carrying the word JUNCTION above the route numbers.

Other designs may be used to accommodate State and County Route signs.

STANDARD:

The Combination Junction (M2-2) sign shall have a green background with white border and lettering for the word JUNCTION.



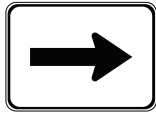
M2-2
Variable Size

GUIDANCE:

Where U.S. or State Route signs are used as components of guide signs, only the outline of the shield or other distinctive shape should be used.

Although the size of the Combination Junction sign will depend on the number of routes involved, the numerals should be large enough for clear legibility and should be of a size comparable with those in the individual route signs.

2D.26 Directional Arrow Auxiliary Signs (M6 Series)



M6-1
525 x 375 mm
21" x 15"



M6-2
525 x 375 mm
21" x 15"



M6-3
525 x 375 mm
21" x 15"



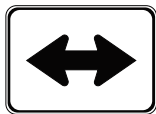
M6-1a
525 x 375 mm
21" x 15"



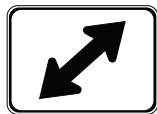
M6-2a
525 x 375 mm
21" x 15"



M6-3a
525 x 375 mm
21" x 15"



M6-4
525 x 375 mm
21" x 15"



M6-5
525 x 375 mm
21" x 15"



M6-6
525 x 375 mm
21" x 15"



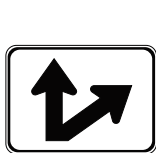
M6-4a
525 x 375 mm
21" x 15"



M6-5a
525 x 375 mm
21" x 15"



M6-6a
525 x 375 mm
21" x 15"



M6-7
525 x 375 mm
21" x 15"



M6-8
525 x 525 mm
21" x 21"



M6-9
525 x 375 mm
21" x 15"



M6-7a
525 x 375 mm
21" x 15"



M6-8a
525 x 375 mm
21" x 15"



M6-9a
525 x 375 mm
21" x 15"

STANDARD:

If used, the Directional Arrow auxiliary sign shall be mounted below the route sign in directional assemblies, and displays a single- or double-headed arrow pointing in the general direction that the route follows.

2D.27 Route Sign Assemblies

STANDARD:

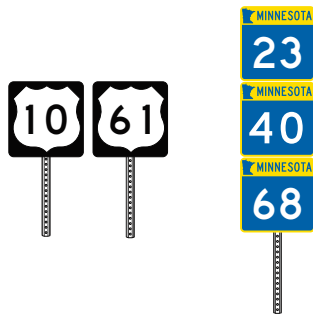
A Route Sign assembly shall consist of a route sign and auxiliary signs that further identify the route and indicate the direction. Route Sign assemblies shall be installed on all approaches to signed numbered routes that intersect with other signed numbered routes.

Where two or more routes follow the same section of highway, the route signs for Interstate, U.S., State, and County routes shall be mounted in that order from the left in horizontal arrangements and from the top in vertical arrangements. Subject to this order of precedence, route signs for lower-numbered routes shall be placed at the left or top.

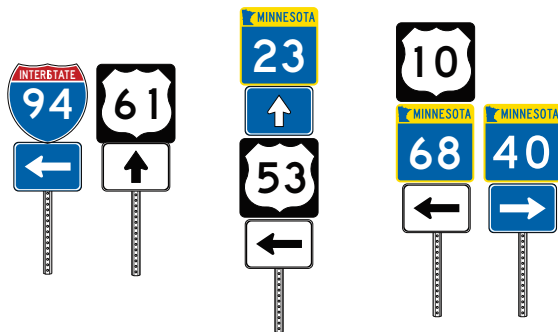


*Route Markers Arranged by
Class of Highway*

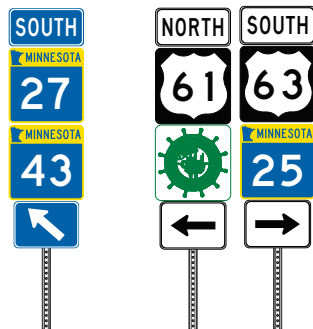
Within groups of assemblies, information for routes intersecting from the left shall be mounted at the left in horizontal arrangements and at the top or center of vertical arrangements. Similarly, information for routes intersecting from the right shall be at the right or bottom, and for straight-through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



**Route Markers Arranged by Number
Within the Class of Highway**



**Route Markers Arranged by
Directional Arrows**



**Route Markers Arranged by
Common Direction**

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

GUIDANCE:

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

OPTION:

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

for the numbered route.

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

SUPPORT:

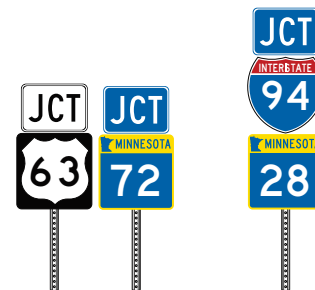
Figure 2D-6 shows typical placements of route signs.

2D.28 Junction Assembly

STANDARD:

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

The Junction assembly shall be installed in advance of every intersection where a signed numbered route is intersected or joined by another signed numbered route. In urban areas it shall be installed in the block preceding the intersection, and in rural areas it shall be installed at least 120 m (400 ft) in advance of the intersection. In rural areas, the minimum distance between the Destination sign and the Route Turn assembly shall be 60 m (200 ft), and the minimum distance between the Route Turn assembly and the Junction assembly shall be 60 m (200 ft).



Examples of Junction Assemblies

GUIDANCE:

In urban areas where speeds are low, the Junction assembly should not be installed more than 90 m (300 ft) in advance of the intersection.

Where prevailing speeds are high, greater spacings should be used.

OPTION:

Where two or more routes are to be indicated, a single Junction auxiliary sign may be used for the assembly and all route signs grouped in a single mounting, or a Combination Junction sign (see Section 2D.14) may be used.

GUIDANCE:

The design of the signs should be consistent with that specified for rest areas in Section 2D.42 and should have a white legend and border on a blue background. An advance sign and an additional sign at the turnoff point should be used for this kind of attraction.

2D.43.1 Public Water Access Signs (D7-X7, D7-X7a, and DNR sign)



D7-X7
variable x 750 mm
variable x 30"



D7-X7a
variable x 750 mm
variable x 30"

DNR sign
450 x 750 mm
18" x 30"

SUPPORT:

The Public Water Access signs may be used to provide direction to a location on a lake, stream or river where a motorist may launch a licensed water craft.

Trailblazing signs, if required, shall be placed before the Public Water Access sign is installed to provide guidance along the route to the site.

STANDARD:

The Minnesota Department of Natural Resources (DNR) Public Water Access sign shall be installed on its own structure. The location of the sign and the design of its structure shall be approved by the appropriate road authority. It shall not obstruct the view of any official traffic control device.

Trailblazing signing on local roads is the responsibility of the facility and/or the local road authority. The color of these signs shall match that of the Public Water Access sign.

2D.44 Weigh Station Signing (D8 Series)

SUPPORT:

The general concept for Weigh Station signing is similar to Rest Area signing (see Section 2D.42) because in both cases traffic using either area remains within the right-of-way.

STANDARD:

The standard installation for Weigh Station signing shall include three basic signs:

- Advance sign (D8-1);
- Exit Direction sign (D8-2), and
- Gore sign (D8-3).

SUPPORT:

The typical locations of these signs are shown in Figure 2D-10.

GUIDANCE:

The Exit Direction sign (D8-2) or the Advance sign (D8-1) should display, either within the sign border or on a supplemental panel, the changeable message OPEN or CLOSED.

2D.45 General Service Signs (D9 Series)



D9-1
600 x 600 mm
24" x 24"



D9-2
600 x 600 mm
24" x 24"



D9-3
600 x 600 mm
24" x 24"



D9-3a
600 x 600 mm
24" x 24"



D9-4
600 x 600 mm
24" x 24"



D9-6
600 x 600 mm
24" x 24"



D9-7
600 x 600 mm
24" x 24"



D9-8
600 x 600 mm
24" x 24"



D9-9
600 x 600 mm
24" x 24"

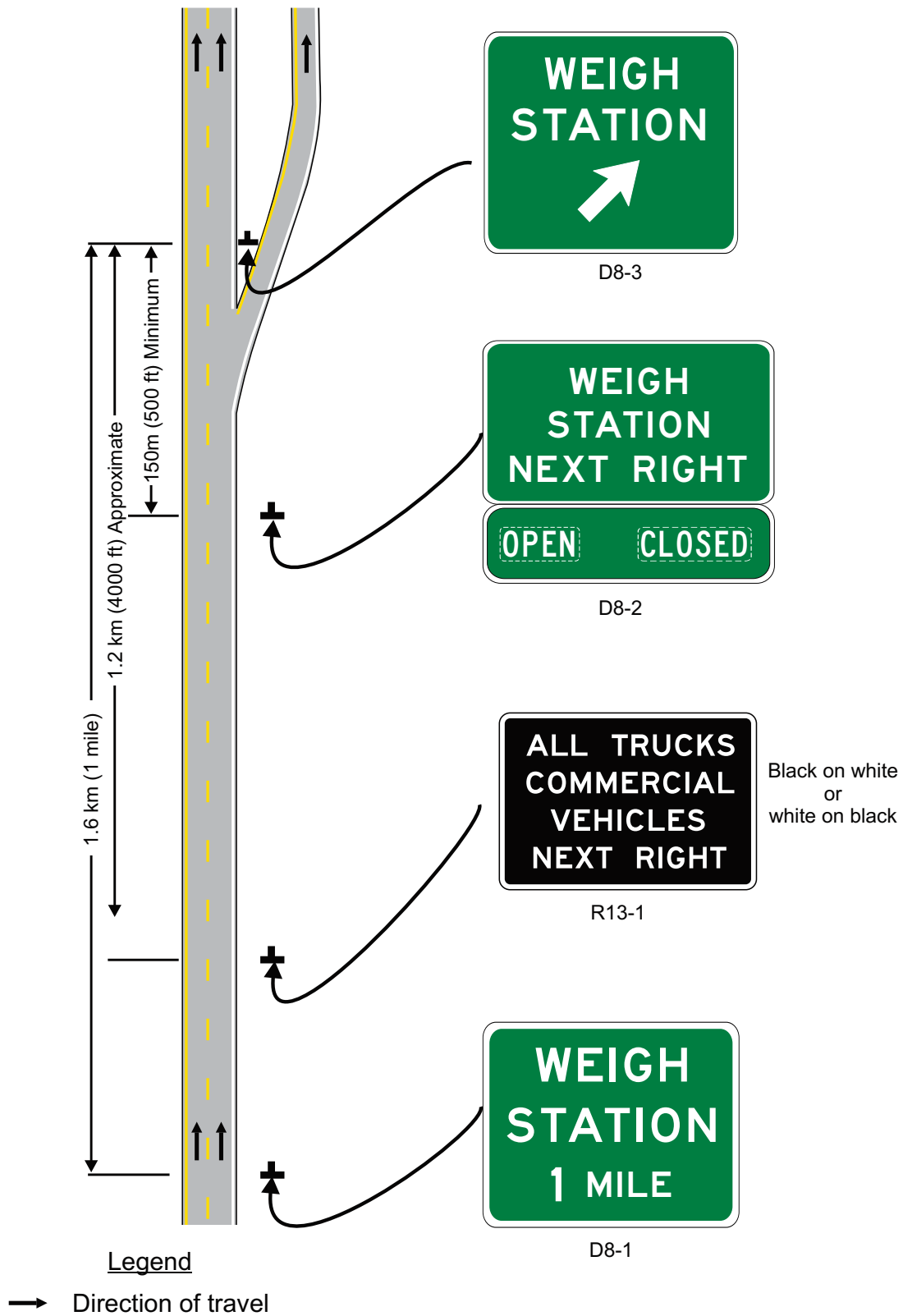


Figure 2D-10. Example of Weigh Station Signing

The State should consider the following guidelines in the preparation of its policy:

A. AMBULANCE

1. 24-hour service, 7 days per week.
2. Staffed by two State-certified persons trained at least to the basic level.
3. Vehicular communications with a hospital emergency department.
4. Operator should have successfully completed an emergency vehicle operator training course.

B. HOSPITAL

1. 24-hour service, 7 days per week.
2. Emergency department facilities with a physician (or emergency care nurse on duty within the emergency department with a physician on call) trained in emergency medical procedures on duty.
3. Licensed or approved for definitive medical care by an appropriate State authority.
4. Equipped for radio voice communications with ambulances and other hospitals.

C. Channel 9 Monitored

1. Provided by either professional or volunteer monitors.
2. Available 24 hours per day, 7 days per week.
3. The service should be endorsed, sponsored, or controlled by an appropriate government authority to guarantee the level of monitoring.

2D.45.1 Hospital Signs

(D9-2a, D9-2b, E10-3, E10-4, E10-8)



D9-2a
450 x 900 mm
18" x 36"



D9-2b
1500 x 750 mm
60" x 30"



E10-3
3050 x 1200 mm
120" x 48"



E10-4
900 x 450 mm
36" x 18"



E10-8
1200 x 300 mm
48" x 12"

STANDARD:

Directional (D9-2a) signs guiding the motorist from Mn/DOT maintained roads to the hospital shall display the appropriate distance and directional arrow installed before any service signing is installed on State Highways.

Trailblazing directional signs shall be installed to provide guidance along the route to the hospital. They shall be in place prior to the installation of signs on a State highway.

On freeways and expressways in urban metropolitan areas, the HOSPITAL (E10-3) sign shall be installed in advance of the interchange leading to the hospital. The appropriate directional signs (E10-4, E10-8) shall be installed on freeway and expressway ramps.

OPTION:

In rural areas, where other Motorist Service (E10-1) signs are used in advance of the interchange leading to the hospital, the word HOSPITAL may be included on the sign. If necessary, HOSPITAL may be displayed on the sign if the word CAMPING is not displayed on the sign..

STANDARD:

On two-lane, two-way roads the Hospital symbol (D9-2b) sign shall be installed either on a ground-mounted structure in advance of the roadway intersection leading to the hospital or overhead on a signal mast arm at the intersection.

PART 2. SIGNS

Chapter 2E. Guide Signs - Freeways and Expressways

TABLE OF CONTENTS

Chapter 2E.	Guide Signs - Freeways and Expressways	Page
Section 2E.1	Scope of Freeway and Expressway Guide Sign Standards.	2E-1
2E.2	Freeway and Expressway Signing Principles	2E-1
2E.3	General.	2E-1
2E.4	Color of Guide Signs.	2E-1
2E.5	Retroreflection or Illumination	2E-2
2E.6	Characteristics of Urban Signing	2E-2
2E.7	Characteristics of Rural Signing	2E-2
2E.8	Memorial Highway Signing	2E-3
2E.9	Amount of Legend on Guide Signs.	2E-3
2E.10	Number of Signs at an Overhead Installation and Sign Spreading	2E-3
2E.11	Pull-Through Signs	2E-5
2E.12	Designation of Destinations	2E-5
2E.13	Size and Style of Letters and Signs.	2E-5
2E.14	Interline and Edge Spacing	2E-10
2E.15	Sign Borders	2E-10
2E.16	Abbreviations.	2E-10
2E.17	Symbols	2E-10
2E.18	Arrows for Interchange Guide Signs.	2E-10
2E.19	Diagrammatic Signs	2E-11
2E.20	Signing for Interchange Lane Drops.	2E-19
2E.21	Changeable Message Signs	2E-19
2E.22	Overhead Sign Installations.	2E-20
2E.23	Lateral Offset.	2E-20
2E.24	Guide Sign Classification	2E-20
2E.25	Route Signs and Trailblazer Assemblies.	2E-21
2E.25.1	Route Marker Guide Signs	2E-22
2E.26	Signs for Intersections at Grade	2E-22
2E.27	Interchange Guide Signs	2E-22
2E.28	Interchange Exit Numbering	2E-22
2E.29	Interchange Classification	2E-23
2E.30	Advance Guide Signs	2E-28
2E.31	Next Exit Supplemental Signs.	2E-29
2E.32	Other Supplemental Guide Signs	2E-29
2E.33	Exit Direction Signs	2E-30
2E.34	Exit Gore Signs	2E-31
2E.35	Post-Interchange Signs	2E-32
2E.36	Distance Signs	2E-32
2E.37	Interchange Sequence Signs	2E-34
2E.38	Community Interchanges Identification Signs	2E-35
2E.39	NEXT X EXITS Sign	2E-35
2E.40	Signing by Type of Interchange	2E-35
2E.41	Freeway-to-Freeway Interchange	2E-42

	Page
2E.42	Cloverleaf Interchange 2E-42
2E.43	Cloverleaf Interchange with Collector-Distributor Roadways 2E-42
2E.44	Partial Cloverleaf Interchange 2E-43
2E.45	Diamond Interchange 2E-43
2E.46	Diamond Interchange in Urban Area 2E-43
2E.47	Closely Spaced Interchanges 2E-43
2E.48	Minor Interchange 2E-43
2E.49	Signing of Approaches and Connecting Roadways 2E-46
2E.50	Wrong-Way Traffic Control at Interchange Ramps 2E-46
2E.51	General Service Signs 2E-52
2E.52	Rest and Scenic Area Signs 2E-55
2E.53	Tourist Information and Welcome Centers 2E-55
2E.54	Reference Location Signs and Enhanced Reference Location Signs (D10-4, D10-5) 2E-57
2E.55	Miscellaneous Guide Signs 2E-58
2E.56	Radio Information Signing 2E-59
2E.57	Carpool Information Signing 2E-59
2E.58	Weigh Station Signing 2E-60
2E.59	Preferential Only Lane Signs 2E-60
2E.60	Freeway Entrance Sign (E1-6) 2E-64
2E.61	Crossover Signs (D13 Series) 2E-64

FIGURES

Figure 2E-1	Example of Guide Sign Spreading 2E-4
Figure 2E-2	Pull-Through Signs 2E-4
Figure 2E-3	Diagrammatic Sign for Single-Lane Left Exit 2E-11
Figure 2E-4	Diagrammatic Signs for Split with Dedicated Lanes 2E-12
Figure 2E-5	Diagrammatic Signs for Split with Optional Lane 2E-13
Figure 2E-6	Diagrammatic Signs for Two-Lane Exit with Optional Lane 2E-14
Figure 2E-7	Diagrammatic Signs for Two-Lane Exit with Optional Lane 2E-15
Figure 2E-8	EXIT ONLY on Left with Diagrammatic Sign for Left Lane Dropped at an Interchange 2E-16
Figure 2E-9	EXIT ONLY Panels 2E-17
Figure 2E-10	EXIT ONLY Panels for Right Lane Dropped at an Interchange 2E-18
Figure 2E-11	This figure has been eliminated
Figure 2E-12	Example of Interchange Numbering for Mainline and Circumferential Routes 2E-24
Figure 2E-13	Example of Interchange Numbering for Mainline, Loop, and Spur Routes 2E-25
Figure 2E-14	Example of Interchange Numbering If Routes Overlap 2E-26
Figure 2E-15	Example of Interchange Advance Guide Signs 2E-27
Figure 2E-16	Next Exit Supplemental Advance Guide Signs 2E-28
Figure 2E-17	Supplemental Guide Signs for Multi-Exit Interchanges 2E-29
Figure 2E-18	Supplemental Guide Sign for a Park and Ride Facility (Route without Exit Numbering) 2E-29
Figure 2E-19	Supplemental Guide Sign for a Park and Ride Facility (Route with Exit Numbering) 2E-30
Figure 2E-20	Interchange Exit Direction Sign 2E-30
Figure 2E-21	Exit Gore Signs 2E-31

Figure 2E-22	Post-Interchange Distance Sign.	2E-32
Figure 2E-23	Signing of Closely Spaced Interchanges Using Interchange Sequence Signs	2E-33
Figure 2E-24	Interchange Sequence Sign	2E-34
Figure 2E-25	Community Interchanges Identification Sign	2E-35
Figure 2E-26	NEXT EXITS Sign	2E-35
Figure 2E-27	Examples of Freeway-to-Freeway Interchange Guide Signs	2E-36
Figure 2E-28	Examples of Guide Signs for Full Cloverleaf Interchange.	2E-37
Figure 2E-29	Examples of Guide Signs for Full Cloverleaf Interchange with Collector-Distributor Roadways	2E-38
Figure 2E-30	Examples of Partial Cloverleaf Interchange Guide Signs.	2E-39
Figure 2E-31	Examples of Diamond Interchange Guide Signs	2E-40
Figure 2E-32	Examples of Diamond Interchange Guide Signs in an Urban Area	2E-41
Figure 2E-33	Examples of Minor Interchange Guide Signs	2E-44
Figure 2E-34	Examples of Crossroad Signing for a One-Lane Approach	2E-45
Figure 2E-35	Example of Minor Interchange Crossroad Signing.	2E-47
Figure 2E-36	Examples of Multi-lane Crossroad Signing for Diamond Interchange	2E-48
Figure 2E-37	Examples of Multi-lane Crossroad Signing for Partial Cloverleaf Interchange.	2E-49
Figure 2E-38	Examples of Multi-lane Crossroad Signing for Cloverleaf Interchange	2E-50
Figure 2E-39	Examples of Regulatory Signing and Pavement Markings at Exit Ramp Termination to Deter Wrong-Way Entry	2E-51
Figure 2E-40	Examples of Regulatory Signing and Pavement Markings at Entrance Ramp Terminal Where Design Does Not Clearly Indicate the Direction of Flow	2E-52
Figure 2E-41	Examples of General Service Signs (without Exit Numbering).	2E-53
Figure 2E-42	Examples of General Service Signs (with Exit Numbering)	2E-53
Figure 2E-43	Example of Next Services Sign.	2E-53
Figure 2E-44	Example of Rest Area and Scenic Overlook and Welcome Center Signs	2E-56
Figure 2E-45	This figure has been eliminated	
Figure 2E-46	Example of Signing for the Entrance to Barrier-Separated HOV Lanes	2E-62
Figure 2E-47	Example of Signing for the Intermediate Entry to and Exit from Barrier- or Buffer-Separated HOV Lanes	2E-63
Figure 2E-48	Example of Signing for the Entrance to and Exit from an added HOV Lanes	2E-66
Figure 2E-49	Example of Signing for the Entrance to and Exit from a General Purpose Lane that Becomes an HOV Lane	2E-67
Figure 2E-50	Example of Signing for a Direct Access Ramp to an HOV Lane from a Park & Ride Facility	2E-68
Figure 2E-51	Example of Signing for a Direct Access Ramp to an HOV Lane from a Local Street . .	2E-69
Figure 2E-52	Example of Signing for a Direct Access Ramp between HOV Lanes on Separate Freeways	2E-70

TABLES

Table 2E-1	Minimum Letter and Numeral Sizes for Expressway Guide Signs According to Interchange Classification	2E-6
Table 2E-2	Minimum Letter and Numeral Sizes for Expressway Guide Signs According to Sign Type	2E-7
Table 2E-3	Minimum Letter and Numeral Sizes for Freeway Guide Signs According to Interchange Classification	2E-8
Table 2E-4	Minimum Letter and Numeral Sizes for Freeway Guide Signs According to Sign Type	2E-9

PART 2. SIGNS

Chapter 2E. Guide Signs - Freeways and Expressways

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

SUPPORT:

These standards provide a uniform and effective system of highway 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 (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 2A.1 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 code. Guidelines for the design of guide signs for freeways and expressways are provided in Chapter 8 (Design Guidelines) of the Federal "Standard Highway Signs" book (see Section 1A.11).

STANDARD:

The standards prescribed herein for freeway or expressway guide signing shall apply to any highway that meets the definition of such 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 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 and symbols, 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.4 Color of Guide Signs

STANDARD:

Guide signs on freeways and expressways, except as noted herein, shall have white legend and borders on a green background.

SUPPORT:

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

2E.5 Retroreflection or Illumination**STANDARD:**

Letters, numerals, symbols, 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 ground-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.6 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.37);
- B. Use of sign spreading to the maximum extent possible (see Section 2E.11);
- C. Elimination of service signing (see Section 2E.51);
- D. Reduction to a minimum of post-interchange signs (see Section 2E.35);
- E. Display of advance signs at distances closer to the interchange, with appropriate adjustments in the legend (see Section 2E.30);
- F. Use of overhead signs on roadway structures and independent sign supports (see Section 2E.22);
- G. Use of diagrammatic signs in advance of intersections and interchanges (see Section 2E.19); 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.7 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.8 Memorial Highway Signing



GUIDANCE:

Freeways and expressways should not be signed as memorial highways. If a route, bridge, or highway component is officially designated as a memorial, and if notification of the memorial is to be made on the highway right-of-way, such notification should consist of installing a memorial plaque in a rest area, scenic overlook, recreational area, or other appropriate location where parking is provided with the signing inconspicuously located relative to vehicle operations along the highway.

OPTION:

If the installation of a memorial plaque off the main roadway is not practical, a memorial sign may be installed on the mainline.

STANDARD:

Where such memorial signs are installed on the mainline, (1) memorial names shall not appear on directional guide signs, (2) memorial signs shall not interfere with the placement of any other necessary highway signing, and (3) memorial signs shall not compromise the safety or efficiency of traffic flow. The memorial signing shall be limited to one sign at an appropriate location in each route direction.

2E.9 Amount of Legend on Guide Signs

GUIDANCE:

No more than two destination names or street names should be shown 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.

OPTION:

Sign legends may include symbols, route numbers, arrows, cardinal directions, and exit instructions.

2E.10 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 panel 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. Pull-Through signs (see Figure 2E-2) are overhead lane use signs intended for through traffic.

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 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.

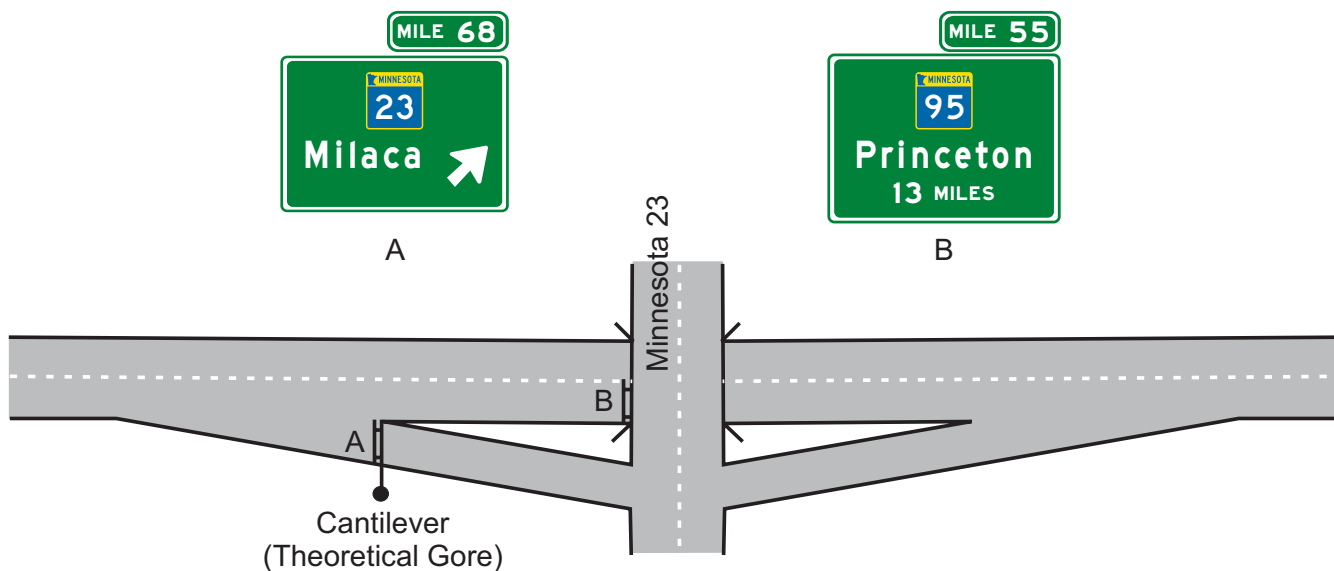


Figure 2E-1 Example of Guide Sign Spreading



E6-2



E6-2a

Figure 2E-2 Pull-Through Signs

2E.11 Pull-Through Signs

SUPPORT:

Pull-Through signs (see Figures 2E-2) are overhead lane use 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..

2E.12 Designation of Destinations

STANDARD:

The direction of a freeway and the major destinations or control cities (see Section 2D.34) along it shall be clearly identified through the use of appropriate destination legends. 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 "List of Control Cities for Use in Guide Signs on Interstate Highways," published and available from American Association of State and Highway Transportation Officials (see Page i for AASHTO's address).

2E.13 Size and Style of Letters and Signs

STANDARD:

With all freeway and expressway signs, 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 200 mm (8 in) 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 are shown in Tables 2E-1 and 2E-2. Minimum numeral and letter sizes for freeway guide signs, according to interchange classification, type of sign, and component of sign legend, appear in Tables 2E-3 and 2E-4. 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. Other word legends shall be in capital letters. The letters and the numerals used shall be Series E(M) of the "Standard Highway Signs" book. Interline and edge spacing shall be as specified in Section 2E.14.

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, lower-case, and capital alphabets are shown in the "Standard Highway Signs" book (see Government Printing Office, page ii). Tables of recommended letter spacing are contained in the Mn/DOT "Standard Signs Manual" (see Map & Manual Sales Unit, page ii).

GUIDANCE:

Where upper- and lower-case lettering is used, the initial upper-case letters should be approximately 1.33 times the "loop" height of the lower-case letters. Freeway lettering sizes (see Tables 2E-3 and 2E-4) 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 should be kept to a minimum.

Type of Sign	Type of Interchange (see Section 2E.29)								Overhead	
	Major				Intermediate		Minor			
	Category a		Category b							
	millimeters	inches	millimeters	inches	millimeters	inches	millimeters	inches	millimeters	inches
A. Advance Guide, Exit Direction, and Overhead Guide Signs										
Exit Plaque										
Word	250	10	250	10	250	10	200	8	250	10
Numeral & Letter	375	15	375	15	375	15	300	12	375	15
Interstate Route Sign										
Numeral	450	18	---	---	---	---	---	---	450	18
1 or 2 digit shield	900 x 900	36 x 36	---	---	---	---	---	---	900 x 900	36 x 36
3 digit shield	1125 x 900	45 x 36	---	---	---	---	---	---	1125 x 900	45 x 36
U.S. or State Route Sign										
Numeral	450	18	450	18	450	18	300	12	450	18
1 or 2 digit shield	900 x 900	36 x 36	900 x 900	36 x 36	900 x 900	36 x 36	600 x 600	24 x 24	900x x900	36 x 36
3 digit shield	1125 x 900	45 x 36	1125 x 900	45 x 36	1125 x 900	45 x 36	750 x 600	30 x 24	1125 x 900	45 x 36
Alternate (Example: U.S. Alt. 56)										
Letters	375	15	300	12	300	12	250	10	300	12
Numeral	450	18	375	15	375	15	300	12	375	15
Cardinal Direction										
Word	375	15	300	12	250	10	200	8	300	12
Name of Destination										
Upper-Case Letters	500	20	400	16	330	13.3	265	10.6	400	16
Lower-Case Letters	375	15	300	12	250	10	200	8	300	12
Distance Number	450	18	375	15	300	12	250	10	375	15
Distance Fraction	300	12	250	10	250	10	200	8	250	10
Distance Word	300	12	250	10	250	10	200	8	250	10
Action Message	250	10	250	10	250	10	200	8	250	10
B. Gore Signs										
Word	250	10	250	10	250	10	200	8	---	---
Numeral & Letter	300	12	300	12	300	12	250	10	---	---

Table 2E-1 Minimum Letter and Numeral Sizes for Expressway Guide Signs According to Interchange Classification

Type of Sign	Minimum Size	
	millimeters	inches
A. Pull-Through Signs		
Destination -- Upper-Case Letters	330	13.3
Destination -- Lower-Case Letters	250	10
Route Sign as Message		
Cardinal Direction	250	10
1- or 2- Digit Shield	900 x 900	36 x 36
3-Digit Shield	1125 x 900	45 x 36
B. Supplemental Guide Signs		
Exit Number Word	200	8
Exit Number Word and Letter	300	12
Place Name -- Upper-Case Letters	265	10.6
Place Name -- Lower-Case Letters	200	8
Action Message	200	8
C. Changeable Message Signs		
Characters	265 *	10.6 *
D. Interchange Sequence Signs		
Word -- Upper-Case Letters	265	10.6
Word -- Lower-Case Letters	200	8
Numeral	250	10
Fraction	200	8
E. Next X Exits Sign		
Place Name -- Upper-Case Letters	265	10.6
Place Name -- Lower-Case Letters	200	8
NEXT X EXITS	200	8

Type of Sign	Minimum Size	
	millimeters	inches
F. Distance Signs		
Word -- Upper-Case Letters	200	8
Word -- Lower-Case Letters	150	6
Numeral	200	8
G. General Services Signs		
Exit Number Word	200	8
Exit Number Numeral and Letter	300	12
Services	200	8
H. Rest Area and Scenic Area Signs		
Word	250	10
Distance Numeral	300	12
Distance Fraction	200	8
Distance Word	250	10
Action Message Word	250	10
I. Reference Location (Mile Post) Signs		
Word	100	4
Numeral	250	10
J. Boundary and Orientation Signs		
Word -- Upper-Case Letters	200	8
Word -- Lower-Case Letters	150	6
K. Next Exit and Next Services Signs		
Word and Numeral	200	8
L. Exit Only Signs		
Word	300	12

* Changeable Message Signs may often require larger sizes than the minimum. A size of 450 mm (18 in) should be used where traffic speeds are greater than 55 mph, in areas of persistent inclement weather, or where complex driving tasks are involved.

Table 2E-2 Minimum Letter and Numeral Sizes for Expressway Guide Signs According to Sign Type

Type of Sign	Type of Interchange (see Section 2E.29)									
	Major				Intermediate		Minor			
	Category a		Category b							
	millimeters	inches	millimeters	inches	millimeters	inches	millimeters	inches	millimeters	inches
A. Advance Guide, Exit Direction, and Overhead Guide Signs										
Exit Plaque										
Word	250	10	250	10	250	10	250	10	250	10
Numeral & Letter	375	15	375	15	375	15	375	15	375	15
Interstate Route Sign										
Numeral	600/450	24/18	---	---	---	---	---	---	450	18
1 or 2 digit shield	1200 x 1200/ 900 x 900	48 x 48 36 x 36	---	---	---	---	---	---	900 x 900	36 x 36
3 digit shield	1500 x 1200/ 1125 x 900	60 x 48 45 x 36	---	---	---	---	---	---	1125 x 900	45 x 36
U.S. or State Route Sign										
Numeral	600/450	24/18	450	18	450	18	300	12	450	18
1 or 2 digit shield	1200 x 1200/ 900 x 900	48 x 48 36 x 36	900 x 900	36 x 36	900 x 900	36 x 36	600 x 600	24 x 24	900x x900	36 x 36
3 digit shield	1500 x 1200/ 1125 x 900	60 x 48 45 x 36	1125 x 900	45 x 36	1125 x 900	45 x 36	750 x 600	30 x 24	1125 x 900	45 x 36
Alternate (Example: U.S. Alt. 56)										
Letters	375	15	375/300	15/12	300	12	250	10	300	12
Numeral	450	18	450/375	18/15	375	15	300	12	375	15
Cardinal Direction										
Word	375	15	300	12	300	12	200	8	300	12
Name of Destination										
Upper-Case Letters	500	20	500	20	400	16	330	13.3	400	16
Lower-Case Letters	375	15	375	15	300	12	250	10	300	12
Distance Number	450	18	450/375	18/15	375	15	300	12	375	15
Distance Fraction	300	12	300/250	12/10	250	10	200	8	250	10
Distance Word	300	12	300/250	12/10	250	10	200	8	250	10
Action Message	300	12	300/250	12/10	250	10	200	8	250	10
B. Gore Signs										
Word	300	12	300	12	300	12	200	8	---	---
Numeral & Letter	375	15	375	15	375	15	250	10	---	---

Table 2E-3 Minimum Letter and Numeral Sizes for Freeway Guide Signs According to Interchange Classification

Type of Sign	Minimum Size	
	millimeters	inches
A. Pull-Through Signs		
Destination -- Upper-Case Letters	400	16
Destination -- Lower-Case Letters	300	12
Route Sign as Message		
Cardinal Direction	300	12
1- or 2- Digit Shield	900 x 900	36 x 36
3-Digit Shield	1125 x 900	45 x 36
B. Supplemental Guide Signs		
Exit Number Word	250	10
Exit Number Word and Letter	375	15
Place Name -- Upper-Case Letters	330	13.3
Place Name -- Lower-Case Letters	250	10
Action Message	250	10
C. Changeable Message Signs		
Characters	265 *	10.6 *
D. Interchange Sequence Signs		
Word -- Upper-Case Letters	330	13.3
Word -- Lower-Case Letters	250	10
Numerals	330	13.3
Fraction	250	10
E. Next X Exits Sign		
Place Name -- Upper-Case Letters	330	13.3
Place Name -- Lower-Case Letters	250	10
NEXT X EXITS	250	10
F. Distance Signs		
Word -- Upper-Case Letters	200	8
Word -- Lower-Case Letters	150	6
Numerals	200	8
G. General Services Signs		
Exit Number Word	250	10
Exit Number Numeral and Letter	375	15
Services	250	10

Type of Sign	Minimum Size	
	millimeters	inches
H. Rest Area and Scenic Area Signs		
Word	300	12
Distance Numeral	375	15
Distance Fraction	250	10
Distance Word	300	12
Action Message Word	300	12
I. Reference Location (Mile Post) Signs		
Word	100	4
Numerals	250	10
J. Boundary and Orientation Signs		
Word -- Upper-Case Letters	200	8
Word -- Lower-Case Letters	150	6
K. Next Exit and Next Services Signs		
Word and Numeral	200	8
L. Exit Only Signs		
Word	300	12
M. Diagrammatic Signs		
Lane Widths	125	5
Lane Line Segments	25 x 150	1 x 6
Gap Between Lane Lines	150	6
Stem Height (up to upper point of departure)	750	30
Arrowhead (standard up" arrow)	200	8
Space Between Arrowhead and	300	12
Route Shield		

* Changeable Message Signs may often require larger sizes than the minimum. A size of 450 mm (18 in) should be used where traffic speeds are greater than 55 mph, in areas of persistent inclement weather, or where complex driving tasks are involved.

Table 2E-4 Minimum Letter and Numeral Sizes for Freeway Guide Signs According to Sign Type

SUPPORT:

A sign mounted over a particular roadway lane to which it applies might have to be limited in horizontal dimension to the width of the lane, so that another sign can be placed over an adjacent lane. The necessity to maintain proper vertical clearance might also place a further limitation on the size of the overhead sign and the legend that can be accommodated.

2E.14 Interline and Edge Spacing

GUIDANCE:

Interline spacing of upper-case letters should be approximately three-fourths the average of upper-case letter heights in adjacent lines of letters.

The spacings to the top and bottom borders should be equal to the average of the letter height of the adjacent line of letters. The lateral spacing to the vertical borders should be essentially the same as the height of the largest letter.

2E.15 Sign Borders

STANDARD:

Signs shall have a border of the same color as the legend in order to outline their distinctive shape and thereby give them easy recognition and a finished appearance.

GUIDANCE:

For guide signs larger than 3000 x 1800 mm (120 x 72 in), the border should have a width of 50 mm (2 in). For smaller guide signs, a border width of 31 mm (1.25 in) should be used, but the width should not exceed the stroke width of the major lettering on the sign.

Corner radii of sign borders should be one-eighth of the minimum sign dimension on guide signs, except that the radii should not exceed 300 mm (12 in) on any sign.

OPTION:

The sign material in the area outside of the corner radius may be trimmed.

2E.16 Abbreviations

GUIDANCE:

Abbreviations should be kept to a minimum; however, they are useful when complete destination messages produce excessively long signs. If used, abbreviations should be unmistakably recognized by road users (see Section 1A.14).

Periods should not be used unless a cardinal direction is abbreviated as part of a destination name.

STANDARD:

The words NORTH, SOUTH, EAST, and WEST shall not be abbreviated when used with route signs to indicate cardinal directions on guide signs.

2E.17 Symbols

STANDARD:

Symbol designs shall be essentially like those shown in Appendix C of this Manual and the Mn/DOT "Standard Signs Manual" (see Map & Manual Sales Unit, page ii), and the Federal "Standard Highway Signs" book (see Government Printing Office, page ii).

GUIDANCE:

A special effort should be made to balance legend components for maximum legibility of the symbol with the rest of the sign.

OPTION:

Educational plaques may be used below symbol signs where needed.

2E.18 Arrows for Interchange Guide Signs

STANDARD:

On all Exit Direction signs, both overhead and ground mounted, arrows shall be upward slanting and shall be located on the side of the sign consistent with the direction of the exiting movement.

Downward pointing arrows shall be used only for overhead guide signs to prescribe lane assignment for traffic bound for a destination or route that can be reached only by being in the designated lane(s).

OPTION:

Downward pointing arrows may be tilted where it is desired to emphasize the separation of roadways.

SUPPORT:

Examples of arrows for use on guide signs are shown in Figure 2D-1. Detailed dimensions of arrows are provided in the Mn/DOT "Standard Signs Manual" (see Map & Manual Sales Unit, page ii), and the Federal "Standard Highway Signs" book (see Government Printing Office, page ii).



* The upper half of a Left Exit plaque, which contains the word LEFT, may have a black legend and border on a yellow background.

Figure 2E-3 Diagrammatic Signs for Single-Lane Left Exit

2E.19 Diagrammatic Signs

SUPPORT:

Diagrammatic signs are guide signs that show a graphic view of the exit arrangement in relationship to the main highway. Use of such guide signs has been shown to be superior to conventional guide signs for some interchanges.

STANDARD:

Diagrammatic signs 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 location (see Section 2E.33).
- D. The EXIT ONLY panel shall not be used on diagrammatic signs at any major split.

GUIDANCE:

Diagrammatic signs 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 shown for each arrowhead, and no more than two destinations should be shown per sign.
- C. A black on yellow EXIT ONLY panel should be used to supplement a lane drop graphic.
- D. The shaft for the exit ramp movement should be shorter than, but not separated from, the through movement graphic. Where the movements are freeway splits rather than exits, the shafts should be equal in length.
- E. Arrow shafts should contain lane lines where appropriate.
- F. Route shields, cardinal directions, and destinations should be clearly related to the arrowhead, and the arrowhead should point toward the route shield for the off movement.
- G. The cardinal direction should be placed adjacent to the route shield, and the destination should be placed below and justified with the route shield.

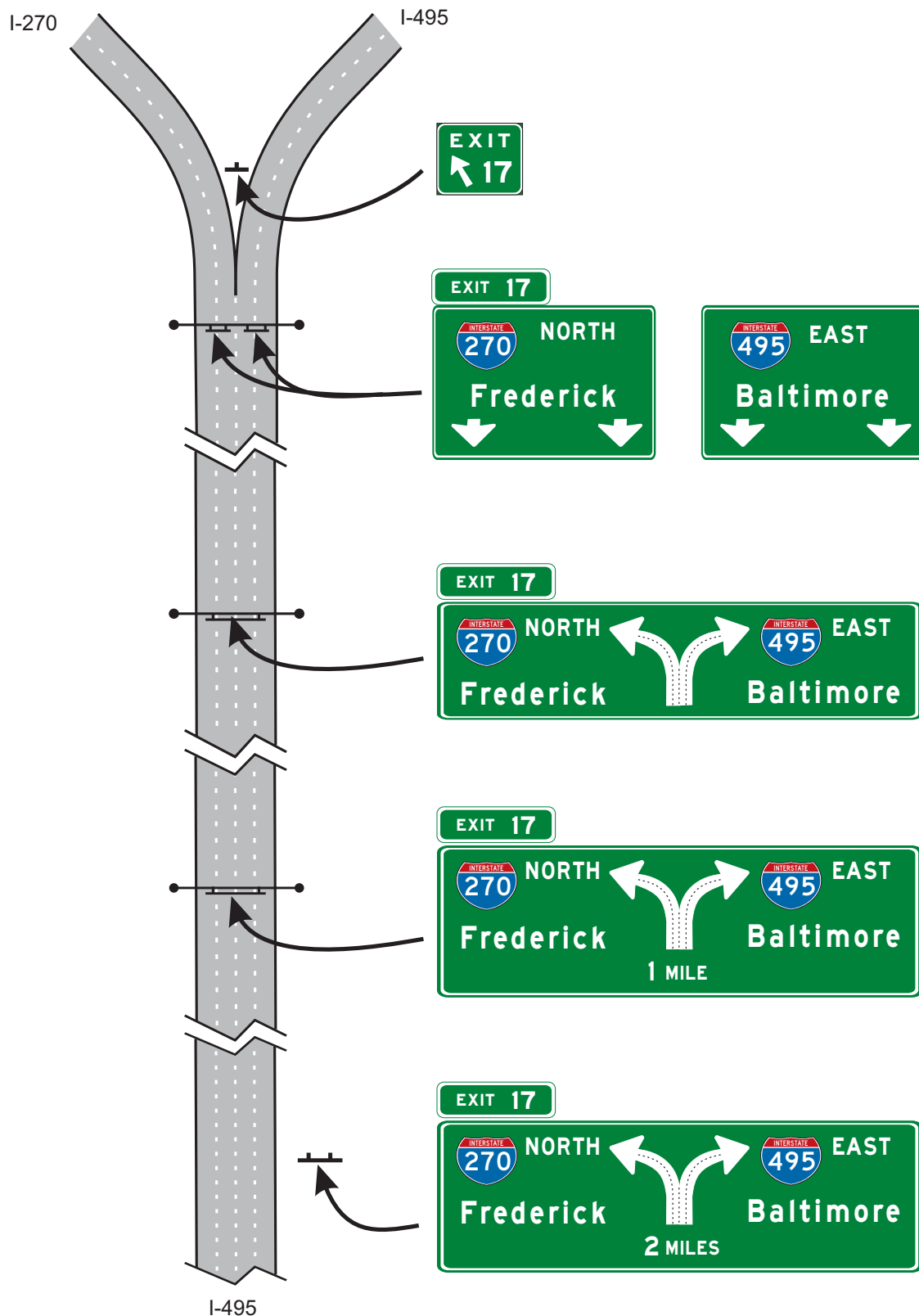


Figure 2E-4 Diagrammatic Signs for Split with Dedicated Lanes

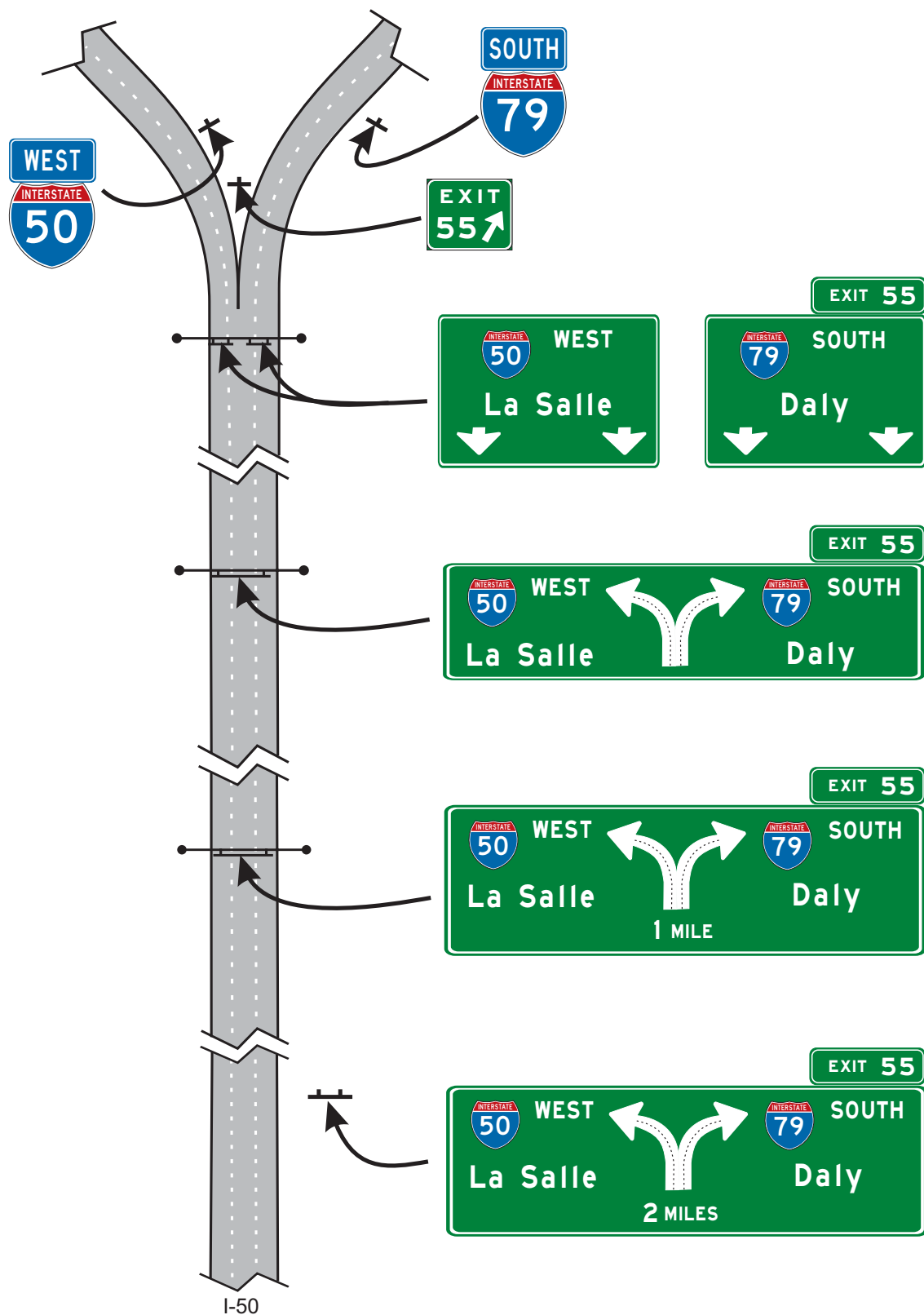


Figure 2E-5 Diagrammatic Signs for Split with Optional Lane

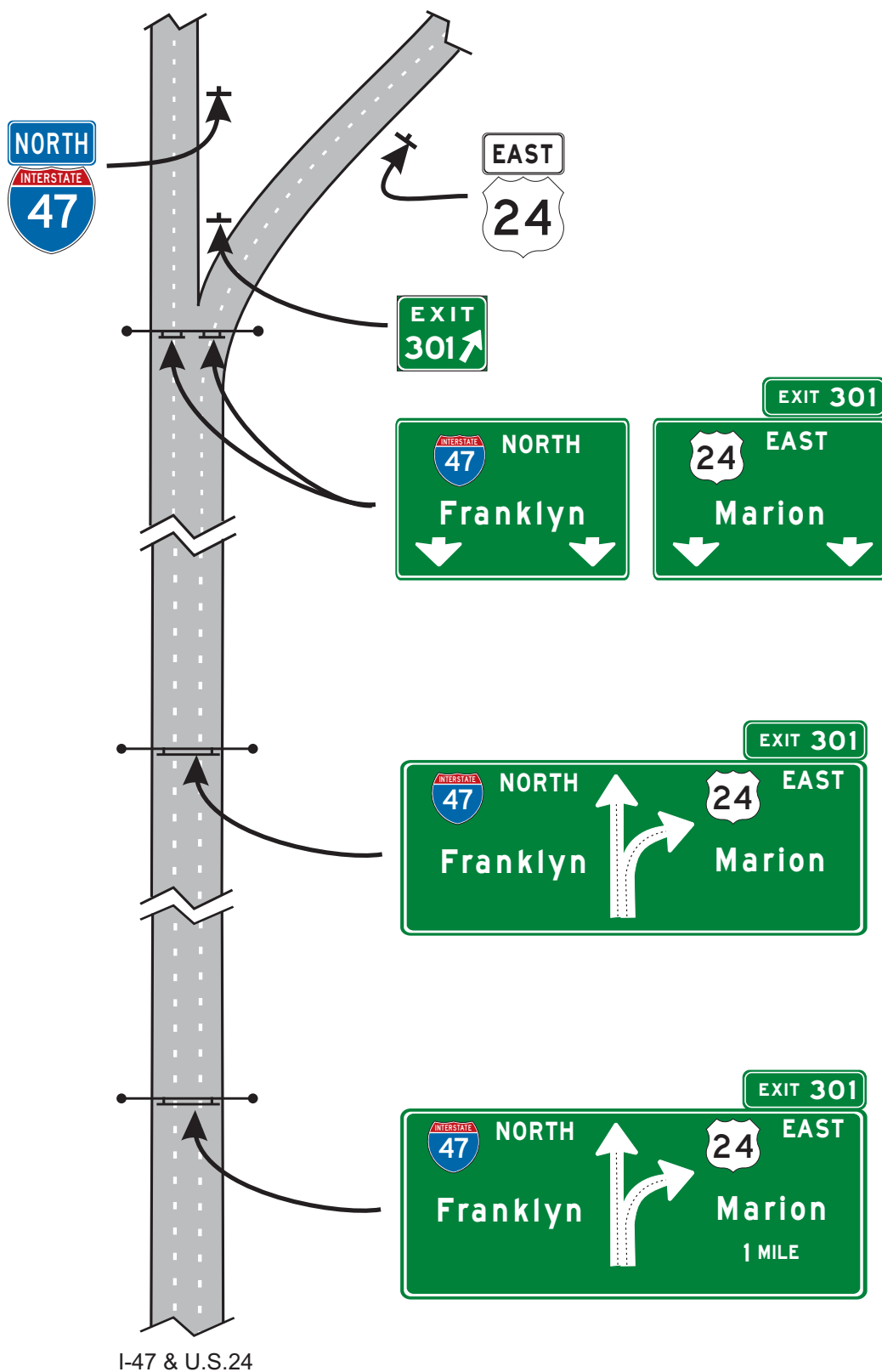


Figure 2E-7 Diagrammatic Signs for Two-Lane Exit with Optional Lane

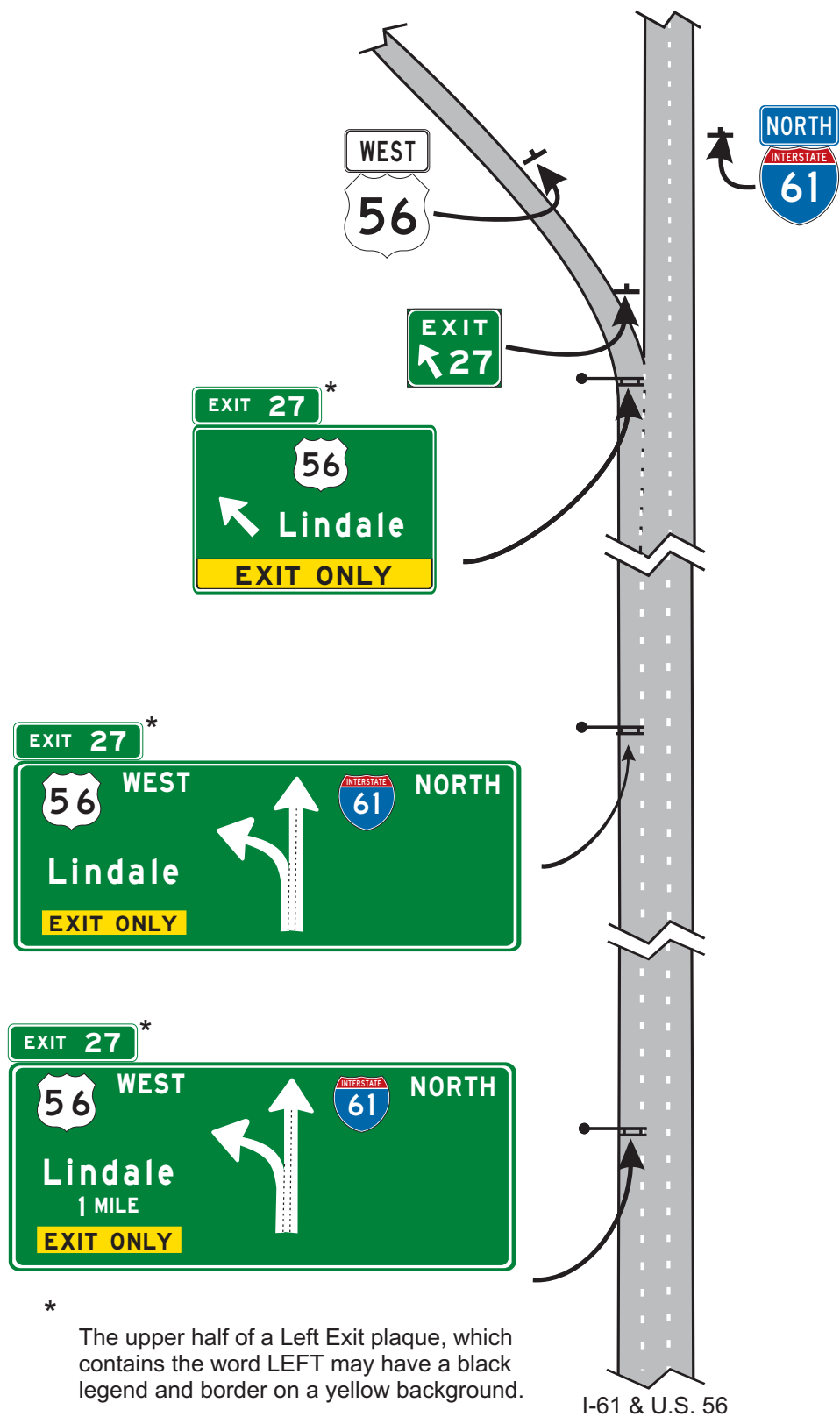


Figure 2E-8 EXIT ONLY on Left with Diagrammatic Sign for Left Lane Dropped at Interchange



E11-1



E11-1a



E11-1b



E11-1c

Figure 2E-9 EXIT ONLY Panels

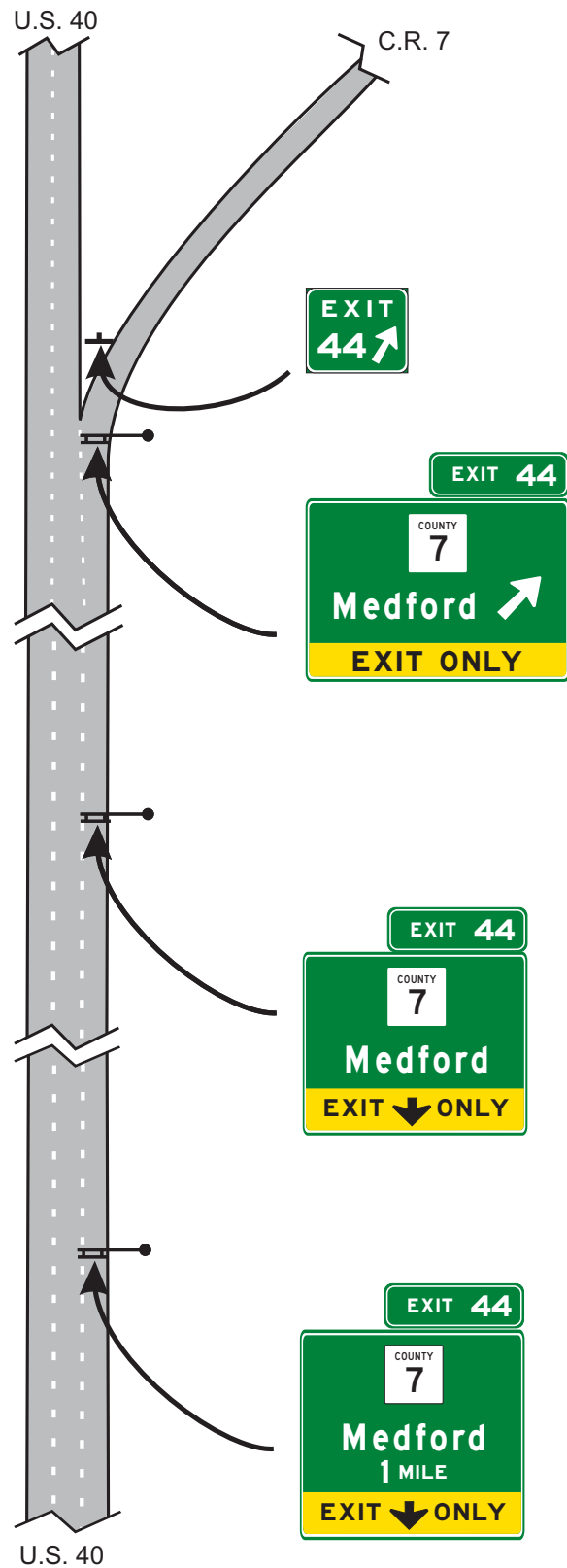


**Figure 2E-10 EXIT ONLY Panels for Right Lane
Dropped at an Interchange**

Diagrammatic signs should be used at the Advance Guide sign location(s) for the following:

- A. Left exits (see Figure 2E-3).
- B. Splits where the off-route movement is to the left (see Figure 2E-4).
- C. Optional lane splits for non-overlapping routes (see Figure 2E-5).
- D. Where a two-lane exit has an optional lane that carries the through route (see Figures 2E-6 and 2E-7). These interchanges create serious expectancy problems for drivers who are unfamiliar with the interchange.
- E. Left exit interchange lane drop situations. In this situation, an EXIT ONLY (E11-1c) panel should be used without a down arrow for advance guide signs (see Figure 2E-8).

STANDARD:

Diagrammatic signs have been shown to be inferior to conventional signs at cloverleaf interchanges and shall not be used at these locations.

SUPPORT:

Specific guidelines for more detailed design of diagrammatic signs are contained in the Federal "Standard Highway Signs" book (see Government Printing Office, page ii).

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

2E.20 Signing for Interchange Lane Drops

STANDARD:

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

GUIDANCE:

The EXIT ONLY (down arrow) (E11-1) panel should be used on all signing of lane drops on all Advance Guide signs for right exits (see Figure 2E-9). For lane drops on the left side, diagrammatic signing with the EXIT ONLY (E11-1c) panel should be used without a down arrow for Advance Guide signs (see Figure 2E-8).

STANDARD:

The Exit Direction sign (see Figure 2E-20) and E11-1a panel (see Figure 2E-9) for all lane drops shall be of the format shown in Figure 2E-8 and 2E-10. The standard slanted up arrow (left or right side) shall be included on the Exit Direction sign.

OPTION:

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

STANDARD:

If used on an existing sign, the E11-1b panel shall be placed on either side of a white down arrow. The E11-1c panel, if used on an existing nondiagrammatic sign, shall be placed between the lower destination message and the white down arrow.

GUIDANCE:

Advance Guide signs for lane drops within 2 km (1 mi) of the interchange should not contain the distance message.

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

2E.21 Changeable Message Signs

STANDARD:

Changeable message signs shall be capable of displaying several messages in a sequence. Such messages shall be changed manually, by remote control, or by automatic controls. Changeable message signs shall display pertinent traffic operational and guidance information only, not advertising.

SUPPORT:

Because technology for changeable message signs continues to advance, a specific standard for changeable message signs is not practical. Considerations that influence the selection of the best sign for a particular application include conspicuity, legibility, operation, and maintenance of the changeable message sign. This Section applies to signs for use on freeway and expressway mainlines. It is recognized that similar signs might be used on ramps and at ramp terminals where smaller letter heights and the number of messages might differ from the provisions of this Section.

GUIDANCE:

To the extent practical, the design and application of changeable message signs should conform to the general principles of this Manual. Within the context of Section 2A.7, these practices should be followed for mainline freeway and expressway applications:

- A. Changeable message signs should be capital letters and have a desirable letter size of 450 mm (18 in) or a minimum letter size of 265 mm (10.6 in). Signs should be limited to not more than 3 lines with not more than 20 characters per line.

- B. No more than two displays should be used within any message cycle.
- C. Each display should convey a single thought.
- D. The entire message cycle should be readable at least twice by drivers traveling at the posted speed, the off-peak 85th-percentile speed, or the operating speed.

STANDARD:

Messages shall be centered within each line of legend. If more than one changeable message sign is visible to road users, then only one such sign shall display a sequential message at any given time.

A three-line changeable message sign shall be limited to not more than two messages. Techniques of message display such as fading, exploding, dissolving, or moving messages shall not be used.

2E.22 Overhead Sign Installations

SUPPORT:

Specifications for the design and construction of structural supports for highway 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.

2E.23 Lateral Offset

STANDARD:

The minimum lateral clearance outside the usable roadway shoulder for ground-mounted freeway and expressway signs or for overhead sign supports, either to the right or left side of the roadway, shall be 1.9 m (6 ft). This minimum clearance shall also apply outside of a barrier 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 3 m (10 ft) from the edge of the nearest traffic lane. Large guide signs especially should be farther removed, preferably 9 m (30 ft) or more from the nearest traffic lane.

Where an expressway median is 3.7 m (12 ft) or less in width, consideration should be given to spanning both roadways without a center support.

Where overhead sign supports cannot be placed a reasonably safe distance 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 physical barrier or guardrail of suitable design.

STANDARD:

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

OPTION:

Lesser clearances, but not generally less than 1.9 m (6 ft), may be used on connecting roadways or ramps at interchanges.

2E.24 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.25);
- B. At-Grade Intersection signs (see Section 2E.26);
- C. Interchange signs (see Sections 2E.27 through 2E.36);
- D. Interchange Sequence signs (see Section 2E.37);
- E. Community Interchanges Identification signs (see Section 2E.38);
- F. NEXT X EXITS signs (see Section 2E.39);
- G. General Service signs (see Section 2E.51);
- H. Rest and Scenic Area signs (see Section 2E.52);
- I. Tourist Information and Welcome Center signs (see Section 2E.53);
- J. Reference Location Signs (see Section 2E.54);
- K. Miscellaneous guide signs (see Section 2E.55);
- L. Radio Information signing (see Section 2E.56);
- M. Carpool and Ridesharing signing (see Section 2E.57);
- N. Weigh Station signing (see Section 2E.58);
- O. Specific Service signs (see Chapter 2F); and
- P. Recreation and Cultural Interest Area signs (see Chapter 2H).

2E.25 Route Signs and Trailblazer Assemblies

STANDARD:

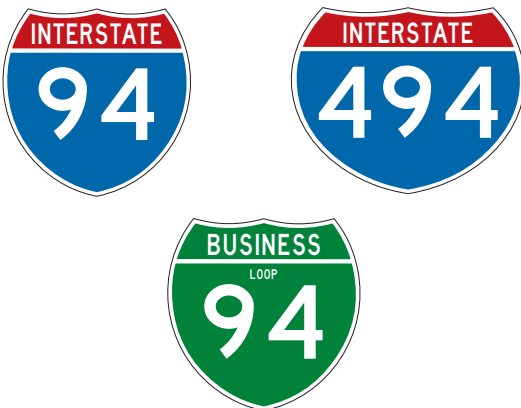
The official Route sign for the Interstate Highway System shall be the red, white, and blue retroreflective distinctive shield adopted by the American Association of State Highway and Transportation Officials (see Section 2D.11).

GUIDANCE:

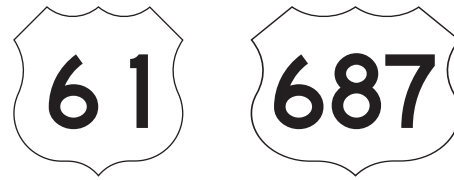
Route signs should be incorporated as cut-out shields or other distinctive shapes on large directional guide signs. Where the Interstate shield is displayed in an assembly or on the face of a guide sign with U.S. or State Route signs, the Interstate numeral should be at least equal in size to the numerals on the other Route signs. The use of independent Route signs should be limited primarily to route confirmation assemblies.

Route signs and auxiliary signs showing junctions and turns should be used for guidance on approach roads, for route confirmation just beyond entrances and exits, and for reassurance along the freeway or expressway. When used along the freeway or expressway, the Route signs should be enlarged as shown in the Mn/DOT "Standard Signs Manual" (see Map & Manual Sales Unit, page ii), and the Federal "Standard Highway Signs" book (see Government Printing Office, page ii). When independently mounted Route signs are used in place of Pull-Through signs, they should be located just beyond the exit.

FOR GUIDE SIGN AND INDEPENDENT USE



FOR GUIDE SIGN USE



FOR INDEPENDENT USE



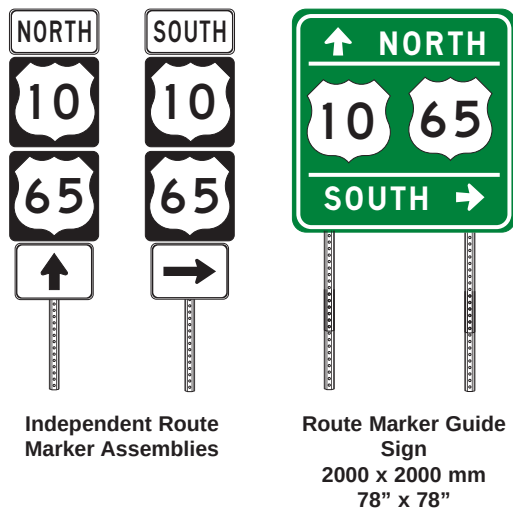
OPTION:

The standard Trailblazer Assembly (see Section 2D.32) may be used on roads leading to the freeway or expressway. Component parts of the Trailblazer Assembly may be included on a single sign panel. Independently mounted Route signs may be used instead of Pull-Through signs as confirmation information (see Section 2E.11). The commonly used name or trailblazer symbol for a toll facility may be displayed on nontoll sections of the Interstate Highway System at:

- The last exit before entering a toll section of the Interstate Highway System;
- The interchange or connection with a toll facility, whether or not the toll facility is a part of the Interstate Highway System; and
- Other locations within a reasonable approach distance of toll facilities when the name or trailblazer symbol for the toll facility would provide better guidance to road users unfamiliar with the area than would place names and route numbers.

The toll facility name or symbol may be included as a part of the guide sign installations on intersecting highways and approach roads to indicate the interchange with a toll section of an Interstate route. Where needed for the proper direction of traffic, a trailblazer for a toll facility that is part of the Interstate Highway System may be displayed with the Interstate Trailblazer Assembly.

2E.25.1 Route Marker Guide Signs



OPTION:

On conventional roads intersecting with expressways, freeways, and interstate highways an alternative to the Route Marker Assembly may be used. The Route Marker Guide sign may be used to simplify junction signing for singular or concurrent routes by combining route markers, cardinal directions, and arrows into a singular sign with a green background.

When used, it replaces Route Marker Assemblies as shown in Figures 2E-26 through 2E-30

STANDARD:

A single sign shall contain no more than two 600 mm (24 in) route markers. In the event that there are more than two concurrent routes at an interchange, a second Route Marker Guide sign shall be installed.

2E.26 Signs for Intersections at Grade

GUIDANCE:

If there are intersections at grade within the limits of an expressway, guide sign types specified 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.27 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.10 and Sections 2E.30 through 2E.39 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 245 m (800 ft) apart.

Supplemental guide signing should be used sparingly as provided in Section 2E.32.

2E.28 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 Gore sign. The exit number shall be displayed on a separate plaque at the top of the Advance Guide or Exit Direction sign. The standard exit number plaque shall include the word EXIT, the appropriate exit number, and the suffix letter A or B (on multi-exit interchanges) separated from the exit number by a space in a single-line format on a plaque 600 mm (24 in) in height. 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-1 through 2E-4. If used, the interchange numbering system for expressways shall conform to the provisions prescribed for freeways.

Compliance Date: January 17, 2008

OPTION:

There are two approaches to interchange exit numbering that the State and local highway agencies may use reference location sign numbering.

SUPPORT:

Reference location sign exit numbering is preferred over consecutive exit numbering for two reasons: (1) if new interchanges are added to a route, the highway agencies do not have to change the numbering sequence; and (2) reference location sign numbering assists road users in determining their destination distances and travel mileage.

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

GUIDANCE:

Exit number plaques should be located toward the top left edge of the sign for a left exit and toward the top right edge for right exits.

Because road users might not expect a left exit and might have difficulty in maneuvering to the left, the word LEFT should be added to the exit number plaque (see Figure 2E-3). Where a left exit is not numbered (no exit number plaque), a plaque with the word LEFT should be added to the top left edge of the sign.

Compliance Date: December 22, 2008

OPTION:

The portion of the exit number plaque containing the word LEFT may have a black legend and border on a yellow background.

SUPPORT:

The general plan for numbering interchange exits is shown in Figures 2E-12 through 2E-14.

Example exit number plaque designs are shown in Figures 2E-3 and 2E-15. Figures 2E-1, 2E-20, 2E-23, 2E-27 through 2E-32, and 2E-42 illustrate the incorporation of exit number plaques on guide signs.

STANDARD:

Where a route originates within a State, the southernmost or westernmost terminus shall be the beginning point for numbering. If a loop, spur, or circumferential route crosses State boundaries, the sequence of numbering shall be coordinated by the States to provide continuous numbering.

For circumferential routes, the numbering of interchanges 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-12). 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-13). Spur route interchanges shall be numbered in ascending order starting at the interchange where the spur leaves the mainline of the principal route (see Figure 2E-13).

Where numbered routes overlap, continuity of interchange numbering shall be established for only one of the routes (see Figure 2E-14). If one of the routes is 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-14).

2E.29 Interchange Classification

SUPPORT:

For signing purposes, interchanges are classified as major, intermediate, and minor. The minimum alphabet sizes contained in Tables 2E-1 and 2E-3 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.

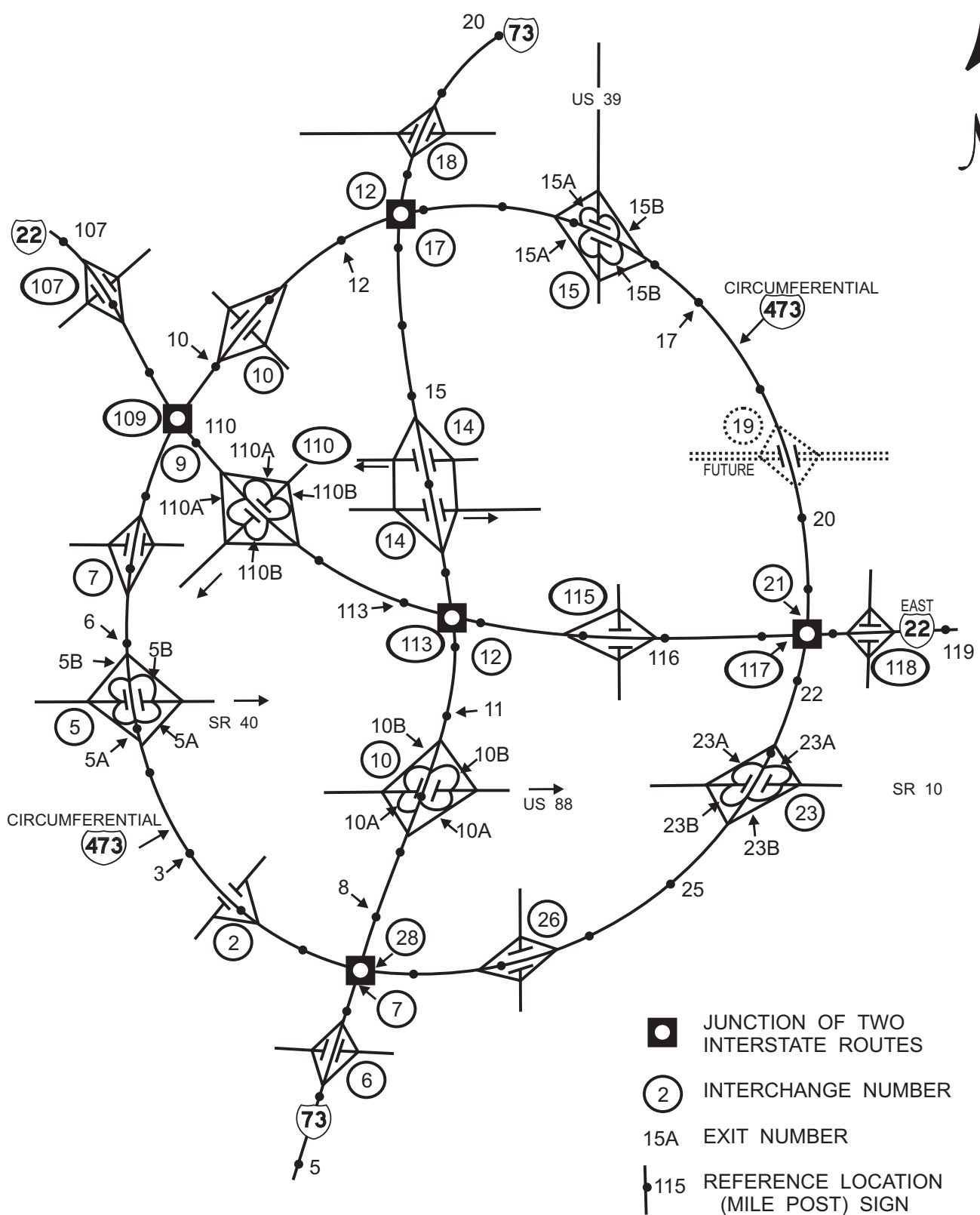


Figure 2E-12. Example of Interchange Numbering for Mainline and Circumferential Routes

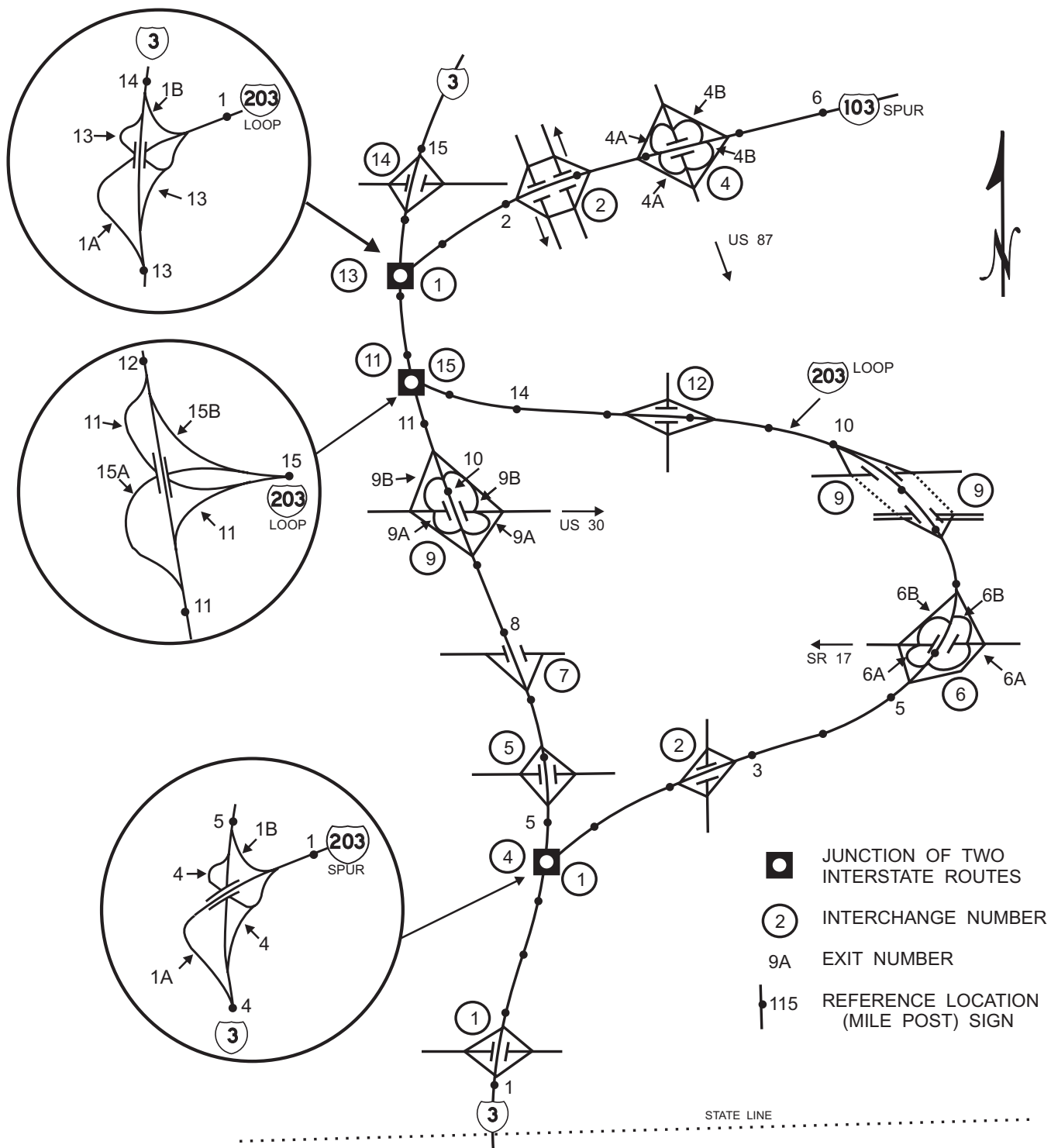
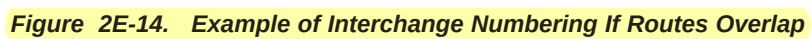


Figure 2E-13. Example of Interchange Numbering for Mainline, Loop, and Spur Routes





E1-1



E1-1a

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



E1-2



E1-2a



E1-5m

Exit number plaque

Figure 2E-15. Examples of Interchange Advance Guide Signs



E2-1



E2-1A

Figure 2E-16. Next Exit Supplemental Advance Guide Signs

2E.30 Advance Guide Signs

SUPPORT:

The Advance Guide sign gives notice well in advance of the exit point of the principal destinations served by the next interchange and the distance to that interchange (see Figure 2E-15).

GUIDANCE:

For major and intermediate interchanges (see Section 2E.29), Advance Guide signs should be placed at 1 km or 0.5 miles and at 2 km or 1 mile in advance of the exit with a third Advance Guide sign placed at 4 km (2 mi) in advance of the exit if spacing permits. At minor interchanges, only one Advance Guide sign should be used. It should be located 1 to 2 km (0.5 to 1 mi) from the exit gore. If the sign is located less than 1 km (0.5 mi) from the exit, the distance shown should be to the nearest 400 m (0.25 mi). Fractions of kilometers or decimals of kilometers should not be used. Fractions of a mile, rather than decimals, should be shown in all cases.

Where Advance Guide signs are provided for a left exit, diagrammatic signs should be used (see Figure 2E-3).

STANDARD:

When used, Advance Guide signs shall contain the distance message. 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 X MILES. If the interchange has two or more exit roadways, the bottom line shall read EXITS X MILES.

Compliance Date: January 17, 2008

OPTION:

Where interchange exit numbers are used, the word EXIT may be omitted from the bottom line. Where the distance between interchanges is more than 2 km (1 mi), but less than 4 km (2 mi), the first Advance Guide sign may be closer than 4 km (2 mi), 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 245 m (800 ft) between interchanges, Interchange Sequence Series signs should be used instead of Advance Guide signs for the affected interchanges.

2E.31 Next Exit Supplemental Signs

OPTION:

Where the distance to the next interchange is unusually long, Next Exit supplemental signs may be installed to inform road users of the distance to the next interchange (see Figure 2E-16).

GUIDANCE:

The Next Exit supplemental sign should not be used unless the distance between successive interchanges is more than 8 km (5 mi).

STANDARD:

The Next Exit supplemental sign shall carry the legend NEXT EXIT X MILES. If the Next Exit supplemental sign 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 supplemental sign may be displayed in either one or two lines. The one-line message is the more desirable choice unless the message causes the sign to have a horizontal dimension greater than that of the Advance Guide sign.

2E.32 Other Supplemental Guide Signs

SUPPORT:

Supplemental Guide signs can be used to provide information regarding destinations accessible from an interchange, other than places shown 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).

GUIDANCE:

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

A Supplemental Guide sign (see Figure 2E-17) 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 245 m (800 feet). If the interchanges are numbered, the interchange number should be used for the action message.



Figure 2E-17. Supplemental Guide Signs for Multi-exit Interchanges



Figure 2E-18. Supplemental Guide Sign for a Park and Ride Facility (Route without Exit Numbering)



Figure 2E-19. Supplemental Guide Sign for a Park and Ride Facility (Route with Exit Numbering)



Figure 2E-20. Interchange Exit Direction Sign

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 and ride facilities shall be considered as Supplemental Guide signs (see Figures 2E-18 and 2E-19).

2E.33 Exit Direction Signs

SUPPORT:

The Exit Direction sign repeats the route and destination information that was shown 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 the left for that destination.

STANDARD:

Exit Direction signs (see Figure 2E-20) shall be used at all interchanges. Population figures or other similar information shall not be used on Exit Direction signs.

GUIDANCE:

Ground-mounted Exit Direction signs should be installed at the beginning of the deceleration lane. If there is less than 90 m (300 ft) from the beginning 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:

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 and 2E-10).

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

- A. The sign shall carry the exit number (if used), the route number, cardinal direction, and destination with an appropriate upward slanting arrow (see Figure 2E-20).
- B. The message EXIT ONLY in black on a yellow panel shall be used on the overhead Exit Direction sign to advise road users of a lane drop situation. The sign shall conform to the provisions of Section 2E.20.
- C. Diagrammatic signs shall not be employed at the exit direction location.

GUIDANCE:

Exit number plaques should be located toward the left edge of the sign for a left exit and toward the right edge for right exits.



E5-1



E5-1a



E13-1
(optional)

Figure 2E-21. 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-30) between major guide signs. Interchange Sequence signs (see Section 2E.37) 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 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.

2E.34 Exit Gore Signs

SUPPORT:

The Exit Gore sign 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 (see Figure 2E-21). 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 E13-1 panel indicating the advisory speed may be mounted below the Exit Gore sign (see Figure 2E-21) to supplement, but not to replace, the exit or ramp advisory speed warning signs.



Figure 2E-22. Post-Interchange Distance Sign

2E.35 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 150 m (500 ft) beyond the 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 300 m (1,000 ft).

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.36 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-22).

SUPPORT:

The minimum sizes of the route shields identifying a significant destination point are prescribed in Tables 2E-1 through 2E-4.

OPTION:

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

GUIDANCE:

If a second line is used, it should be reserved for communities of general interest that are located on or immediately adjacent to the route or for major traffic generators along the route.

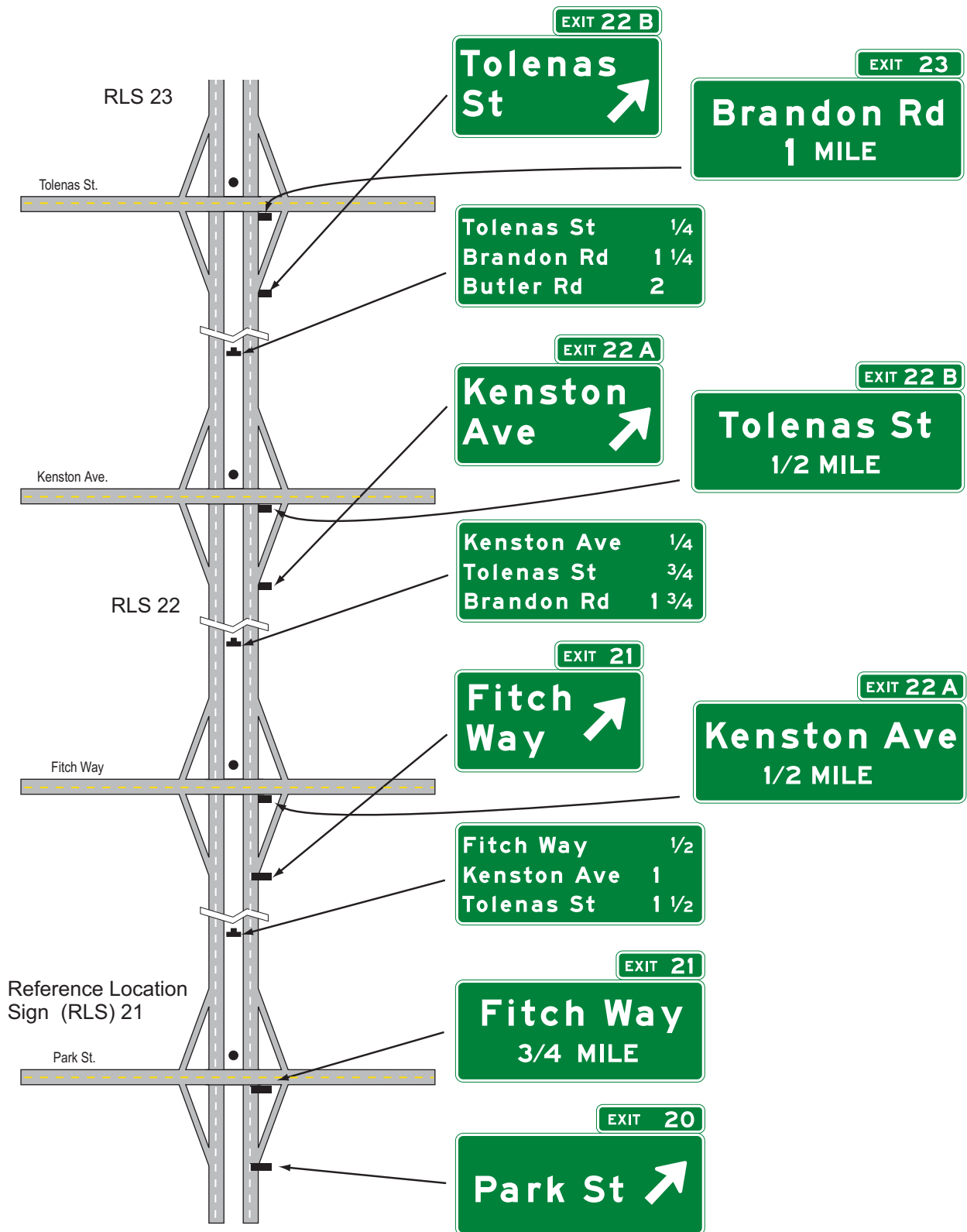


Figure 2E-23. Signing of Closely Spaced Interchanges Using Interchange Sequence Signs



Figure 2E-24. Interchange Sequence Sign

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 8 km (5 mi) 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.

2E.37 Interchange Sequence Signs

GUIDANCE:

If there is less than 245 m (800 ft) between interchanges, Interchange Sequence signs should be used instead of the Advance Guide signs for the affected interchanges. If used, Interchange Sequence signs should be used over the entire length of a route in an urban area. They should not be used on a single interchange basis.

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.

SUPPORT:

Interchange Sequence signs are generally supplemental to Advance Guide signs. Signing of this type is illustrated in Figures 2E-23 and 2E-24, and is compatible with the sign spreading concept.

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 400 m (0.25 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, interchange names or route numbers shown on such signs shall be followed by the legend LEFT or LEFT EXIT in black letters on a yellow rectangular background.

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 shown to the left of the interchange name or route number.

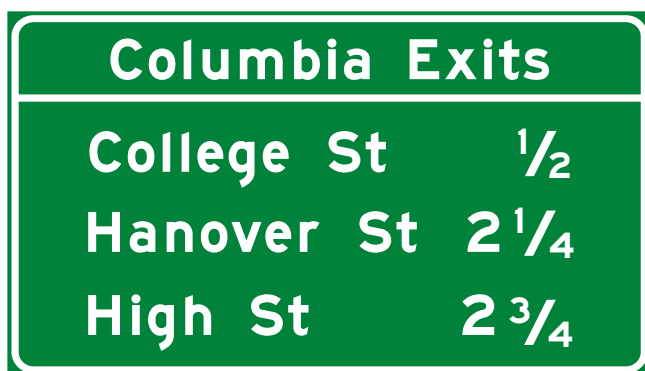


Figure 2E-25. Community Interchanges Identification Sign



Figure 2E-26. NEXT EXITS Sign

2E.38 Community Interchanges Identification Signs

SUPPORT:

For suburban or rural communities served by two or three interchanges, Community Interchanges Identification signs are useful (see Figure 2E-25).

GUIDANCE:

In these cases, the name of the community followed by the word Exits should be shown on the top line; the lines below should display the destination, road name or route number, and the corresponding distances to the nearest 400 m (0.25 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 X EXITS sign (see Section 2E.39) may be used.

2E.39 NEXT X 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 X EXITS sign (see Figure 2E-26) 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.40 Signing by Type of Interchange

SUPPORT:

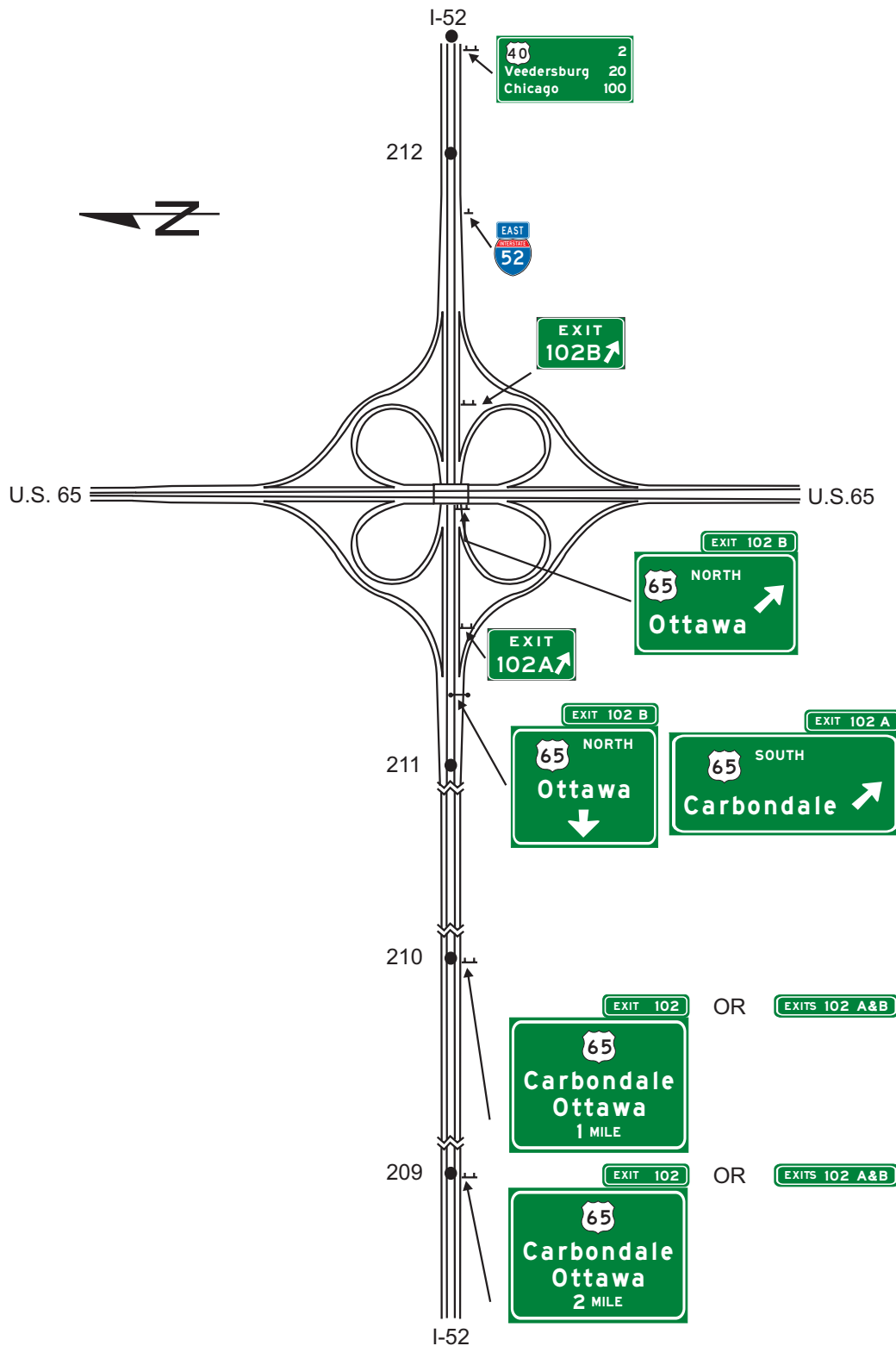
Road users need signs to help identify the location of the exit, as well as to obtain route, direction, and destination information for specific exit ramps. Figures 2E-27 through 2E-32 show examples of guide signs for common types of interchanges. The interchange layouts shown in most of the figures illustrate only the major guide signs for one direction of traffic on the through road and on the crossroad.

STANDARD:

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

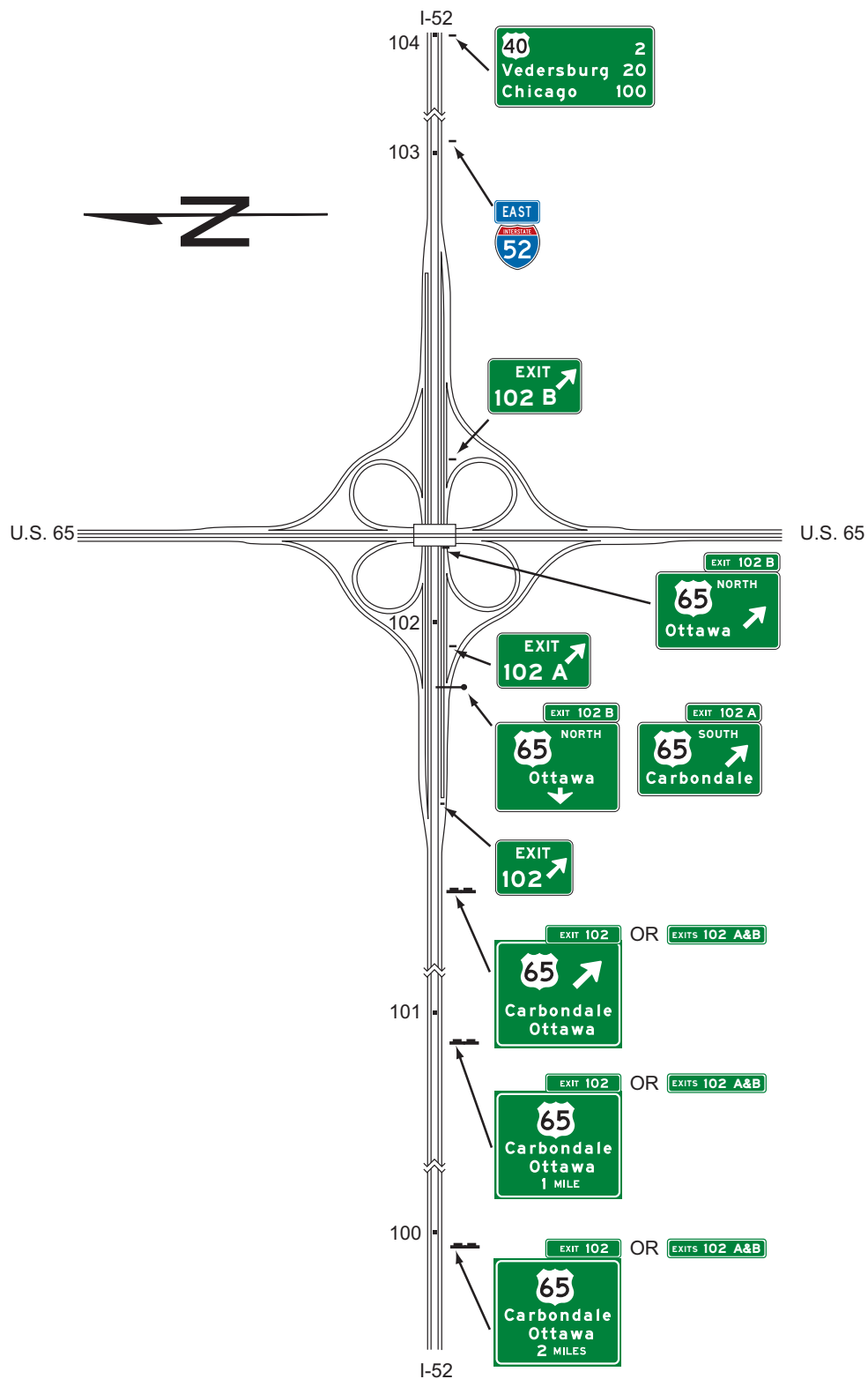
GUIDANCE:

The signing layout for all interchanges having only one exit ramp in the direction of travel should be similar, regardless of the interchange type (see Figures 2E-8, 2E-10, and Figures 2E-27 through 2E-32). 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-27 through 2E-32) should be followed as closely as possible. Even when unusual geometric features exist, variations in signing layout should be held to a minimum.



Note: See Figure 2E-38 for examples of multi-lane crossroad signing for cloverleaf interchanges

Figure 2E-28. Examples of Guide Signs for Full Cloverleaf Interchange



Note: See Figure 2E-38 for examples of multi-lane crossroad signing for cloverleaf interchanges

Figure 2E-29. Examples of Guide Signs for Full Cloverleaf Interchange with Collector-Distributor Roadways

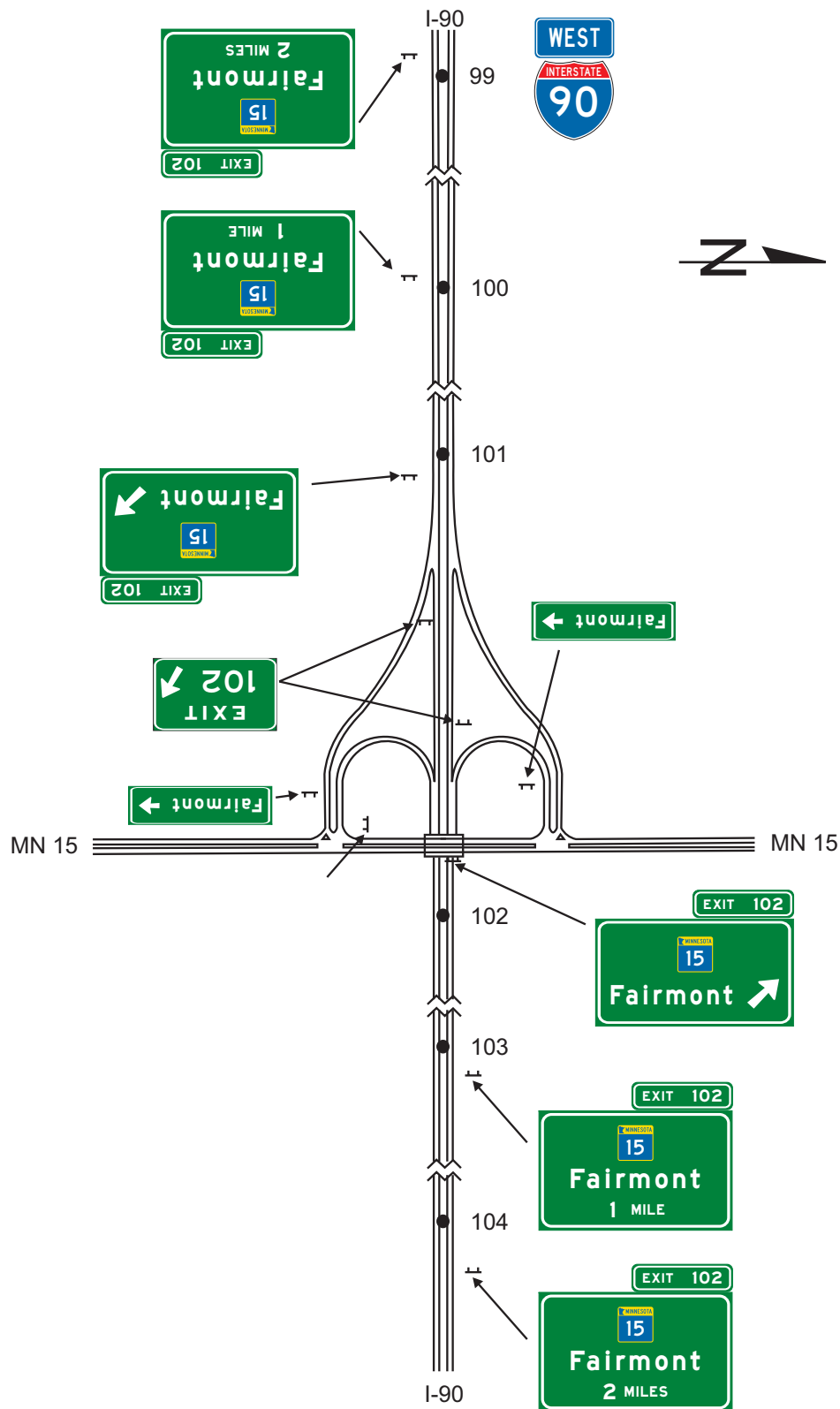
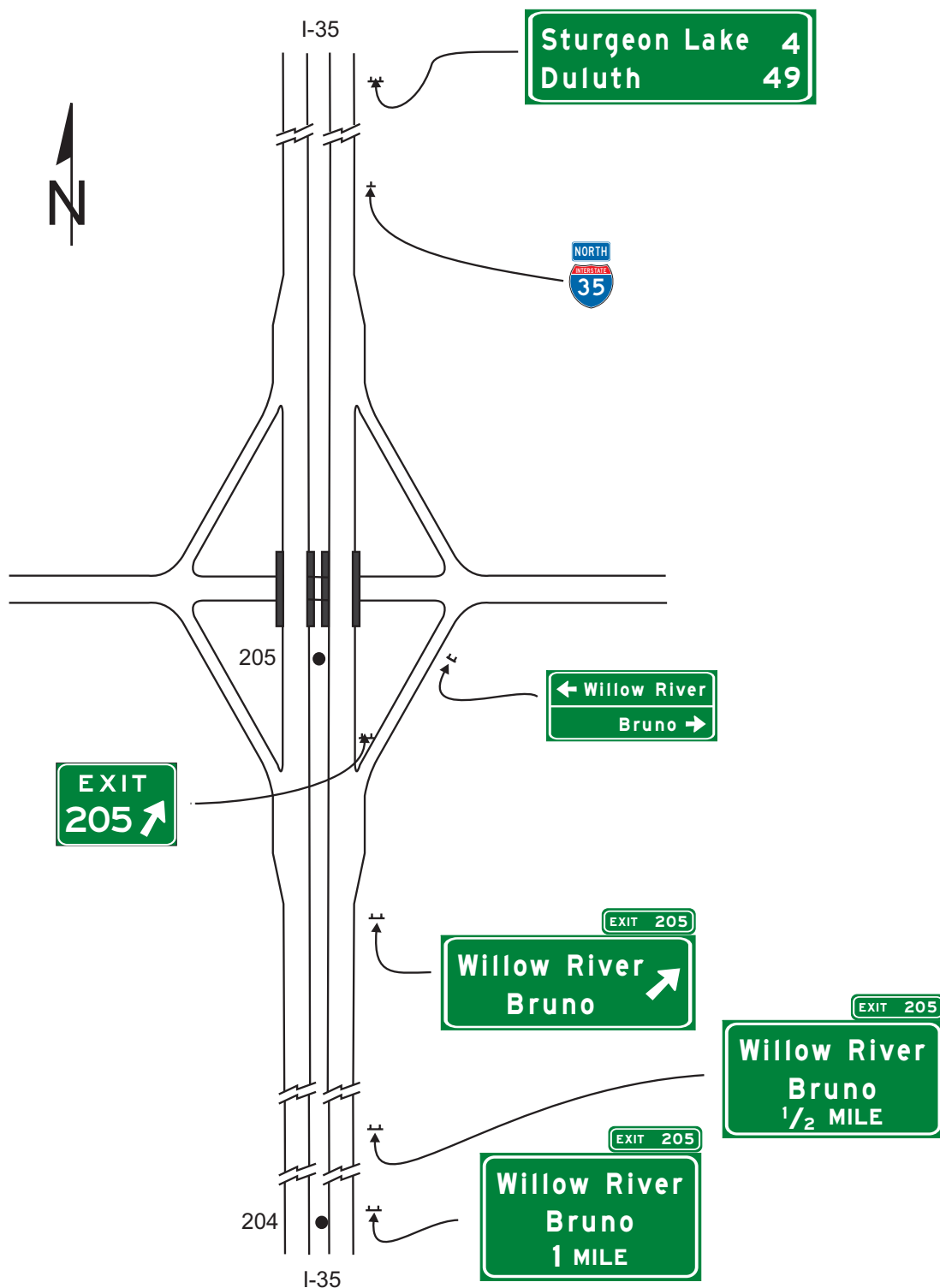


Figure 2E-30. Examples of Partial Cloverleaf Interchange Guide Signs



Note: See Figures 2E-34 and 2E-36 for examples of crossroad signing for one-lane approaches and examples of multi-lane crossroad signing for diamond interchanges.

Figure 2E-31. Examples of Diamond Interchange Guide Signs



Note: See Figures 2E-34 and 2E-36 for examples of crossroad signing for one-lane approaches and examples of multi-lane crossroad signing for diamond interchanges.

Figure 2E-32. Examples of Diamond Interchange Guide Signs in an Urban Area

2E.41 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-27 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.8, unless a diagrammatic representation of the interchange layout requires otherwise.

At splits where the off-route movement is to the left or where there is an optional lane split, expectancy problems usually result, and diagrammatic signs should be used at the Advance Guide sign location. Diagrammatic signs (see Section 2E.19) also should be used at the Advance Guide sign locations for interchanges where two-lane exits with an optional lane carry the through route on the exiting lanes.

STANDARD:

Overhead signs shall be used at a distance of 2 km (1 mi) and at the theoretical gore of each connecting ramp. When diagrammatic signs are used, they shall conform to the provisions of Section 2E.19.

OPTION:

Overhead signs may also be used at the 1 km (0.5 mi) and 4 km (2 mi) points.

The arrow and/or the name of the control city may be omitted on signs that indicate the straight-ahead continuation of a route.

An 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.36).

2E.42 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 is shown in Figure 2E-28.

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 point of the first exit ramp, with an upward slanting arrow on the exit direction sign for that exit and the message XX MILE on the Advance Guide sign for the second exit, as shown in Figure 2E-28. The second exit shall be indicated by an overhead Exit Direction sign over the auxiliary lane. An Exit sign shall also be used at each gore (see Section 2E.34).

Interchanges with more than one exit from the main line shall be numbered as described in Section 2E.28 with an appropriate suffix.

Diagrammatic signs shall not be used for cloverleaf interchanges.

GUIDANCE:

As shown in Figure 2E-28, the overhead Exit Direction sign for the second exit should be mounted on the structure if the mainline passes under the crossroad and the exit roadway is located beyond the structure.

2E.43 Cloverleaf Interchange with Collector-Distributor Roadways

SUPPORT:

Examples of guide signs for full cloverleaf interchanges with collector-distributor roadways are shown in Figure 2E-29.

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. The Advance Guide signs may include two place names and their corresponding exit numbers or 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.44 Partial Cloverleaf Interchange

SUPPORT:

Examples of guide signs for partial cloverleaf interchanges is shown in Figure 2E-30.

GUIDANCE:

As shown in Figure 2E-30, the overhead Exit Direction sign should be placed on the structure if the mainline passes under the crossroad and the exit roadway is located beyond the structure.

STANDARD:

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

2E.45 Diamond Interchange

SUPPORT:

Examples of guide signs for diamond interchanges is shown in Figure 2E-31.

STANDARD:

The singular message EXIT shall be used on the Advance Guide and Exit Direction signs. Exit numbers shall not include the cardinal initials corresponding to the direction of the cross route.

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 safely 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 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.36).

GUIDANCE:

The Exit Speed sign should be located along the deceleration lane such that it is visible to the driver far enough in advance so that a safe slowing and exiting maneuver can be made.

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.29).

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.46 Diamond Interchange in Urban Area

SUPPORT:

Examples of guide signs for diamond interchanges in an urban area is shown in Figure 2E-32. This example includes the use of the Community Interchanges Identification sign (see Section 2E.38) which might be useful if two or more interchanges serve the same community.

In urban areas, street names are often shown 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, and the distance figures adjusted accordingly.

2E.47 Closely Spaced Interchanges

OPTION:

When a series of interchanges is closely spaced, the advance guide sign for the next interchange may be mounted on an overhead structure located downstream from the gore of the preceding interchange.

GUIDANCE:

Interchange Sequence signs 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-23.

STANDARD:

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

2E.48 Minor Interchange

OPTION:

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

SUPPORT:

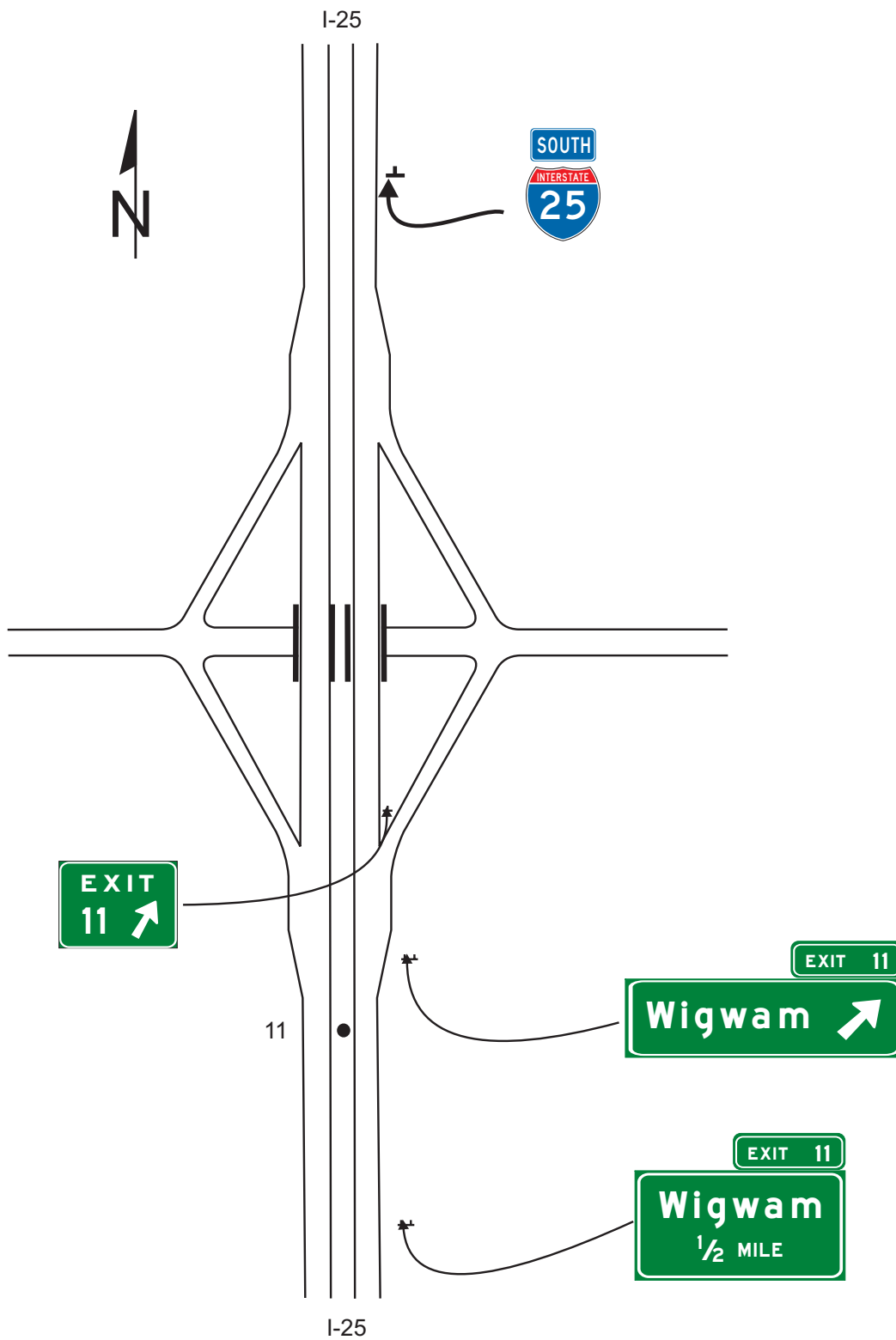
Examples of guide signs for minor interchanges is shown in Figure 2E-33.

STANDARD:

At least one Advance Guide sign and an Exit Gore sign shall be placed at a minor interchange.

GUIDANCE:

An Exit Direction sign should also be used.



Note: See Figure 2E-35 for examples of minor interchange crossroad signing

Figure 2E-33. Examples of Minor Interchange Guide Signs

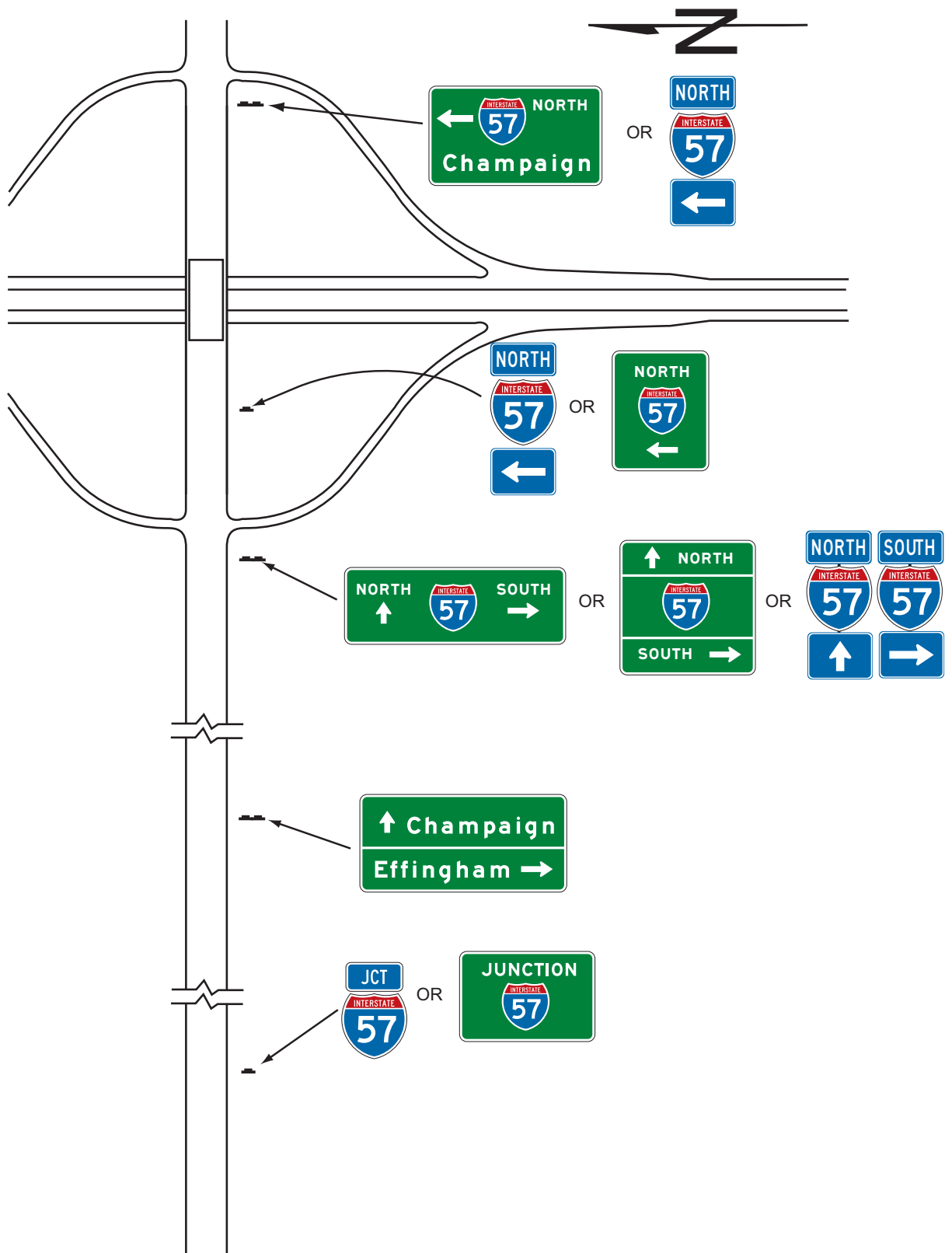


Figure 2E-34. Examples of Crossroad Signing for One-Lane Approach

2E.49 Signing of Approaches and Connecting Roadways

OPTION:

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.

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 2E-34):

- 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

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 2E-35):

- 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 2E-36, 2E-37, and 2E-38):

- 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 signs are used to direct road users to the appropriate lane(s).

STANDARD:

The Advance Entrance 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 sign may have destinations, directional arrows, and/or an action message such as LEFT LANE, NEXT LEFT, or SECOND RIGHT. Signs in this sequence may be mounted overhead to improve visibility.

2E.50 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 2E-39):

- 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 end of the exit ramp in positions appropriate for full view of a road user starting to enter wrongly.
- 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 2E-39):

- A. On two-lane paved crossroads at interchanges, double solid yellow lines should be used as a centerline 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.

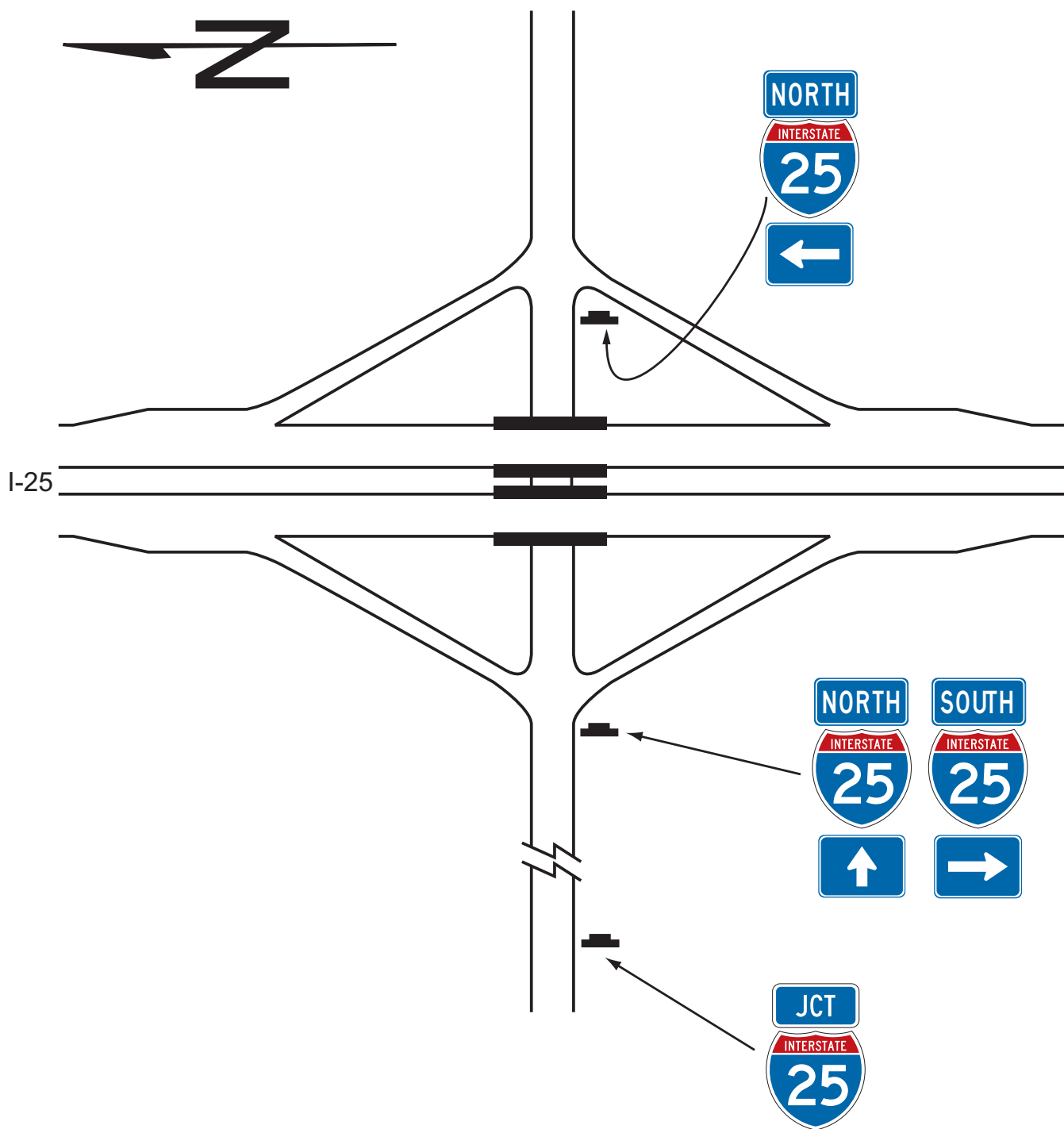


Figure 2E-35. Example of Minor Interchange Crossroad Signing



Figure 2E-36. Examples of Multi-lane Crossroad Signing for Diamond Interchange

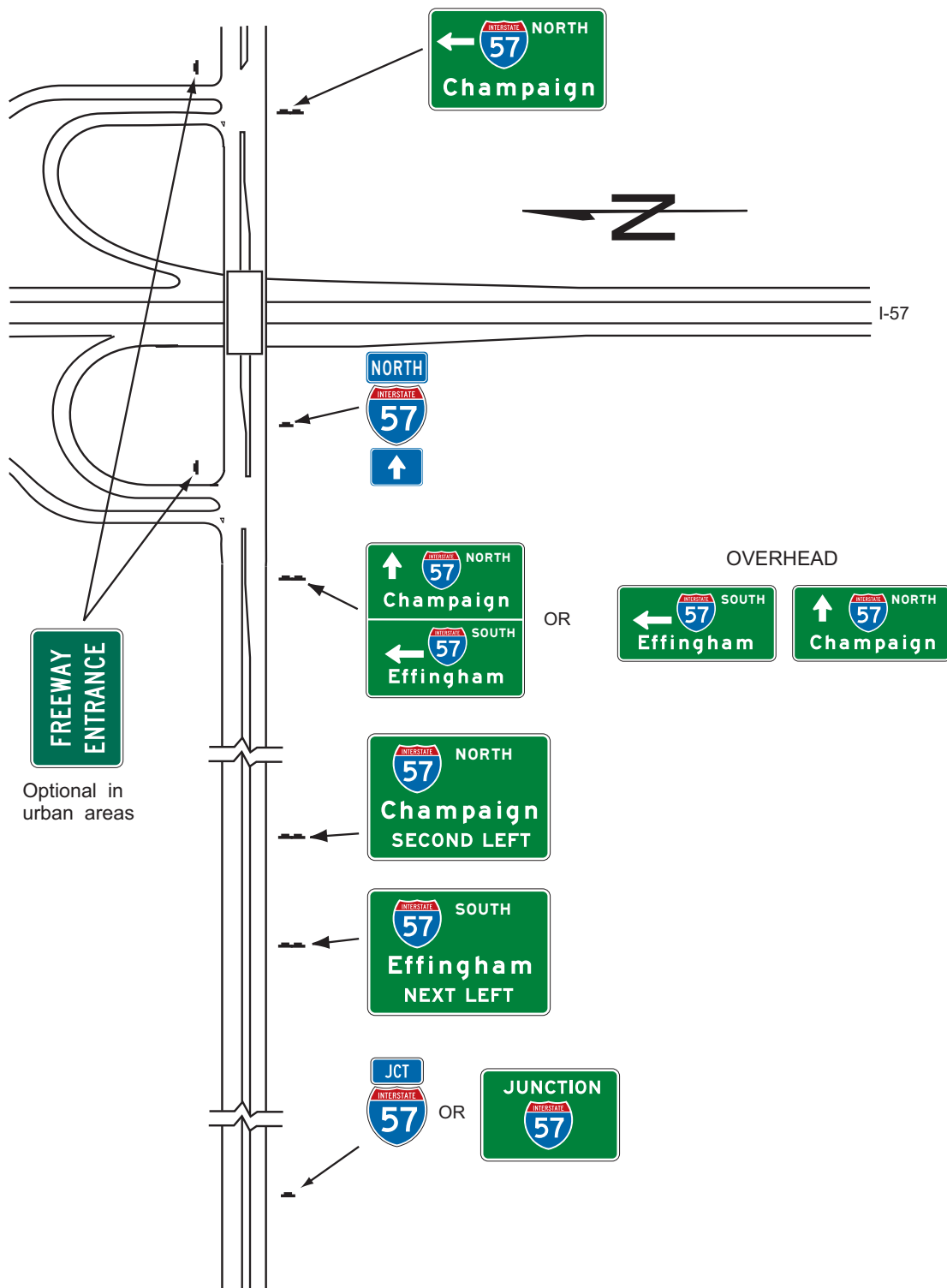


Figure 2E-37. Examples of Multi-lane Crossroad Signing for Partial Cloverleaf Interchange

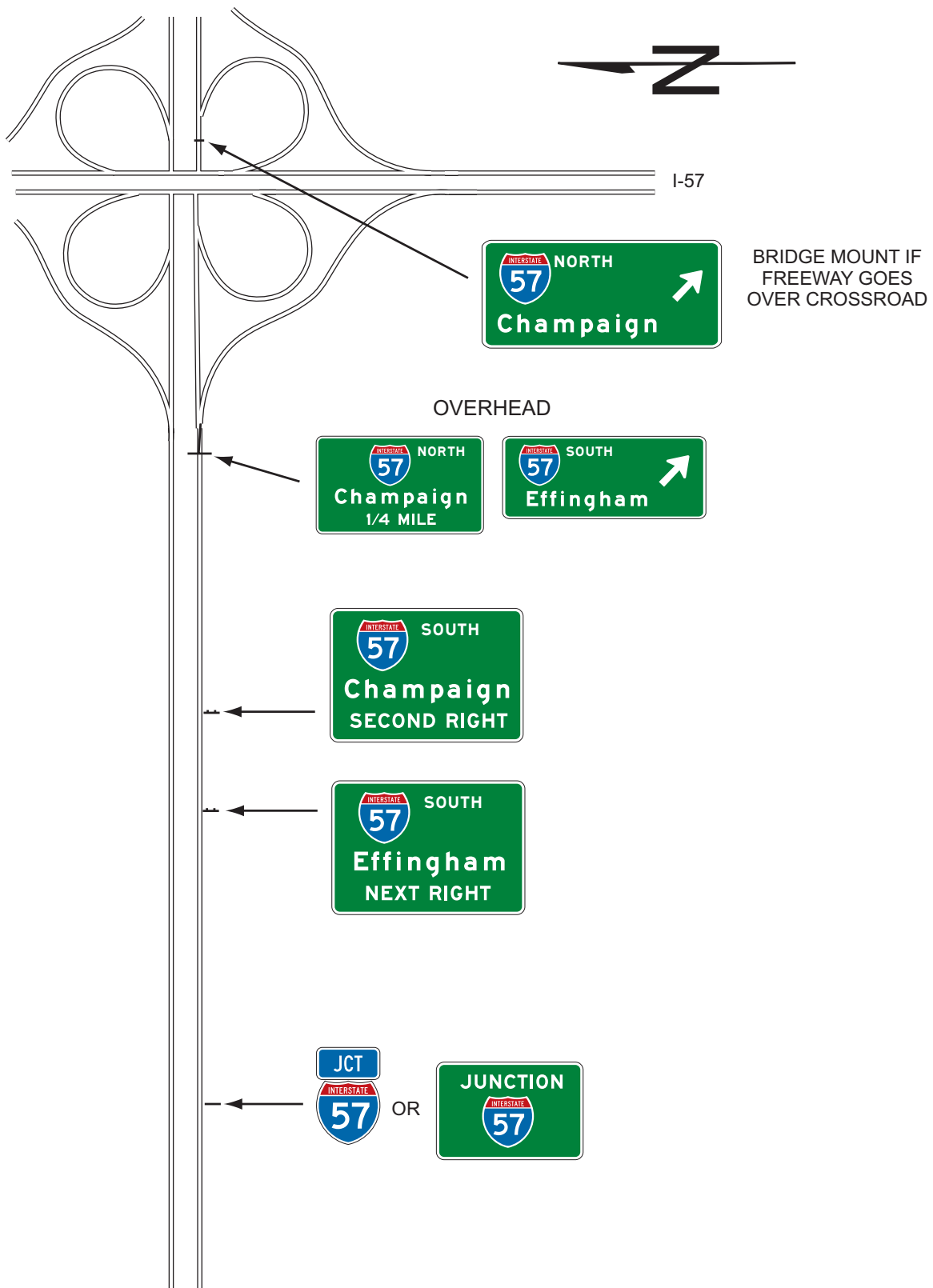


Figure 2E-38. Examples of Multi-lane Crossroad Signing for Cloverleaf Interchange

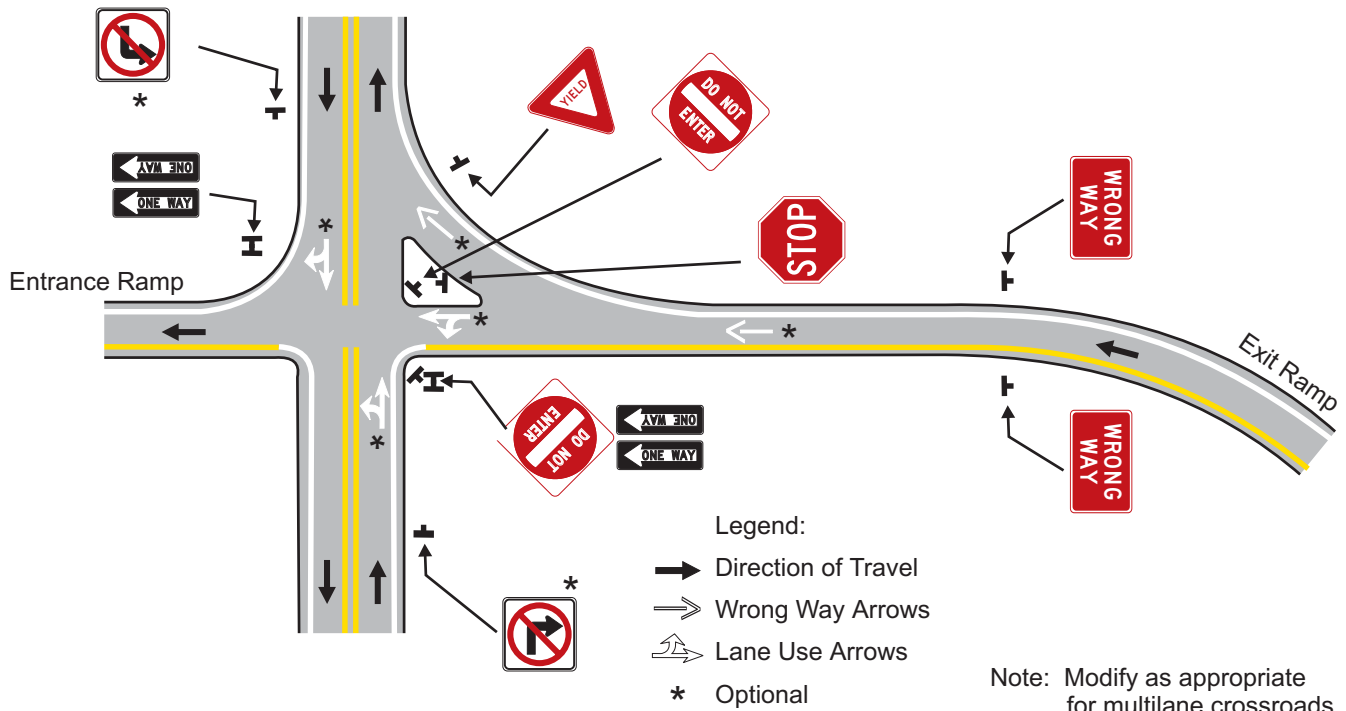


Figure 2E-39. Examples of Regulatory Signing and Pavement Markings at Exit Ramp Termination to Deter Wrong-Way Entry

OPTION:

The following traffic control devices may be used to supplement the above signs and pavement markings:

- 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).
- Additional WRONG WAY signs may be used.
- Slender, elongated wrong-way arrow pavement markings (see Figure 3B-21) intended primarily to warn wrong-way road users that they are going in the wrong direction may be placed upstream from the ramp terminus (see Figure 2E-39), 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.21)

- Lane-use arrow pavement markings may be placed on the exit ramp and crossroad near their intersection to indicate the permissive direction of flow.
- Guide signs may be used on entrance ramps near the crossroad to inform road users of the freeway or expressway entrance, as appropriate (see Figure 2E-37).

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 2E-40.

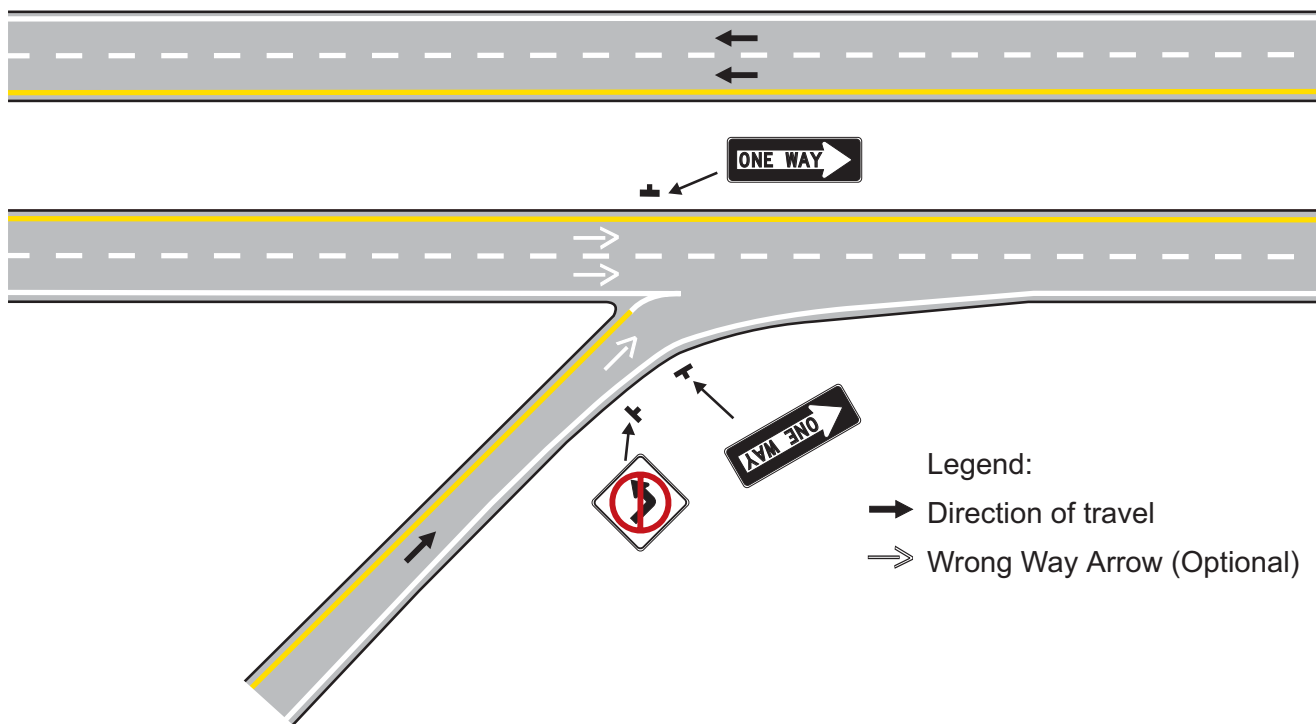


Figure 2E-40. Examples of Regulatory Signing and Pavement Markings at Entrance Ramp Terminal Where Design Does Not Clearly Indicate The Direction of Flow

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.

SUPPORT:

Sections 2B.35 contains further information on signing to avoid wrong-way movements at at-grade intersections on expressways.

2E.51 General Service Signs

SUPPORT:

General Service signs are generally not appropriate at major interchanges (see Section 2E.29 for definition) and in urban areas.

OPTION:

If interchanges are not numbered, an action message such

as NEXT RIGHT or SECOND RIGHT may be used (see Figure 2E-41).

STANDARD:

General Service signs shall have white letters, symbols, and borders on a blue background. Letter and numeral sizes shall conform to the minimum requirements of Tables 2E-1 through 2E-4. All approved symbols shall be permitted as alternatives to word messages, but symbols and word service messages shall not be intermixed. If the services are not visible from the ramp of a single-exit interchange, the service signing shall be repeated in smaller size at the intersection of the exit ramp and the crossroad. Such service signs shall use arrows to indicate the direction to the services.

GUIDANCE:

Distance to services should be shown on General Service signs where distances are more than 2 km (1 mi).

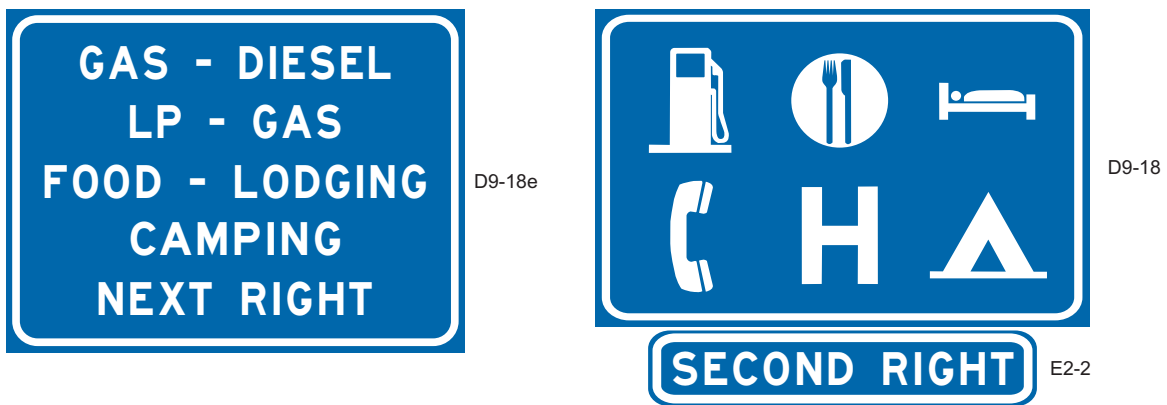


Figure 2E-41. Examples of General Service Signs (without Exit Numbering)

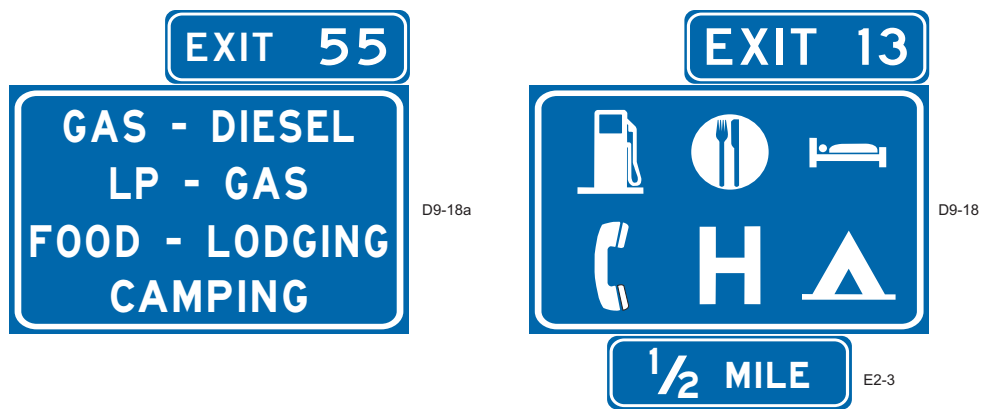


Figure 2E-42. Examples of General Service Signs (with Exit Numbering)



Figure 2E-43. Example of Next Services Sign

General Service signing should only be provided at locations where the road user can return to the freeway or expressway and continue in the same direction of travel.

Only services that fulfill the needs of the road user should be shown on General Service signs. If State or local agencies elect to provide General Service signing, there should be a statewide policy for such signing and criteria for the availability of the various types of services. The criteria should consider the following:

- A. Gas, Diesel, LP Gas, EV Charging, and/or other alternative fuels if all of the following are available:
 1. Vehicle services such as gas, oil, and water;
 2. Modern sanitary facilities and drinking water;
 3. Continuous operations at least 16 hours per day, 7 days per week; and
 4. Public telephone.
- B. Food if all of the following are available:
 1. Licensing or approval, where required;
 2. Continuous operation to serve two meals per day, at least 6 days per week;
 3. Public telephone; and
 4. Modern sanitary facilities.
- C. Lodging if all of the following are available:
 1. Licensing or approval, where required;
 2. Adequate sleeping accommodations;
 3. Public telephone; and
 4. Modern sanitary facilities.
- D. Public Telephone if continuous operation, 7 days per week is available.
- E. Hospital if continuous emergency care capability, with a physician on duty 24 hours per day, 7 days per week is available. A physician on duty would include the following criteria and should be signed in accordance with the priority as follows:
 1. Physician on duty within the emergency department;
 2. Registered nurse on duty within the emergency department, with a physician in the hospital on call; or
 3. Registered nurse on duty within the emergency department, with a physician on call from office or home.
- F. Camping if all of the following are available:
 1. Licensing or approval, where required;
 2. Adequate parking accommodations; and
 3. Modern sanitary facilities and drinking water.

STANDARD:

For any service that is operated on a seasonal basis only, the General Service signs shall be removed or covered during periods when the service is not available.

The General Service signs shall be mounted in an effective location, between the Advance Guide sign and the Exit Direction sign, in advance of the exit leading to the available services.

GUIDANCE:

The General Service sign should contain the interchange number, if any, as illustrated in Figure 2E-42.

OPTION:

If the distance to the next point where services are available is greater than 16 km (10 miles), a NEXT SERVICES XX MILES (D9-17) sign (see Figure 2E-43) may be used as a separate panel installed below the Exit Direction sign.

STANDARD:

Signs for services shall conform to the format for General Service signs (see Section 2D.45) and as specified herein. Letter and numeral sizes shall be as shown in Tables 2E-1 through 2E-4. No more than six general road user services shall be displayed on one sign, which includes any appended panels. General Service signs shall carry the legends for one or more of the following services: Food, Gas, Lodging, Camping, Phone, Hospital, or Tourist Information.

The qualified services available shall be shown at specific locations on the sign.

To provide flexibility for the future when the service might become available, the sign space normally reserved for a given service symbol or word shall be left blank when that service is not present.

GUIDANCE:

The standard display of word messages should be FOOD and PHONE in that order on the top line, and GAS and LODGING on the second line. If used, HOSPITAL and CAMPING should be on separate lines (see Figure 2E-42).

OPTION:

Signing for DIESEL, LP-Gas, or other alternative fuel services may be substituted for any of the general services or appended to such signs. The International Symbol of Accessibility for the Handicapped (D9-6) sign may be used for facilities that qualify.

GUIDANCE:

When symbols are used for the road user services, they should be displayed as follows:

- A. Six services:
 1. Top row - GAS, FOOD, and LODGING
 2. Bottom row - PHONE, HOSPITAL, and CAMPING
- B. Four services:
 1. Top row - FOOD and PHONE
 2. Bottom row - GAS and LODGING
- C. Three services:
 1. Top row - GAS, FOOD, and LODGING

OPTION:

Substitutions of other services for any of the services shown above may be made by placing the substitution in the lower right (four services) or extreme right (three services) portion of the panel. An action message or an interchange number may be used for symbol signs in the same manner as they are used for word message signs. The Diesel Fuel (D9-11) symbol or the LP-Gas (D9-15) symbol may be substituted for the symbol representing fuel or appended to such assemblies. The information (D9-10) symbol may be substituted on any of the above configurations.

At rural interchange areas where limited road user services are available and where it is unlikely that additional services will be provided within the near future, a panel having one to three services (words or symbols) may be appended to ground-mounted interchange guide signs.

STANDARD:

If more than three services become available at rural interchange areas where limited road user services were anticipated, any appended sign panel shall be removed and replaced with an independently mounted General Service sign as described in this Section.

OPTION:

A separate Telephone Service sign (D9-1) may be installed if telephone facilities are located adjacent to the route at places where public telephones would not normally be expected.

The Recreational Vehicle Sanitary Station (D9-12) sign may be used as needed to indicate the availability of facilities designed for dumping wastes from recreational vehicle holding tanks.

In some locations, signs may be used to indicate that services are not available.

A Truck Parking (D9-16) sign may be used on a separate panel below the other general road user services to direct truck drivers to designated parking areas.

2E.52 Rest and Scenic Area Signs

GUIDANCE:

Signing for rest areas and scenic areas should conform to the provisions set forth in Sections 2D.41 and 2D.42. However, the signs should be suitably enlarged for freeway or expressway application. A roadside area that does not contain restroom facilities should be signed to indicate the major road user service that is provided. For example, an area with only parking should be signed with a PARKING AREA (D5-4) sign. An area with picnic tables and parking should be signed with a PICNIC AREA (D5-5c) sign or a Picnic Table (D5-5a) symbol sign.

Rest areas that have tourist information and welcome centers should be signed as discussed in Section 2E.53.

Scenic area signing should be consistent with that specified for rest areas. Standard messages should read SCENIC AREA (D6-1), SCENIC VIEW (D6-2), SCENIC OVERLOOK (D6-3), or the equivalent.

STANDARD:

All signs for rest and scenic areas shall have white letters, symbols, and borders on a blue background. Letter and numeral sizes shall conform to the minimum requirements of Tables 2E-1 through 2E-4. On the approach to rest areas, a REST AREA advance guide sign shall be placed 2 km (1 mi) and/or 4 km (2 mi) in advance of the rest area. At the rest area exit gore, there shall be a sign with a message REST AREA together with an arrow indicating the appropriate turn as shown in Figure 2E-44.

OPTION:

If the rest area has facilities for the physically impaired (see Section 2D.45), the International Symbol of Accessibility for the Handicapped (D9-6) sign may be placed with or beneath the REST AREA advance guide sign.

Between the REST AREA advance guide sign and the gore of the rest area exit, there may be a REST AREA (D5-1b) sign. The words NEXT RIGHT (E2-2) or an arrow may be included as part of the message.

To provide the road user with information on the location of succeeding rest areas, a NEXT REST AREA XX MILES (D5-6) sign may be installed independently or as a supplemental sign panel mounted below one of the REST AREA advance guide signs.

2E.53 Tourist Information and Welcome Centers

SUPPORT:

Tourist information and welcome centers have been constructed within rest areas on freeways and expressways and are operated by either a State or a private organization. Others have been located within close proximity to these facilities and operated by civic clubs, chambers of commerce, or private enterprise.

GUIDANCE:

An excessive number of supplemental panels should not be installed with Tourist Information or Welcome Center signs so as not to overload the road user.

STANDARD:

Tourist Information or Welcome Center signs shall have a white legend and border on a blue background. Continuously staffed or unstaffed operation at least 8 hours per day, 7 days per week, shall be required.



D5-1



D5-1a



D5-1b



D5-1c



D5-2



D5-2a



D5-3



D5-4



D5-7



D5-7a



D5-7b



D5-12

Figure 2E-44. Examples of Rest Area, Scenic Overlook, and Welcome Center Signs

If operated only on a seasonal basis, the Tourist Information or Welcome Center signs shall be removed or covered during the off seasons.

GUIDANCE:

For freeway or expressway rest area locations that also serve as tourist information or welcome centers, the following signing criteria should be used:

- A. The locations for tourist information and welcome center Advance Guide, Exit Direction, and Exit Gore signs should meet the General Service signing requirements described in Section 2E.51.
- B. If the signing for the tourist information or welcome center is to be accomplished in conjunction with the initial signing for the rest areas, the message on the Advance Guide sign should be REST AREA, TOURIST INFO CENTER, XX MILES or REST AREA, WELCOME CENTER XX MILES. On the Exit Direction sign the message should be REST AREA, TOURIST INFO CENTER with an upward sloping arrow (or NEXT RIGHT), or REST AREA, WELCOME CENTER with an upward sloping arrow (or NEXT RIGHT).
- C. If the initial rest area Advance Guide and Exit Direction signing is in place, these signs should include, on supplemental panels, the legend TOURIST INFO CENTER or STATE NAME (optional), WELCOME CENTER.
- D. The Gore sign should contain only the legend REST AREA with the arrow and should not be supplemented with any legend pertaining to the tourist information center or welcome center.

OPTION:

An alternative to the supplemental TOURIST INFO CENTER legend is the Information Symbol (D9-10) sign, which may be appended beneath the REST AREA advance guide sign. The name of the State or local jurisdiction may appear on tourist information/welcome center signs if the jurisdiction controls the operation of the tourist information or welcome center and the center meets the operating criteria set forth herein and is consistent with State policies. The State name may be used on the Advance Guide and the Exit Direction signs.

GUIDANCE:

For tourist information centers located off the freeway or expressway facility, additional signing criteria should be as follows:

- A. Each State should adopt a policy establishing the maximum distance that a tourist information center can be located from the interchange in order to be included on official signs.

- B. The location of signing should be in accordance with requirements pertaining to General Service signing (see Section 2E.51).
- C. Signing along the crossroad should be installed to guide the road user from the interchange to the tourist information center and back to the interchange.

OPTION:

As an alternative, the Information Symbol (D9-10) sign may be appended to the guide signs for the exit providing access to the tourist information center. As a second alternative, the Information Symbol sign may be combined with General Service signing.

2E.54 Reference Location Signs and Enhanced Reference Location Signs (D10-4, D10-5)



D10-4
450 x 1550 mm
18" x 54"



D10-5
450 x 1500 mm
18" x 60"

SUPPORT:

Reference Location (D10-1 through D10-3) signs and Intermediate Reference Location (D10-1a through D10-3a) signs and their applications are described in Section 2D.46.

There are two types of enhanced reference location signs:

- A. Enhanced Reference Location signs (D10-4), and
- B. Intermediate Enhanced Reference Location signs (D10-5).

STANDARD:

Except as provided in the option below, Reference Location (D10-1 through D10-3) signs (see Section 2D.46) shall be placed on all expressway facilities that are located on a route where there is reference location sign continuity and on all freeway facilities to assist road users in estimating their progress, to provide a means for identifying the location of emergency incidents and traffic crashes, and to aid in highway maintenance and servicing.

OPTION:

Enhanced Reference Location (D10-4) signs, which enhance the reference location sign system by identifying the route, may be placed on freeways or expressways (instead of Reference Location signs) or on conventional roads.

To augment an enhanced reference location sign system, Intermediate Enhanced Reference Location (D10-5) signs, which show the tenth of a kilometer (mile) with a decimal point, may be installed along any section of a highway route or ramp at one tenth of a kilometer (mile) intervals, or at some other regular spacing.

STANDARD:

If enhanced reference location signs are used, they shall be vertical panels having blue or green backgrounds with white numerals, letters, and borders, except for the route shield, which shall be the standard color and shape. The top line shall consist of the cardinal direction for the roadway. The second line shall consist of the applicable route shield for the roadway. The third line shall identify the kilometer (mile) reference for the location and the bottom line of the Intermediate Enhanced Reference Location sign shall give the tenth of a kilometer (mile) reference for the location. The bottom line of the Intermediate Enhanced Reference Location sign shall contain a decimal point. The height of the legend on enhanced reference location signs shall be a minimum of 150 mm (6 in). The height of the route shield on enhanced reference location signs shall be a minimum of 300 mm (12 in).

The background color shall be the same for all enhanced reference location signs within a jurisdiction.

The design details for enhanced reference location signs shall be as shown in the "Standard Highway Signs" book (see Section 1A.11).

Enhanced reference location signs shall have a minimum mounting height of 1.2 m (4 ft) to the bottom of the sign in accordance with the mounting height requirements of delineators (see Section 3D.4), and shall not be governed by the mounting height requirements prescribed in Section 2A.18.

The distance numbering shall be continuous for each route within any State, except where overlaps occur (see Section 2E.28). Where routes overlap, enhanced reference location sign continuity shall be established for only one of the routes. If one of the overlapping routes is an Interstate route, that route shall be selected for continuity of distance numbering.

The distance measurement shall be made on the northbound and eastbound roadways. The enhanced

reference location signs for southbound or westbound roadways shall be set at locations directly opposite the enhanced reference location signs for the northbound or eastbound roadways.

GUIDANCE:

The route selected for continuity of distance numbering should also have continuity in interchange exit numbering (see Section 2E.28). On a route without enhanced reference location sign continuity, the first enhanced reference location sign beyond the overlap should indicate the total distance traveled on the route so that road users will have a means of correlating their travel distance between enhanced reference location signs with that shown on their odometer.

STANDARD:

Except as provided in the option below, enhanced reference location signs shall be installed on the right side of the roadway.

OPTION:

Where conditions limit or restrict the use of enhanced reference location signs on the right side of the roadway, they may be installed in the median. In urban areas, Intermediate Enhanced Reference Location signs may be installed on the right side of the roadway, in the median, or on ramps to replace or to supplement the reference location signs. Enhanced Reference Location signs may be installed back-to-back in median locations.

Compliance Date: December 22, 2013

2E.55 Miscellaneous Guide Signs

SUPPORT:

Miscellaneous Guide signs are used to point out geographical features, such as rivers and summits, and other jurisdictional boundaries (see Section 2D.48).

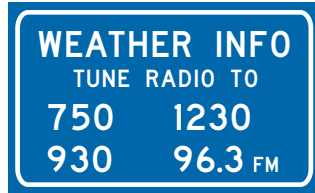
OPTION:

Miscellaneous Guide signs may be used if they do not interfere with signing for interchanges or other critical points.

GUIDANCE:

Miscellaneous Guide signs should not be installed unless there are specific reasons for orienting the road users or identifying control points for activities that are clearly in the public interest. If Miscellaneous Guide signs are to be of value to the road user, they should be consistent with other freeway or expressway guide signs in design and legibility. On all such signs, the design should be simple and dignified, devoid of any tendency toward flamboyant advertising, and in general conformance with other freeway and expressway signing.

2E.56 Radio Information Signing



D12-1
2100 X 1200 mm
84" X 48"

OPTION:

Radio-Weather Information (D12-1) signs may be used in areas where difficult driving conditions commonly result from weather systems. Radio-Traffic Information signs may be used in conjunction with traffic management systems.

STANDARD:

Radio-Weather and Radio-Traffic Information signs shall have a white legend and border on a blue background. Only the numerical indication of the radio frequency shall be used to identify a station broadcasting travel-related weather or traffic information. No more than three frequencies shall be shown on each sign. Only radio stations whose signal will be of value to the road user and who agree to broadcast either of the two items below shall be identified on Radio-Weather and Radio-Traffic Information signs:

- A. Periodic weather warnings at no more than 15-minute intervals during periods of adverse weather; or
- B. Driving condition information (affecting the roadway being traveled) at a rate of at least once every 15 minutes, or when required, during periods of adverse traffic conditions, and when supplied by an official agency having jurisdiction.

If a station to be considered operates only on a seasonal basis, its signs shall be removed or covered during the off season.

GUIDANCE:

The radio station should have a signal strength to adequately broadcast 110 km (70 mi) along the route. Signs should be spaced as needed for each direction of travel at distances determined by an engineering study. The stations to be included on the signs should be selected in cooperation with the association(s) representing major broadcasting stations in the area to provide: (1) maximum coverage to all road users on both AM and FM frequencies; and (2) consideration of 24 hours per day, 7 days per week broadcast capability.

OPTION:

In roadway rest area locations, a smaller sign using a greater number of radio frequencies, but of the same general design, may be used.

STANDARD:

Radio-Weather and Radio-Traffic Information signs installed in rest areas shall be positioned such that they are not visible from the main roadway.

OPTION:

A Channel 9 Monitored (D12-3) sign or cell phone sign may be installed as needed.

STANDARD:

Only official public agencies or their designee shall be shown as the monitoring agency on the Channel 9 Monitored sign.

SUPPORT:

Section 2D.45 contains information about the use and application of TRAVEL INFO CALL 511 (D12-5) signs.

2E.57 Carpool and Ridesharing Signing



D12-2a
1500 x 750 mm
60" x 30"

OPTION:

In areas having carpool matching services, Carpool Information (D12-2) signs may be provided adjacent to highways with preferential lanes or along any other highway.

Carpool Information signs may include Internet addresses or telephone numbers of more than four characters within the legend.

GUIDANCE:

Because this is an information sign related to road user services, the Carpool Information sign should have a white legend and border on a blue background.

STANDARD:

If a local transit logo or carpool symbol is incorporated into the Carpool Information sign, the maximum vertical dimension of the logo or symbol shall not exceed 450 mm (18 in).

2E.58 Weigh Station Signing

STANDARD:

Weigh Station signing on freeways and expressways shall be the same as that specified in Section 2D.43, except for lettering size and the advance posting distance for the Exit Direction sign, which shall be located a minimum of 450 m (1,500 ft) in advance of the gore.

SUPPORT:

Weigh Station sign layouts for expressway and freeway applications are available from Mn/DOT (see Office of Traffic, Safety and Operations, page ii).

2E.59 Preferential Only Lane Signs

Compliance Date: December 22, 2013

SUPPORT:

Additional guidance and standards related to the designation, operational considerations, signing, pavement markings, and other considerations for preferential only lanes is provided in Sections 2B.26, 2B.27, 2B.28, 2C.52, 3B.22, and 3B.23.

STANDARD:

Ground-mounted advance guide signs shall be provided at least 800 m (0.5 mi) prior to the beginning or initial entry point to all types of preferential only lanes (including barrier-separated, buffer-separated, and concurrent flow). Ground-mounted guide signs shall be provided at the beginning or initial entry point and at intermediate access points to all types of preferential only lanes.

A combination of guide and regulatory signs shall be used in advance of all preferential only lanes. The advance guide signs for preferential only lanes shall be consistent with the requirements of Section 2E.30.

Reversible flow or express lanes that do not have any specific vehicle occupancy or designation restrictions shall be consistent with the requirements of Chapters 2B and 3B.

Overhead preferential only lane guide signs shall be used only as a supplement to ground-mounted preferential only lane guide signs unless an engineering study identifies that ground-mounted guide signs are not appropriate for a particular situation or location.

Either the HOV abbreviation or the diamond symbol shall appear in the legend of each preferential only lane sign at the designated entry and exit points for all types of HOV lanes (including barrier- and buffer-separated, concurrent flow, and direct access ramps) in order to alert motorists that there is a minimum allowable vehicle occupancy requirement for vehicles to use the HOV lanes and to inform them of the times during which these vehicle occupancy requirements are in effect.

GUIDANCE:

Because consistency in signing and pavement markings for preferential only lanes within a State or metropolitan area plays a critical role in building public awareness, understanding, and acceptance, and makes enforcement more effective, an engineering study should be conducted to determine the appropriate combinations of overhead signs, ground-mounted signs, and pavement markings for a specific preferential only lane application.

Existing sign and bridge structures should be used to the extent practical for the installation of preferential only lane signs. Where possible, advance guide and guide signs that are provided for preferential only lanes should share sign structures spanning the preferential only lanes and the adjoining freeway facility.

The preferential only lane signing should be designed to avoid overloading the road user. Based on the importance of the sign, the following priority should be given: regulatory, advance regulatory, guide, then next exit supplemental signs.

OPTION:

Overhead advance guide signs and overhead guide signs may be used in advance of, at the beginning or initial entry point, and at designated intermediate access points to any type of preferential only lane. Advance guide signs may be installed and located approximately 1.6 km (1 mi) and 3.2 km (2 mi) in advance of the beginning or initial entry point to any type of preferential only lane.

GUIDANCE:

Where conditions restrict the ability to provide more than one advance guide sign in advance of any type of preferential only lane, the advance guide sign that is installed should be placed at least 800 m (0.5 mi) in advance of the beginning or entry point to the preferential only lane.

Advance destination guide signs, identifying downstream exit locations, should be installed in advance of designated entry points and along the length of access restricted preferential only lanes (such as barrier- and buffer-separated). In addition to the routes that typically appear on advance destination guide signs, these signs should also include destinations. These signs should be located based on the priority of the message, the available space, the existing signs on adjoining general purpose traffic lanes, roadway and traffic characteristics, the proximity to existing overhead signs, the ability to install overhead signs, and other unique local factors.

OPTION:

Advance guide signs may be provided for preferential only lanes with unrestricted access, such as concurrent flow preferential only lanes.

GUIDANCE:

The use of guide signs for preferential only lanes at freeway interchanges should conform to the regulatory and guide sign requirements established in this Manual.

OPTION:

Changeable message signs may be used to supplement static signs where travel conditions change or where multiple types of operational strategies (such as variable occupancy requirements, vehicle types, or pricing policies) are used and varied throughout the day or week to manage the use of, control of, or access to preferential only lanes.

STANDARD:

When changeable message signs (see Section 2A.7) are used as regulatory or guide signs for preferential only lanes, they shall be the required sign size and shall display the required letter height and legend format that corresponds to the type of roadway facility and design speed.

Ground-mounted and overhead advance guide signs, guide signs, and exit signs applicable to HOV lanes and direct access ramps to HOV lanes shall contain the HOV diamond symbol in the upper left corner of the sign as shown in Figures 2E-46 through 2E-52. The diamond symbol shall not be used with lanes designated for bus or taxi traffic.

OPTION:

Agencies may select from either the HOV abbreviation or the diamond symbol to reference the HOV lane designation.

GUIDANCE:

Where lateral clearance is limited, such as when a ground-mounted Preferential Only Lane sign is installed on a median barrier, the edges of the sign should not project beyond the outer edges of the barrier.

OPTION:

Where lateral clearance is limited, Preferential Only Lane (R3-10, R3-11, and R3-12 series) signs that are 1800 mm (72 in) or less in width may be skewed up to 45 degrees in order to fit within the barrier width or may be mounted at a height of 4.3 m (14 ft) or more above the roadway.

GUIDANCE:

Where lateral clearance is limited, Preferential Only Lane signs that are wider than 1800 mm (72 in) should be mounted at a height of at least 4.3 m (14 ft) above the roadway.

Compliance Date: December 22, 2013

STANDARD:

For barrier-separated preferential only lanes, overhead advance guide and overhead guide signs shall be provided in advance of and at the beginning or initial entry point to the preferential only lanes (see Figure 2E-46 for HOV lanes). Overhead guide signs shall also be used at all intermediate entry points to barrier-separated preferential only lanes (see Figure 2E-47 for HOV lanes).

For barrier-separated preferential only lanes, ground-mounted advance exit and ground-mounted exit signs shall be installed prior to and at the intermediate exit points of the preferential only lanes (see Figure 2E-47 for HOV lanes). Ground-mounted guide signs shall be mounted in the median or on median barriers that separate two directions of traffic.

OPTION:

For barrier-separated preferential only lanes, an advance destination guide sign may be used in the vicinity of designated intermediate entry and exit points.

GUIDANCE:

For barrier-separated preferential only lanes where conditions restrict the ability to provide more than one advance guide sign prior to the entrance to the preferential only lane, the sign should be placed approximately 800 m (0.5 mi) in advance of the exit. In these situations, the installation of the corresponding regulatory and next exit supplemental signs should be located based on the priority of the message and the available space.

STANDARD:

For buffer-separated preferential only lanes (painted buffer of 0.6 m (2 ft) or more) where access is restricted to designated entry points, ground-mounted guide signs shall be mounted in the median or on median barriers separating two directions of traffic. Ground-mounted advance exit and ground-mounted exit signs shall be installed prior to and at the intermediate exit points of buffer-separated preferential only lanes (see Figure 2E-47 for HOV lanes).

OPTION:

For buffer-separated preferential only lanes, an advance destination guide sign may be used in the vicinity of designated intermediate entry and exit points.

GUIDANCE:

For buffer-separated HOV lanes, guide and regulatory signs should be provided to alert HOV lane users and non-users of the minimum allowable vehicle occupancy requirement and the locations of the designated entry and exit points.

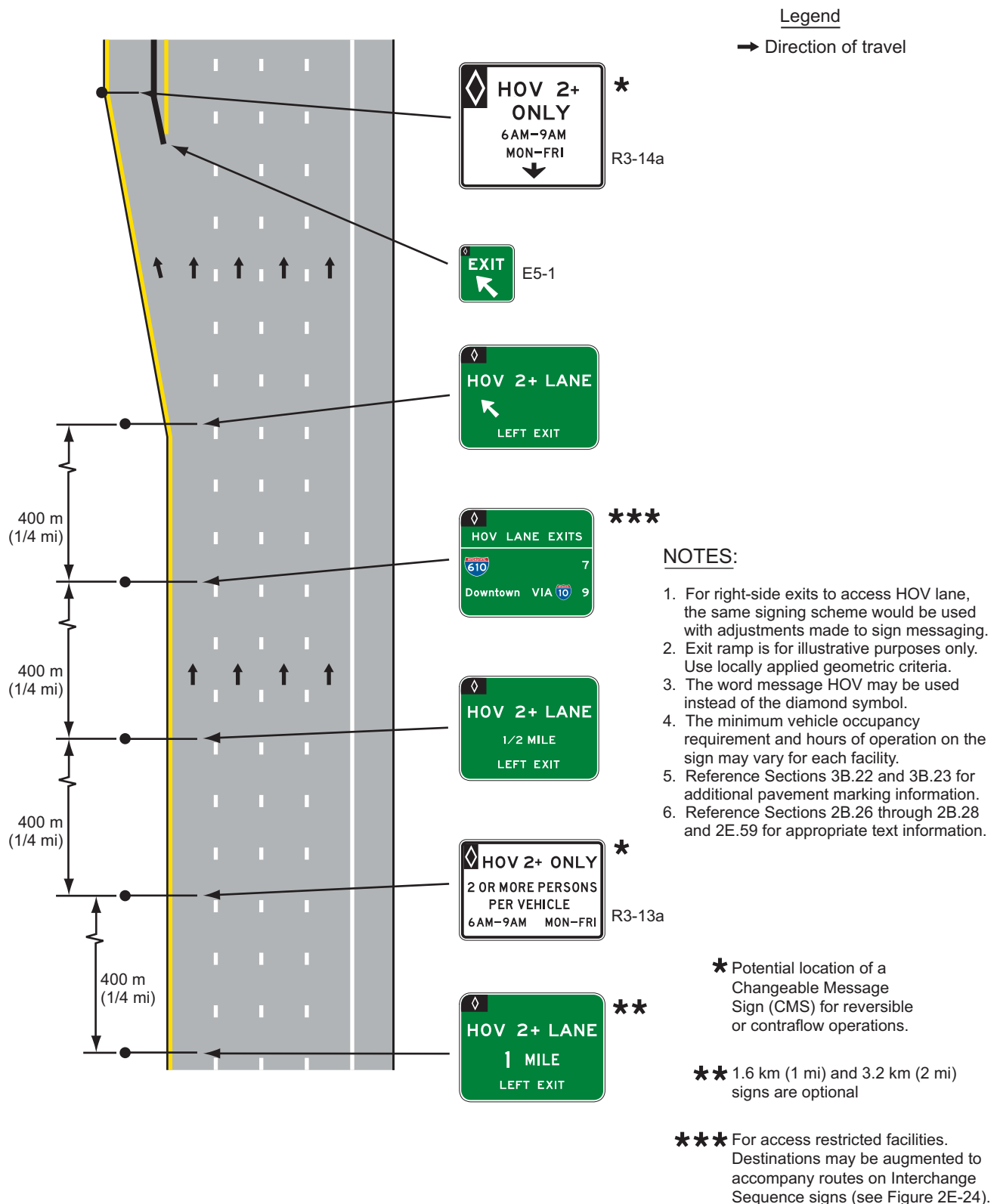


Figure 2E-46. Example of Signing for the Entrance to Barrier-Separated HOV Lanes

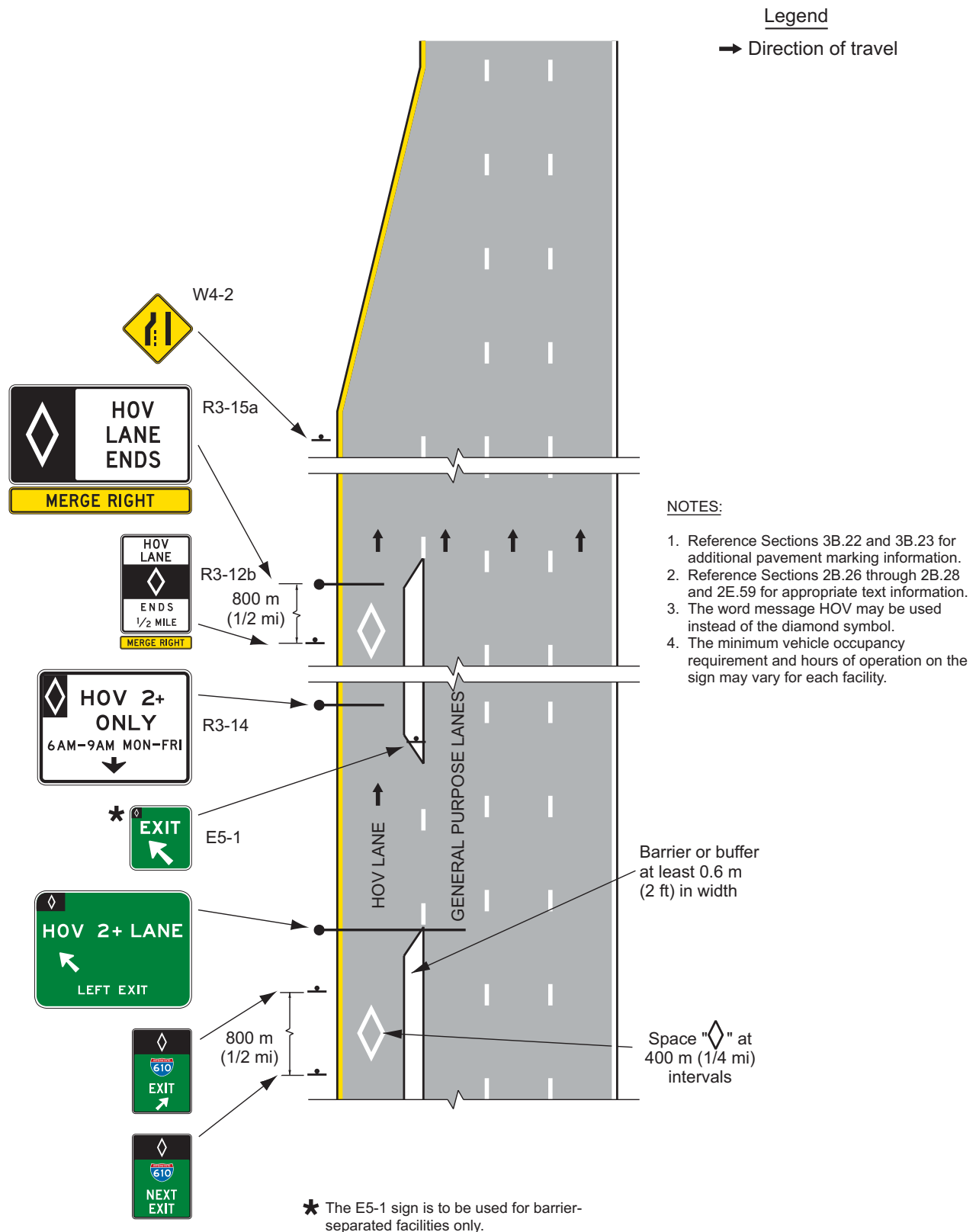


Figure 2E-47. Example of Signing for the Intermediate Entry to and Exit from Barrier- or Buffer-Separated HOV Lanes

STANDARD:

For concurrent flow preferential only lanes, including those where a preferential only lane is added to the roadway (see Figure 2E-48 for HOV lanes) and those where a general purpose lane transitions into a preferential only lane on the roadway (see Figure 2E-49 for HOV lanes), an overhead regulatory (R3-14 or R3-14a) sign shall be used.

For concurrent flow HOV lanes on the left side of the roadway with unrestricted access, advance guide and guide signs shall only be used on direct access ramps, such as HOV lane only ramps or ramps to park & ride lots (see Figures 2E-50 and 2E-51 for HOV lanes).

For direct access ramps to HOV lanes, advance guide signs shall be provided along the adjoining surface streets to direct traffic into a transit facility (such as a park & ride lot or a transit station or terminal) that ultimately leads to HOV lanes (see Figure 2E-50 for HOV lanes).

Because direct access ramps for preferential only lanes at interchanges connecting two freeways are typically left side exits and typically have design speeds similar to the preferential only lane, overhead advance guide signs and overhead guide signs shall be provided in advance of and at the entry point to each preferential only lane ramp (see Figure 2E-52 for HOV lanes).

SUPPORT:

Figures 2E-50 through 2E-52 provide examples of recommended uses and layouts of signs for HOV lanes for direct access ramps, park & ride lots, access from surface streets, and exclusive preferential only lane ramps at interchanges that directly connect two freeway facilities. Direct access ramps to preferential only lanes sometimes form a three or four-legged intersection that is controlled by either static signs or traffic control signals.

The use of advance guide and guide signs for direct access ramps for preferential only lanes at interchanges connecting two freeways is similar to a connecting ramp between two freeway facilities.

Compliance Date: December 22, 2013

2E.60 Freeway Entrance Sign (E1-6)

E1-6
900 x 450 mm
36" x 18"

GUIDANCE:

The Freeway Entrance (E1-6) sign should be used at those locations where a motorist may unintentionally enter a freeway or expressway entrance ramp.

The following are locations where the installation of this sign should be considered:

- A. a road or city street which becomes a freeway entrance ramp without a break in the horizontal alignment;
- B. locations where entrance ramp geometrics are not obvious and which may be confusing for an unfamiliar motorist; or
- C. where there has been a continuing number of complaints from motorists who have entered a freeway or expressway entrance ramp unintentionally.

2E.61 Crossover Signs (D13 Series)

D13-1
1800 x 900 mm
72" x 36"



D13-2
1800 x 900 mm
72" x 36"

OPTION:

Crossover signs may be installed on divided highways to identify median openings not otherwise identified by warning or other guide signs.

STANDARD:

A CROSSOVER (D13-1) sign shall not be used to identify a median opening that is permitted to be used only by official or authorized vehicles. If used, the sign shall be a horizontal rectangle of appropriate size to carry the word CROSSOVER and a horizontal directional arrow. The CROSSOVER sign shall have a white legend and border on a green background.

GUIDANCE:

If used, the CROSSOVER sign should be installed immediately beyond the median opening, either on the right side of the roadway or in the median.

OPTION:

The Advance Crossover (D13-2) sign may be installed in advance of the CROSSOVER sign to provide advance notice of the crossover.

STANDARD:

If used, the Advance Crossover sign shall be a horizontal rectangle of appropriate size to carry the word CROSSOVER and the distance to the median opening. The sign shall have white legend and border on a green background.

GUIDANCE:

The distance shown on the Advance Crossover sign should be 1 MILE, 1/2 MILE, or 1/4 MILE, unless unusual conditions require some other distance. If used, the sign should be installed either on the right side of the roadway or in the median at approximately the distance shown.

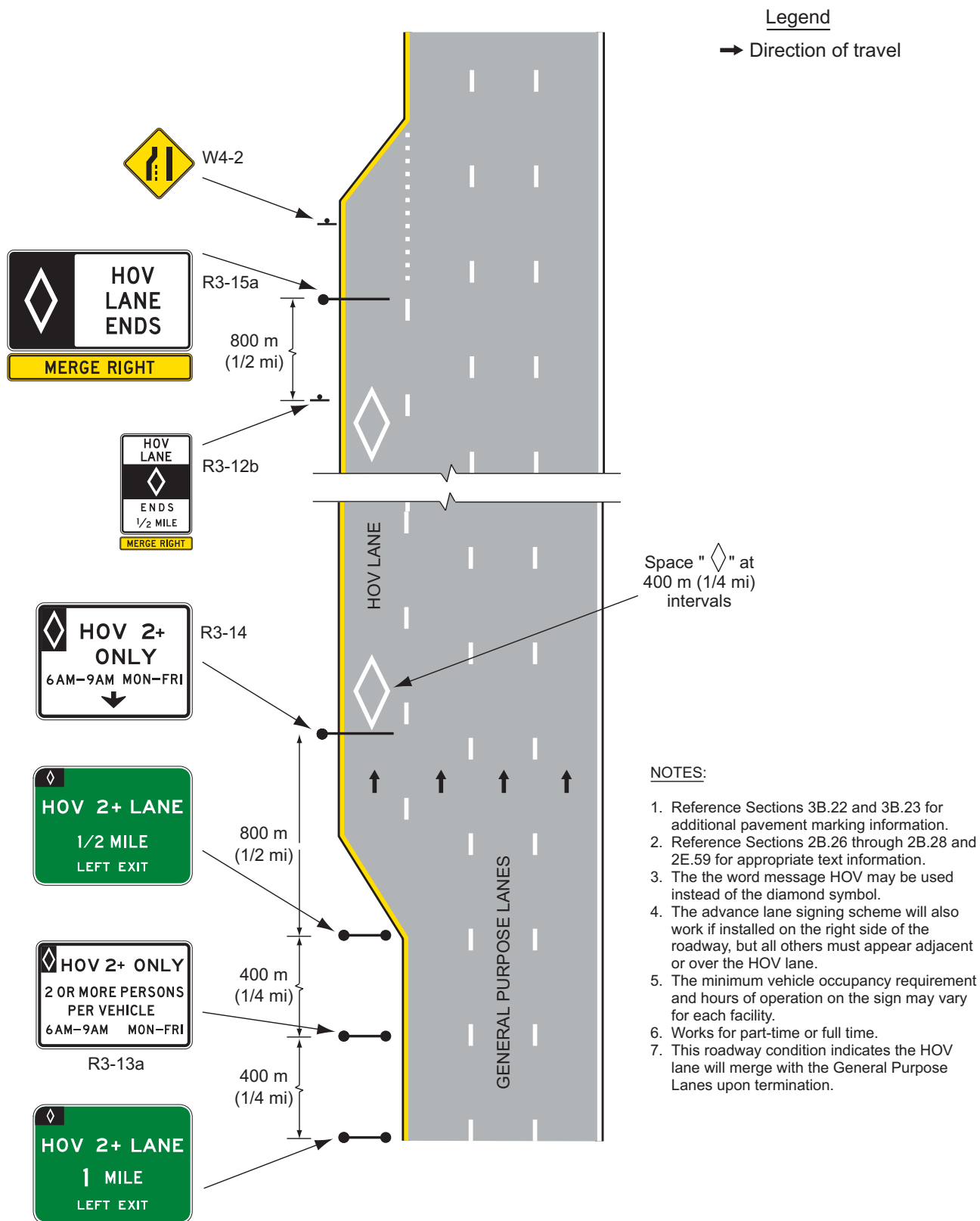


Figure 2E-48. Example of Signing for the Entrance to and Exit from an Added HOV Lane

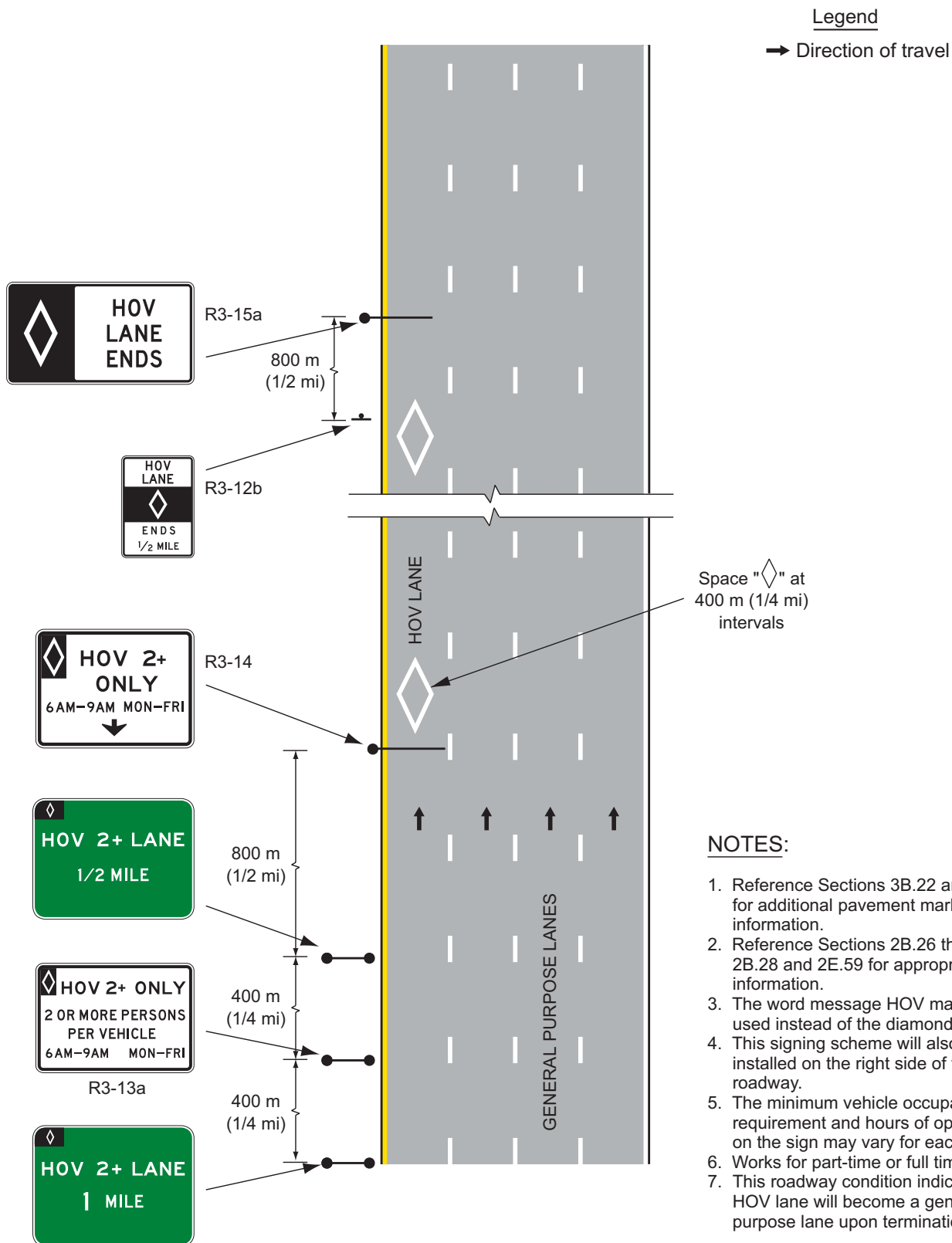
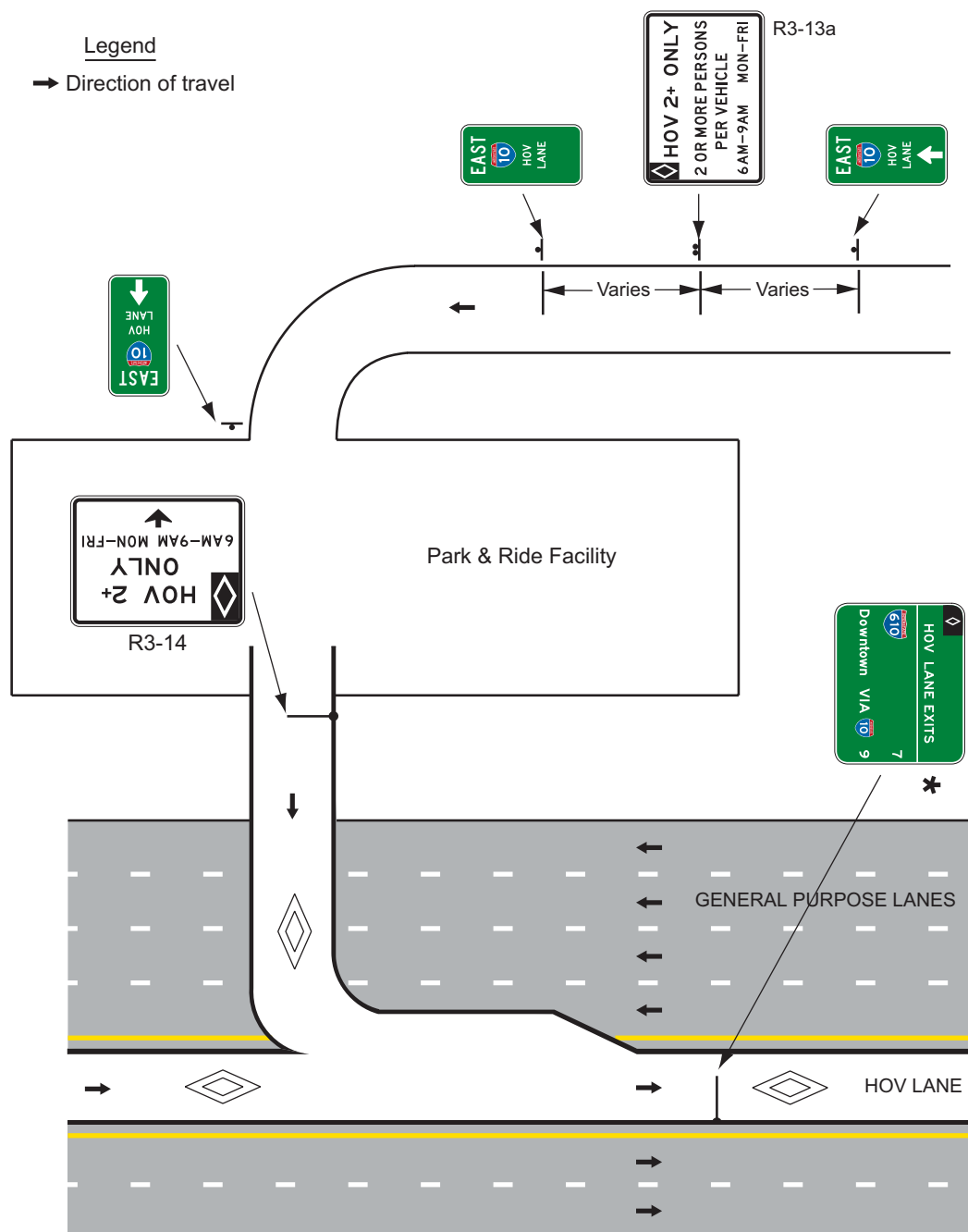


Figure 2E-49. Example of Signing for the Entrance to and Exit from a General Purpose Lane that Becomes an HOV Lane



NOTES:

1. Reference Sections 3B.22 and 3B.23 for additional pavement marking information.
2. Reference Sections 2B.26 through 2B.28 and 2E.59 for appropriate text information.
3. Additional advisory and warning signs are required.
4. Direction of HOV traffic is inbound.
5. Sign locations are approximate.
6. The word message HOV may be used instead of the diamond symbol.
7. The minimum vehicle occupancy requirement on the sign may vary for each facility.
8. Overhead HOV signs should supplement ground-mounted HOV signs.
9. Additional signs may be required to direct drivers from the surrounding streets into the park & ride lot and HOV lane.
10. Additional signs are required on the adjoining surface streets to inform non-HOVs that they should not enter the HOV facility.

* For access restricted facilities. Destinations may be augmented to accompany routes on Interchange Sequence signs (see Figure 2E-24).

Figure 2E-50. Example of Signing for a Direct Access Ramp to an HOV Lane from a Park & Ride Facility

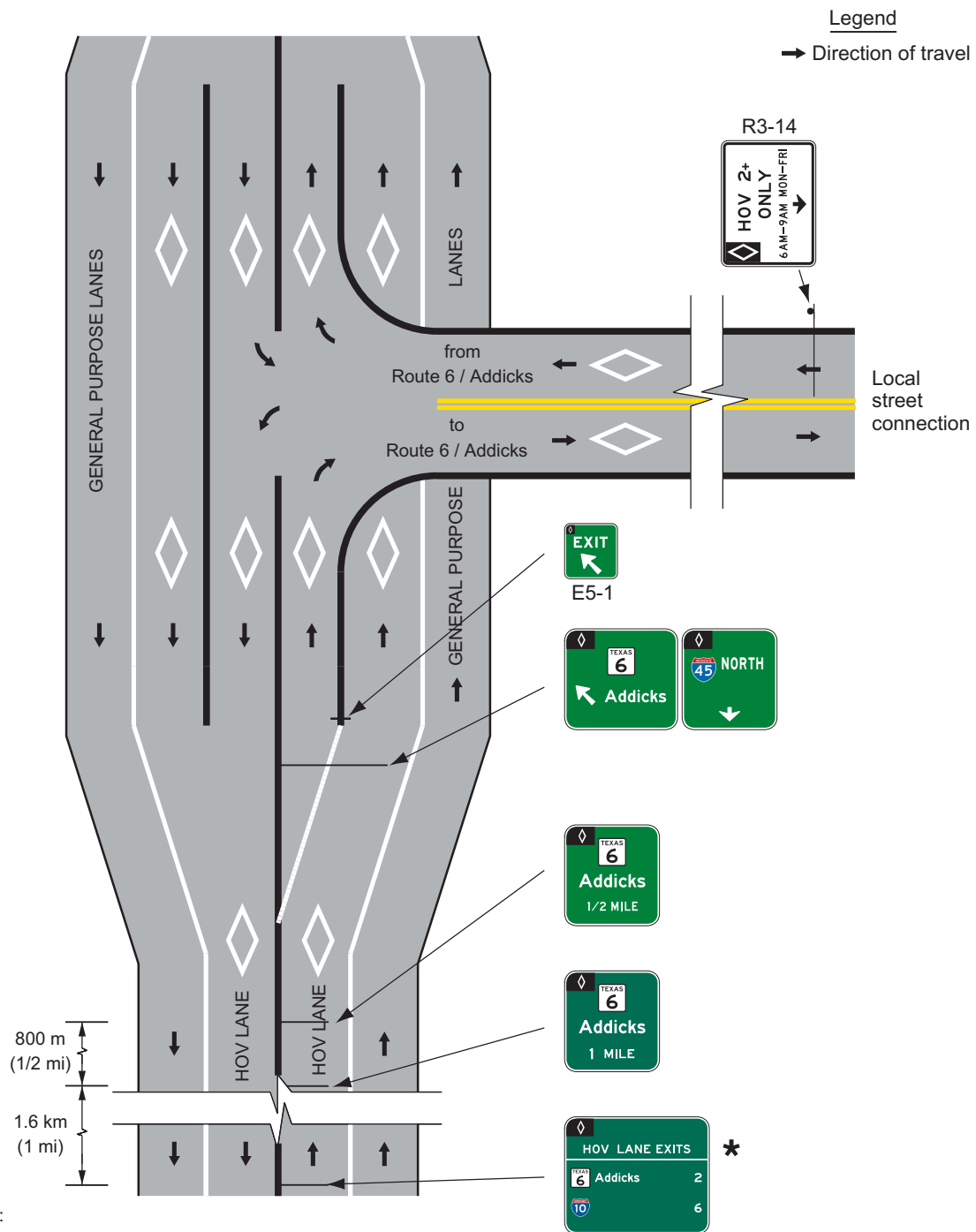


Figure 2E-51. Example of Signing for a Direct Access Ramp to an HOV Lane from a Local Street

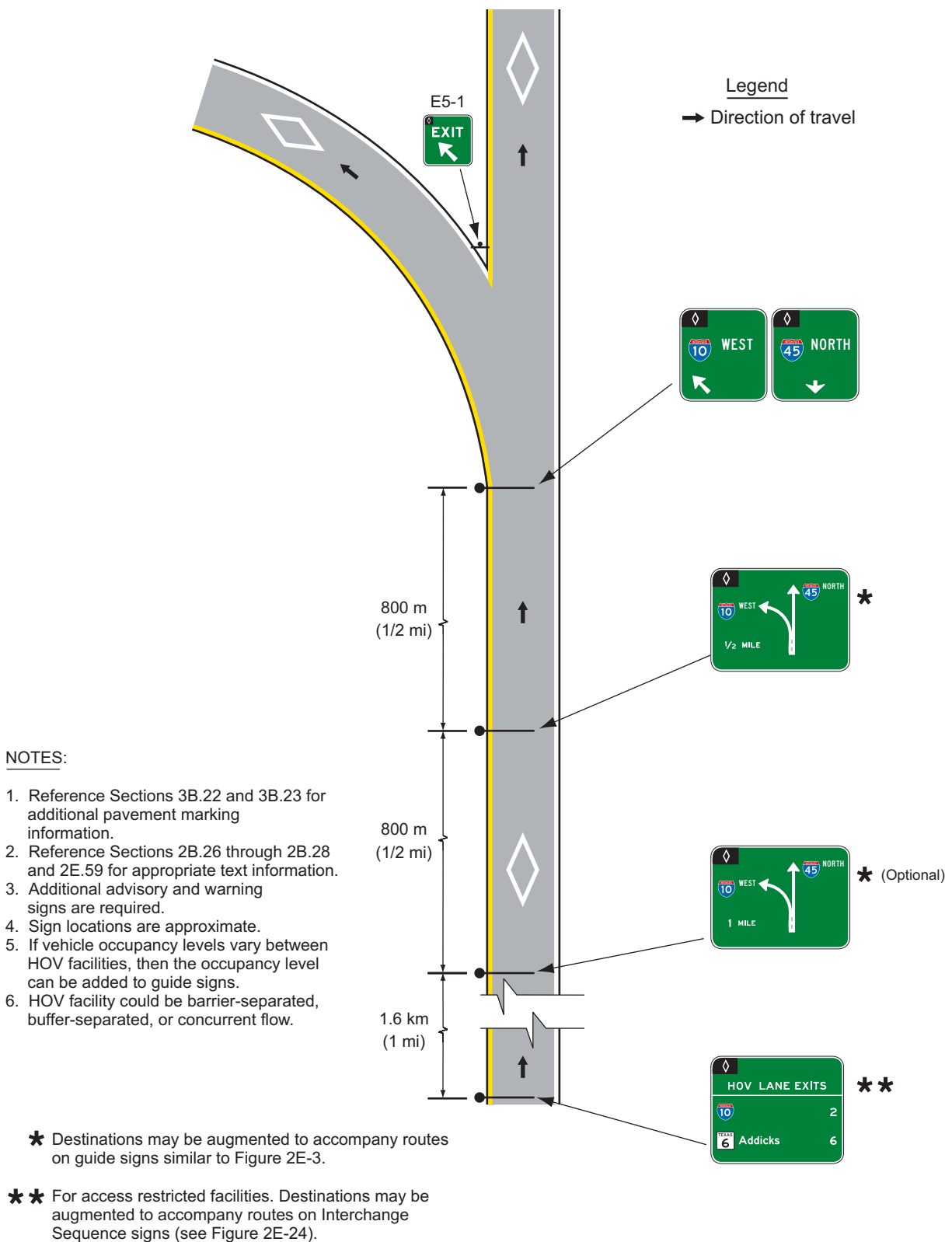


Figure 2E-52. Example of Signing for a Direct Access Ramp between HOV Lanes on Separate Freeways

3. TEM CHAPTER 6

Chapter 6

TRAFFIC SIGNS

TABLE OF CONTENTS	Page
6-1.00 INTRODUCTION	6-5
1.01 Purpose	
1.02 Scope	
1.03 Organization of the Manual	
6-2.00 GLOSSARY	6-6
6-3.00 LEGALITY - LEGAL AUTHORITY FOR PLACEMENT OF TRAFFIC SIGNS	6-8
3.01 Traffic Signs Installed by Mn/DOT Maintenance Forces	
3.02 Traffic Signs Installed by Contract	
3.03 Traffic Signs Installed by Others by Maintenance Permit	
3.04 Temporary Traffic Control Signs Installed by Construction Contracts and Public Utility Companies at Work Sites	
6-4.00 GENERAL PRINCIPLES OF TRAFFIC SIGNING	6-8
4.01 Principles of Traffic Control Devices	
4.02 Basic Considerations for Installation of Traffic Signs	
4.03 Functional Classifications of Traffic Signs	
4.04 Department Classification by Sign Design Type	
4.05 Elements of Traffic Sign Design	
4.06 Sign Design Type Classification	
4.07 Lateral Offset and Vertical Clearance Requirements	
4.08 Sign Installation and Maintenance Practices	
4.09 Implementation of Signing	
6-5.00 APPLICATION GUIDELINES - REGULATORY SIGNS	6-21
5.01 Purpose	
5.02 Typical Sign Placement	
5.03 Bridge Speed and Load Restrictions	
5.04 Bus Shoulder Sign (R4-X7)	
5.05 BYPASS LANE Sign (R4-X8)	
BYPASS & RIGHT TURN LANE Sign (R4-X8a)	
5.06 DO NOT PASS Sign (R4-1)	
5.07 Intersection Lane Control Signs (R3-8)	
5.08 ONE WAY Sign (R6-1)	
5.09 RIGHT LANE MUST TURN RIGHT Sign (R3-7)	
LEFT LANE MUST TURN LEFT Sign (R3-7)	
5.10 SLOWER TRAFFIC MOVE RIGHT Sign (R4-3a)	
5.11 Speed Zone Signing	
5.12 STOP Sign (R1-1)	
5.13 Two-Way Snowmobile Trail Signing	
5.14 VEHICLE NOISE LAWS ENFORCED Sign (R16-X13)	

6-6.00 APPLICATION GUIDELINES - WARNING SIGNS	6-29
6.01 Purpose	
6.02 Acceleration Lane Signing	
6.03 Advance Warning Signs on Local Road Approaches	
6.04 Advisory Exit Speed Sign (W13-2)	
6.05 BRIDGE ICES BEFORE ROAD Sign (W8-13)	
6.06 Channelized Intersections	
6.07 Chevron Alignment Sign (W1-8)	
6.08 Controlled Burning Signs	
6.09 Crossing Signs	
6.10 EVENT CONGESTION AHEAD Sign (W14-X11)	
6.11 Low Clearance Sign (W12-2)	
6.12 No Passing Zones	
6.13 Passing Lane Sections	
6.14 SCHOOL BUS STOP AHEAD Sign (S3-1)	
6.15 SHOULDER NARROWS Sign (W5-X1)	
NO SHOULDER Sign (W21-X1)	
6.16 Speed Reduction Sign (W3-5)	
6-17 Truck Hauling Signs	
6.18 Typical Signing for Transitions Between Divided Highway Sections and Two Lane Two-Way Sections	
6-7.00 APPLICATION GUIDELINES - GUIDE SIGNING	6-36
7.01 Purpose	
7.02 Freeways	
7.03 Signing Destinations	
7.04 Typical Junction Signing Layouts	
7.05 Independent Route Marker Assemblies	
7.06 Named Road, Street, and 911 Road Name Signs	
7.07 Boundary Signs	
7.08 Designated Roadways	
7.09 Supplemental Guide Signing Programs	
7.10 External Sign Variance Committee	
6-8.00 APPLICATION GUIDELINES - MISCELLANEOUS SIGNING	6-79
8.01 Adopt-A-Highway Signing Program	
8.02 Adopt-A-Rest Area Signing Program	
8.03 Community Destination Signing Program	
8.04 DNR PUBLIC WATER ACCESS Sign (DNR NRM 8.2.35)	
8.05 General Service Signs	
8.06 Geological Marker Sign (D5-X1C, D7-X1, and D7-X2)	
8.07 Reference Location Sign (D10-1, D10-2, and D10-3)	
8.08 Rest Area Signing	
8.09 Seat Belt Signs (R16-X11 and R16-X2)	
8.10 Sign Attachments	
8.11 Test Section Signing	

List of Figures

Description	Page
6.1 Sign Placement	6-89
6.2 Sign Placement	6-90
6.3A Type C & D Structure Details (sheet 1 of 3)	6-91
6.3B Type C & D Structure Details (sheet 2 of 3)	6-92
6.3C Type C & D Structure Details (sheet 3 of 3)	6-93
6.3D Type C Signs Mounted on O-Posts, OH Sign Posts or Signal Standards	6-94
6.3E Alternate Type C & D Mounting System	6-95
6.4 Regulatory Signs on Divided Highways at Entrances	6-96
6.5 Regulatory Signs for Divided Highway Intersections - T-Intersections	6-97
6.6 Regulatory Signs for Divided Highway Intersections - Medians <30 feet Wide	6-98
6.7A Regulatory Signs for Divided Highway Intersections - Median 30 Feet or Greater	6-99
6.7B Regulatory Signs for Divided Highway Intersections - Median 30 Feet or Greater	6-100
6.8 Regulatory Signs for Divided Highway Intersections with Frontage Roads	6-101
6.9 Regulatory Signs for Divided Highway Intersections with a One-Way Street/Ramp	6-102
6.10 3/4 Access Intersection Signing	6-103
6.11 Regulatory & Warning Signs for 3/4 Right-in - Right-out Intersections	6-104
6.12 Highway Intersection with One-way Street/Ramp	6-105
6.13 Extended Left Turn Lane	6-106
6.14 Regulatory Signs on Diamond Interchange Ramps	6-107
6.15 Regulatory Signs on Cloverleaf Interchange Ramps	6-108
6.16 Authorized Bus Lane Signing on Shoulders	6-109
6.17 Bypass Lanes	6-110
6.18A Lane Designation on Ramps (1 of 2)	6-111
6.18B Lane Designation on Ramps (2 of 2)	6-112
6.19 Acceleration Lane Signing/Striping Options	6-113
6.20A Channelized Intersection Signing (Raised Median)	6-114
6.20B Channelized Intersection Signing (Painted Median)	6-115
6.21 Pedestrian Crossing Signing at Unsignalized Intersections	6-116
6.22A Passing Lane Section Signing	6-117
6.22B Passing Lane Signing Near Low-Volume Cross Roads	6-118
6.23 Transition Signing Divided and Undivided Roadways	6-119
6.24 Signal Mast Arm Intersection Signing	6-120
6.25 T-Intersection Signing (w/ Divided Highway)	6-121
6.26 Diamond Interchange & Crossroad Signing (Unsignalized)	6-122
6.27 Diamond Interchange & Crossroad Signing (Signalized)	6-123
6.28 Folded-Diamond Interchange & Crossroad Signing (Unsignalized)	6-124
6.29 Cloverleaf Interchange & Crossroad Signing	6-125
6.30A Signing for Auxiliary Lanes on Freeways, Lane Less than 1/2 Mile without Escape Lane	6-126
6.309B Signing for Auxiliary Lanes on Freeways, Lane Less than 1/2 Mile with Escape Lane	6-127
6.30C Signing for Auxiliary Lanes on Freeways, Lane 1/2 Mile or Greater without Escape Lane	6-128

Description	Page
6.309D Signing for Auxiliary Lanes on Freeways	
Lane 1/2 Mile or Greater with Escape Lane	6-129
6.31 T-Intersection Signing (Two-Lane, Two-Way)	6-130
6.32 Four-Leg Intersection Signing	6-131
6.33 Local Road/Street Intersection Signing	6-132
6.34 Single Lane Roundabout	6-133
6.35 Named County Road Signing on an Expressway	6-134
6.36 Community Recognition Signing	6-135
6.37A Specific Service Signing - Typical Clarification Diagrams	6-136
6.37B Specific Service Signing - Typical Clarification Diagrams	6-137
6.38 Wayside Rest Signing	6-138

List of Forms

Description	Page
6.1A Specific Services Application (front side)	6-139
6.1B (back side)	6-140
6.1C Specific Services Application, Page 2 (front side)	6-141
6.1D (back side)	6-142
6.2A Guide and Information Signs Application (front side)	6-143
6.2B (back side)	6-144
6.3A Adopt-A-Highway Application (front side)	6-145
6.3B (back side)	6-146
6.4A Adopt-A-Rest Area Application (front side)	6-147
6.4B (back side)	6-148
6.5 Community Destination Signing - Sample Resolution	6-149

List of Charts & Tables

Description	Page
6-1A Guidelines for Type D Guide Signs	6-151
6-1B Guidelines for Type D Guide Signs (cont.)	6-152
6-1C Guidelines for Type D Guide Signs (cont.)	6-153
6-1D Guidelines for Type D Guide Signs (cont.)	6-154
6-1E Guidelines for Type D Guide Signs (cont.)	6-155
6-2 U Post Structure Chart (3# Post)	6-156
6-3 U Post Structure Chart (2.5# Post)	6-157
6-4 Sign Post Spacing Chart	6-158
6-5 Warning Sign Placement Chart	6-159
6-6 Chevron Sign Spacing	6-160
6-7 Ball Bank Angles for Safe Curve Speeds	6-161
6-8A Requester Pays Signing Costs - Tables 1, 2 & 3	6-162
6-8B Requester Pays Signing Costs - Tables 4, 5 & 6	6-163

6-3.0 LEGALITY - LEGAL AUTHORITY FOR PLACEMENT OF TRAFFIC SIGNS

6-3.01 Traffic Signs Installed by Mn/DOT Maintenance Forces

Minnesota Statute (MS) 169.06, subd.2, provides that the Commissioner of Transportation (Commissioner) shall place and maintain traffic signs conforming to the MN MUTCD and the Mn/DOT Standard Specifications for Construction as deemed necessary to regulate, warn, or guide traffic on the Minnesota trunk highway system. Mn/DOT 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 MS 161.32, subd.1, the Commissioner may elect to conduct sign installation work by construction contract rather than by maintenance forces. Additional statutes may also be applicable.

6-3.03 Traffic Signs Installed by Others by Maintenance Permit

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

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, colors, 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 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 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:

1. Primary guide signs consist of advance junction signing, exit directional signs, exit gore signs, destination, and distance signs. Exit numbers are included on interstate freeway signs.
2. 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 interstate freeway signs.

**See Appendix A for Chapter 5 of the 2001 ITE
Traffic Control Devices Handbook on Signing Priorities**

6-4.04 Department Classification by Sign Design Type

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

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.

Type C signs are primarily regulatory, warning, route marker assemblies, and auxiliaries, as found in the Standard Signs Manual. They are the most common sign type and are typically installed by Mn/DOT sign crews.

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



Type A Sign



Type C Sign



Type D Sign

Type OH signs are large overhead guide, directional, or informational signs, either spanning a roadway, cantilevered over the roadway/shoulder, or bridge-mounted. The requirements of the structural support system generally require installation or maintenance by contract. There are three kinds of Type OH signs: 1) sign support (no walkway or sign lighting), 2) truss (may or may not include walkway and sign lighting) and 3) bridge-mounted (may or may not include walkway and sign lighting).



Type OH Sign - Sign Support



Type OH Sign - Truss

See Appendix D for an overview of sign symbols.

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

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

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

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

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.



Type A Sign with EA Sign Panel



Type OH Sign - Bridge-Mounted

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; 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.

6-4.05.06 Sign Lighting

Driving on freeways and expressways is a complex and demanding task. Communication with the driver by signing is in constant competition for the driver's attention, particularly in the urban environment. As a countermeasure, overhead signs are typically utilized on urban area freeways.

The following guidelines were developed as a result of studies and field trips. Generally, overhead sign lighting is not needed. Each district shall conduct a field review to determine if it is necessary to light overhead signs. During the field review of each site, viewing of the signs should be made only with low beam vehicle headlights. Also, it is recommended that personnel unfamiliar with the sign message be part of the review team to ensure the most objective decision possible.

By turning off or not installing overhead sign lighting, Mn/DOT benefits by reducing energy and maintenance costs while maintaining adequate sign legibility.

Any one of the following guidelines may make it necessary to light overhead sign panels:

1. Advertising devices and/or lighting sources competing for drivers' attention.
2. Engineering judgment based on various factors including, but not limited to:
 - a. At least 650 foot legibility distance.
 - b. At least 1000 foot detection distance.
 - c. Roadway and interchange geometrics.
 - d. High weaving traffic volumes.
 - e. Three or more overhead mounted sign panels on the same sign structure facing one direction of traffic (sign message overload).
 - f. Number of lanes (horizontal and vertical alignment).
 - g. Major forks.
 - h. Skewed bridge crossings.
 - i. Horizontal curves.
3. High density fog areas.
4. Roadway lighting located in close proximity to overhead signs causing glare from the sign panels.
5. Regulatory and diagrammatic signs.

Sign lighting shall be provided for all sign panels if one sign panel on a sign structure requires lighting.

The details of sign lighting are discussed in Chapter 10, Lighting.

6-4.06 Sign Design Type Classification**6-4.06.01 Type A signs**

1. Support system - poured concrete footings or driven structural steel H-piles to support breakaway wide-flange steel posts.
2. Sign panels - 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.

6-4.06.02 Type C signs

1. Support system - ground-mounted signs are spliced or single U-posts driven into subsoil, attached to a bridge railing utilizing O-posts, or banded to traffic signal pedestals or mast arm poles. Unsupported length and sign panel area determines number of U-posts and need for stringers and/or knee bracing.
2. Sign panel - sheet aluminum with direct applied retroreflectorized or screen processed legend. Punching is specified in the Standard Signs Manual.

6-4.06.03 Type D signs

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

6-4.06.04 Type OH 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.
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.

6-4.07 Lateral Offset and Vertical Clearance Requirements

6-4.07.01 Type A Signs

See Figure 6.1 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 Figure 6.1.

6-4.07.02 Type C and Type D Signs

See Figure 6.2 for normal lateral offsets and vertical clearances.

6-4.07.03 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.

6-4.08 Sign Installation and Maintenance Practices

6-4.08.01 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. The Regional Traffic Management Center (RTMC) should be contacted whenever installation is planned on a freeway within the Metro Area.

Minnesota Statute 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 notification system which was established as a result of Minnesota law to inform all Minnesota underground facility operators of intended excavation. Gopher State One-Call is open 24 hours a day, seven days a week. Calls after 5:00 p.m., before 7:00 a.m., on weekends, and on holidays are accepted for emergencies only. 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 (MN MUTCD, Section 1A.2). 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 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 40 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 thru two-lane, two-way highways see Figures 6.30, 6.31, and 6.32.

Urban Areas - In urban areas with speed limits of 30 mph or less, the minimum desirable distance between signs is approximately 100 feet.

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

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.

5. 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.

6. A-Frame and U-Post mountings

Assuming an average distance of ten 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 Charts 6-2, 6-3, and 6-4.

To use these charts, first determine the total length of the sign panel. Then, determine the height of the sign panel or add the heights of all of the individual sign panels to be mounted on the same sign structure. Based upon these dimensions (in inches), select either Chart 6-2 or Chart 6-3, depending upon the weight of the U-posts to be used for the sign structure. After determining the correct number of riser posts to be used for the sign structure, refer to the punch codes in the Standard Signs Manual for the spacing from center to center of posts. If there is no punch code or the sign structure is unique, then refer to Chart 6-4 to determine riser post (center to center) spacing.

In lieu of using two riser posts (in accordance with Chart 6-2 or Chart 6-3) 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.

See Appendix C for
Types A, C, D, & OH
signpost length tables.

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 Figures 6.3A, 6.3B, and 6.3C. These details were designed based on crash tests conducted at Texas Transportation Institute in 1988 and 1989.

Sign bracket and details are shown in Figures 6.3D and 6.3E.

6-4.08.02 Sign Maintenance Practice

1. Recurring maintenance schedule

Each maintenance area is charged with implementing recurring sign maintenance. A recurring maintenance schedule should be developed using a maximum 12 year cycle for encapsulated lens sheeting and a 15 year cycle for VIP and DG3 sheeting (unless field performance studies coordinated by OTSO staff determine otherwise). In order to monitor the performance of the retroreflective qualities of in place signs, each district should conduct periodic nighttime retroreflectivity observations. This review shall include all signs on Mn/DOT right-of-way facing traffic entering from local roads. See the Mn/DOT Maintenance Manual for those procedures.

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.

6-4.09.07 *Post-Contract Activities*

OTSO is a source of certain information as follows:

1. District personnel often have the opportunity to observe in place signing. Apparent failures in materials should be reported to the State Signing Engineer so that field observations may be made.
2. A report of the district's recurring structural inspection procedure findings, Form 17267, shall be forwarded to OTSO.
3. OTSO is a source of annual quantities, unit prices, and other tabulations concerning contract signing items.

6-5.0 APPLICATION GUIDELINES-REGULATORY SIGNS

6-5.01 Purpose

Generally, the only 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 6.4 through 6.10 show typical signing arrangements for the various intersection geometric elements encountered at divided highway intersections.

Figure 6.11 shows typical regulatory and warning signing for right-in and right-out intersection.

Figure 6.12 shows typical regulatory signing for highway intersection with a one-way street or ramp.

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.

6-5.08 ONE WAY Sign (R6-1)

This section clarifies the recommended use and minimum size of ONE WAY signs (R6-1) on Mn/DOT trunk highways.



1. 36" x 12"

This is the standard size for conventional highways. The sign should be installed above 30" x 30" and 36" x 36" STOP signs and either independently or on traffic signal poles or pedestals at signalized intersections.

2. 48" x 18"

The sign should be installed:

- a. Above 36" x 36" STOP signs on all city, township, or county roads and conventional highways intersecting expressways.
- b. Above all 36" x 36" YIELD signs in medians on expressways
- c. On independent sign structures viewed by motorists crossing expressways
- d. Other locations as directed by the district traffic engineer.

**6-5.09 RIGHT LANE MUST TURN RIGHT Sign (R3-7)
LEFT LANE MUST TURN LEFT Sign (R3-7)**

RIGHT/LEFT TURN LANE signs shall be removed through attrition unless otherwise noted.

The RIGHT/LEFT LANE MUST TURN RIGHT/LEFT sign shall be installed in accordance with the following guidelines:



1. Conventional highways
 - a. If the ADT is less than 2500 or the posted speed limit is 40 mph or less, the use of a RIGHT/LEFT LANE MUST TURN RIGHT/LEFT and/or lane-use pavement arrow to identify turn lanes on highways is optional.
 - b. If the ADT is 2500 or greater or the posted speed limit is 45 mph or greater, all turn lanes shall be signed. If any one existing RIGHT/LEFT TURN LANE sign requires replacement, replace all turn lane signs at the intersection with the appropriate RIGHT/LEFT LANE MUST TURN RIGHT/LEFT sign.
2. Interchange exit ramps
 - a. All turn lanes shall be signed unless the turn lane(s) is(are) included on an EXCLUSIVE LANE USE (R3-8) sign(s).
 - b. If an exit ramp has a right turn lane signed with a RIGHT TURN LANE sign and a left turn lane signed with a LEFT TURN LANE sign, and either sign requires replacement before the end of its useful life, replace all turn lane signs on the exit ramp with RIGHT/LEFT LANE MUST TURN RIGHT/LEFT signs or EXCLUSIVE LANE USE signs.
 - c. See Figures 6.17A and 6.17B for typical EXCLUSIVE LANE USE signs on ramps.
3. Expressways
 - a. If the posted speed limit is 40 mph or less, the use of a RIGHT/LEFT LANE MUST TURN RIGHT/LEFT sign to identify turn lanes on highways is optional.
 - b. If the posted speed limit is 45 mph or greater, sign all turn lanes based on the district sign replacement cycle. Adjoining districts should coordinate installing RIGHT/LEFT TURN LANE MUST TURN RIGHT/LEFT signs within the same time frame on those highways that cross district boundaries. If any one RIGHT/LEFT TURN LANE sign requires replacement before the end of its useful life, replace all turn lane signs at the intersection.

6-5.10 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 Minnesota Statute 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.

6-5.11 Speed Zone Signing

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.

6-5.11.01 Speed Limit Sign (R2-1)

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

The first Speed Limit sign in a lower speed zone shall be one size larger than the supplemental lower speed zone signs. Supplemental Speed Limit signs may be installed at intervals approximately equal to 60 seconds of travel time at the posted speed.



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.

6-5.11.02 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 50,000 or more as defined by the Commissioner) the 48" x 96" 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 48" x 96" Minimum Speed Limit sign shall be used. The speed limit shall not exceed 70 mph. A 48" x 60" Speed Limit (R2-1) sign may be used if a traffic investigation determines that a minimum speed limit is not required.

6-5.12 STOP Sign (R1-1)

This section clarifies the recommended use and minimum size of STOP signs on Mn/DOT trunk highways.

**1. Primary location****a. 30" x 30"**

Install on all two-lane, two-way city, township, or county roads intersecting a conventional highway.

b. 36" x 36"

Install at the following locations:

1) Freeway/expressway ramps.

2) Conventional highways.

3) City, township, or county road with more than one through lane of approach to an intersection.

4) All two-lane, two-way county, city or township roads and conventional highways intersecting expressways

2. Additional location (left side)

Install on any road with more than one through lane of approach to an intersection based on a traffic engineering study. Justification may be based on unusual roadway geometrics, sight restrictions, or crash problems. Sign size shall not exceed the size of the STOP sign mounted on the right side of the road.

6-5.13 Two-Way Snowmobile Trail Signing

Signing of Mn/DOT permitted two-way snowmobile trails within trunk highway right-of-way, which will be the responsibility of the Department of Natural Resources, shall be in accordance with the following:



1. The 18" x 24" sign panel shall be black legend and border on white background.
2. The sign panel shall display BEGIN and END plaques (18" x 6") in black legend and border on white background above the two-way sign panel, designating the beginning and end of the two-way trail.
3. A 3" x 3" piece of yellow retroreflective sheeting shall be attached in the lower left corner on the back of the sign panel.
4. The sign post shall be on the FHWA approved listing of breakaway posts to support the sign panel at a mounting height of five feet.
5. The sign shall be installed on the right side of the trail.
6. All sheeting material shall be a minimum of ASTM Type III retroreflective sheeting.

6-6.0 APPLICATION GUIDELINES - WARNING SIGNS

6-6.01 Purpose

The 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)

Acceleration lanes at rural unsignalized intersections shall be signed in accordance with the following (see Figure 6.18):

1. Advance warning sign shall be a LEFT/RIGHT ACCELERATION LANE sign (W6-X1) with a 1000 FEET plaque mounted below the sign.
2. The first warning sign in the acceleration lane shall be an ACCELERATION LANE ENDS sign (W6-X2) with a XX FEET plaque mounted below the sign.
3. The second sign in the acceleration lane shall be the MERGE w/Arrow sign (W20-X3) displaying the word MERGE with the appropriate left or right arrow at proper warning sign spacing distance (see MN MUTCD Table 2C-4) in advance of the beginning of the taper at the end of the lane.



6-6.03 Advance Warning Signs on Local Road Approaches (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 are:

Stop Ahead (W3-1), Yield Ahead (W3-2), and Signal Ahead (W3-3).



1. Maintenance of these advance warning signs on all local road approaches to trunk highway intersections is the responsibility of the road authority.
2. At new intersections, or at intersections where traffic control is revised by Mn/DOT, Mn/DOT will investigate the need for advance warning signs on the local road approaches and furnish and install the appropriate sign. The road authority(s) should be notified in writing of the sign installations. Maintenance of the advance warning signs become the responsibility of the road authority.

6-6.04 Advisory Exit Speed Sign (W13-2)

The Advisory Exit Speed sign advises motorists of the maximum recommended speed on a ramp.

This sign shall be installed if the maximum recommended speed on a ramp, as it exits the mainline roadway is 70 percent or less of the design speed of the mainline roadway. The exit ramp shall be signed with an Advisory Exit Speed sign located along the mainline in accordance with the MN MUTCD, see Section 2C.36.



Examples of how to apply this guideline:

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

These guidelines do not apply where auxiliary lanes are present.

6-6.16 Speed Reduction Sign (W3-5)

The Speed Reduction sign shall be used if the reduction in speed limits between two zones is 15 mph or greater. This sign may be used if the difference between two zones is 10 mph or less, based on engineering judgment.

The Speed Reduction sign shall be 48" X 48".

The Speed Reduction sign shall be installed at least 1000 feet in advance of the first speed limit sign.

The sign may be installed up to 1700 feet in advance of the speed zone if geometrics, grade, or sign clutter may impact the motorist's ability to reduce speed.

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.

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



6-6.17 Truck Hauling Signs

6-6.17.01 Sugar Beet Piling Station Signs

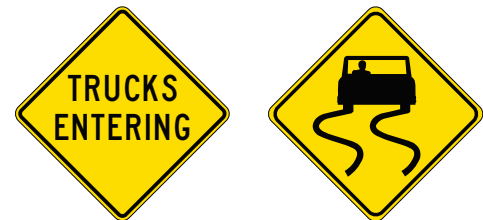
When a site is open to commercial trucks, the TRUCKS ENTERING sign (W11-X3) and the Slippery When Wet sign (W8-5) should be used on each approach to the access.

Both signs shall be: 48" x 48", provided by the requester and delivered to Mn/DOT for installation and maintenance.

If requested, a flasher may be installed above the TRUCKS ENTERING sign under Mn/DOT's permit process.

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

Changeable message signs shall not be used.



6-6.17.02 *Corn and Other Harvest, Gravel Pits, and Logging Operations*

The MN MUTCD Section 2C.40 provides guidance on the use of permanent and seasonal VEHICULAR TRAFFIC signs.

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

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

6-7.0 APPLICATION GUIDELINES - GUIDE SIGNING

6-7.01 Purpose

Generally, the only 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 Mn/DOT is charged with developing and implementing design, use, and application of certain guide signs in accordance with Minnesota Statutes.

Typical signing for expressway intersections is found in Figure 6.24.

The following typical layouts show the signing for freeway/expressway interchanges:

1. Diamond interchange on crossroad (Figures 6.25 and 6.26).
2. Folded diamond interchange on crossroad (Figure 6.27).
3. Cloverleaf interchange on crossroad (Figure 6.28).

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 interstate highways. Criteria for selecting destinations may be found in Section 6-7.03 (destination signs).

Urban and suburban exits intersecting with local street and road systems, shown on available area maps, shall be identified by route number, street name, and exit number if the interchange is on an interstate highway.

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 (e.g. I 94 at I 494/I 694) or with a single exit splitting to serve both movements to the crossroad (e.g. I-494 at I-35E).

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.

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 (see Section 6-7.03 for city criteria).
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 (see Section 6-7.09.06).
7. Educational Institutions (see Section 6-7.09.08).
8. Major traffic generators (see Section 6-7.07.07).
9. General motorist services (see Section 6-7.09.03).
10. LOGO sign franchise program (see Section 6-7.09.09).

6-7.02.03 Auxiliary Lane Signing

This section outlines uniform signing standards for auxiliary lanes on freeways, with and without escape lanes.

The following layouts should be used in the appropriate situation.

1. Auxiliary lane less than 1/2 mile in length, without escape lane (See Figure 6.29A).
2. Auxiliary lane less than 1/2 mile in length, with escape lane (See Figure 6.29B).
3. Auxiliary lane 1/2 mile in length or greater, without escape lane (See Figure 6.29C).
4. Auxiliary lane 1/2 mile in length or greater, with escape lane (See Figure 6.29D).

6-7.03 Signing Destinations

Mn/DOT shall fabricate, install, and maintain destination and distance signs on trunk highways.

In general, Mn/DOT shall pay for the maintenance of signs. 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 Mn/DOT's expense.



1. Signing Destinations - At-grade intersections

MN MUTCD Sections 2D.34 and 2D.35 establish guidelines for destination signs at at-grade intersections.

The following criteria also apply:

- 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 a 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.

2. Signing Destinations - Freeways and interchanges on expressways.

MN MUTCD, Section 2E.12 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 Mn/DOT at no cost to the city(ies).

b. Urban-Suburban

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.

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.

6. Nationally Coordinated Trails

Examples include Prairie Passage and King of Trails.

Some designated roadways in Minnesota are part of a larger, national initiative. One example is Prairie Passage, which is a single route through the western part of Minnesota. It is part of a national Prairie Passage route that extends from Canada to Mexico through the central part of the nation. It was identified and signed in 2002. Its purpose is similar to the wildflower routes but involves a greater degree of local involvement in the identification of the route and the projects along the route.



Signing for Nationally Coordinated Trails will be negotiated with Mn/DOT OTSO on a case by case basis. In the case of Prairie Passage, initial signing was funded through a Federal Highway Administration project.

7. National Forest Scenic Byways

The National Forest Service began designating Scenic Byways in National Forests in the 1980's, prior to the state and national Scenic Byways programs. In Minnesota, all of these byways have also been designated as State Scenic Byways.

While these byways are designated State Scenic Byways, the signing policy for Scenic Byways will be followed. Should they lose their designation by the Minnesota Scenic Byway Commission, sign maintenance and replacement will be funded by the National Forest Service in accordance with signing policy for memorial routes.

8. Wildflower Routes

Wildflower routes were established in 1990. They were designated to identify and protect existing native vegetation along Minnesota roadsides, restore native wildflowers and grasses, and increase public awareness of the value of native plants. There have been no new designations since 1990.



Signs were fabricated and installed by Mn/DOT when the routes were designated.

6-7.09 Supplemental Guide Signing Programs

The MN MUTCD, Minnesota statutes, and Mn/DOT policy allow supplemental guide signs to be installed on trunk highways for a variety of public and private facilities.

6-7.09.01 Signing Programs

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

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

Qualified facilities shall pay for signs under the following signing programs:

- | | |
|--|------------------------------|
| 1. Airports | 8. National Parks |
| 2. Casinos | 9. Regional Shopping Centers |
| 3. Educational Institutions (post-secondary) | 10. Specific Services |
| 4. LOGO Signing Program | 11. State Parks |
| 5. Major Traffic Generators | 12. Tourist Information |
| 6. Minor Traffic Generators | 13. Trail Access |
| 7. National Monuments | |

6-7.09.03 General Motorist Services Signing Program (E10-1)

General Motorist Services signs may be provided for all of the following:

1. Gas, Diesel, and/or alternative fuels (LP Gas, E85) - The business shall meet all of the following criteria:

- a. Provide vehicle services including fuel and oil.
- b. Provide restroom facilities and drinking water.
- c. Provide continuous staffed operation for at least 12 hours a day, seven days a week.
- d. Provide public access to a telephone.
- e. Be located within two miles of the interchange.

2. Food - The business shall meet all of the following criteria:

- a. Serve three meals each day, seven days a week.
- b. Be licensed by the State and/or the appropriate political subdivision.
- c. Be located within two miles of the interchange.

3. Lodging - The business shall meet all of the following criteria:

- a. Provide lodging 24 hours a day throughout the year.
- b. Be licensed by the State and/or the appropriate political subdivision.
- c. Be located within ten miles of the interchange.

4. Camping - The business shall meet all of the following criteria:

- a. Have a State Department of Health license as required by Minnesota Statute (Chapter 327.15),
- b. Provide at least 20 spaces available for camping and parking.
- c. Provide modern sanitary facilities (flush, chemical, or incinerator toilets).
- d. Provide services 24 hours a day, seven days a week.
- e. 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.

5. Hospitals (See Section 6-7.09.04)

In addition to the general criteria for all signing programs, the following criteria apply for the General Motorist Services Signing Program:

1. General Motorist Services signs may be installed at rural freeway and expressway interchanges.
2. The costs of fabrication, installation, and maintenance of these signs shall be paid by Mn/DOT.

**6-7.09.04 Hospital Signing Program (D9-2a, D9-2b, E10-1, E10-3, E10-4, and E10-8)**

In addition to general criteria for all signing programs, all of the following criteria apply for the HOSPITAL signing program:

1. HOSPITAL signs may be installed on all trunk highways. The hospital requesting signing shall meet all of the following criteria:

- a. Accept all emergency cases, without discrimination for any reason (including ability to pay).
- b. Be readily accessible from the nearest intersection or interchange (normally within a ten mile radius).
- c. Provide 24-hour emergency medical care with a physician on the premises (metropolitan area) or on-call (rural areas).



3. The cost of fabrication, installation, and maintenance of the signs shall be paid by Mn/DOT.
4. One guide sign from each direction in advance of a private road or entrance is allowed when the following conditions exist:
 - a. The main access from the trunk highway is via a private road or entrance.
 - b. The resort or campground is located near, but not visible from, the trunk highway.
 - c. The sign located on private property cannot be effectively seen by approaching drivers because of the width of the highway right of way and/or growth of vegetation.
5. Where the access to resorts or private campgrounds is via county, township, or other public road and the road is identified with a road name or destination sign, the sign panel or panels may be combined with the in place sign. Minimum height to the bottom of the lowest sign panel shall be seven feet.
6. Businesses signed under this signing program shall not be signed under the Specific Service signing program. Normally, these signs are installed where SPECIFIC SERVICE signs are not erected at intersections.
7. Resorts shall have a State Department of Health license as required by MS 157.16. A resort is defined in MS 157.15, subd. 11.
8. Private campgrounds shall have a State Department of Health license as required by MS 327.15, modern sanitary facilities (flush, chemical, or incinerator toilets), and no restrictions on type of camping (Tent, RV, Trailer, etc.).

6-7.09.06 Airport Signing Program (D1-X4, I-5)

In addition to the general criteria for all signing programs, all of the following criteria apply to the Airport Signing Program.

1. Airport signs may be installed on all trunk highways. Private airports requiring owner's permission to use shall not be eligible for signing.
2. The airport shall be located within 15 miles of the trunk highway intersection or interchange.
3. Signing from one trunk highway onto a second trunk highway may be allowed if the airport is located within: ten miles for an Air Carrier/Commercial Service airport and 7.5 miles for a General Aviation airport.
4. These guidelines may also be applied to heliports.



Airport signs should be installed in accordance with the following:

1. Individual airport names may be used on signing, as necessary, to ensure adequate identification for motorists.
2. The AIRPORT (D1-X4) sign with arrow will be adequate for most intersections at which airport signing is permitted.
3. At interchanges, the E10-3 sign design (with the word AIRPORT or proper name replacing the word HOSPITAL) shall be installed on the mainline. The D1-X4 sign, or a custom guide sign if proper name is used, shall be installed on ramp(s). The message on the ramp sign shall match the message on the mainline sign.
4. Trailblazing signing on local roads, when needed, shall utilize the Airplane Symbol sign (I-5) with appropriate arrow.

6-7.09.08 Educational Institution Signing Program (Post-Secondary Schools)

In addition to the general criteria for all signing programs, all of the following criteria apply to the Educational Institution Signing Program.



1. Educational Institution signs may be installed on all trunk highways. In order to be considered for signing, all of the following criteria must be met by the educational institution requesting signing:
 - a. 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 four-year colleges, private two-year colleges, private professional schools, private vocational schools and technical colleges.
 - b. 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.
 - c. Schools shall be located within five miles (urban area) or ten miles (rural area) of the intersection or interchange.
2. In rural districts, schools which front directly on trunk highways may be allowed signs to assist the motorist in making proper entrance turns.
3. In the Metro District, 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.

Educational Institution signs should be installed in accordance with the following:

1. The sign shall have a white legend and border on a green background.
2. Signs on freeways shall have the institution name on the top line and EXIT XXX. on the bottom line if the exit is numbered, otherwise the bottom line shall read NEXT (or SECOND) RIGHT.
3. Signs on freeway ramps shall display the institution name and appropriate arrow, without extraneous legend.
4. Distances to schools located two miles or more from the trunk highway intersection or interchange shall be shown on the ramp or intersection sign.

6-7.09.09 LOGO Sign Franchise Program

Logo signs are permitted on interstate highways and urban controlled access trunk highways (freeways) as specified in the Logo Sign Franchise Program Agreement 90212-P.

The MN MUTCD, Part 2F covers standards and guidelines on the use of logo signing. Minnesota Statute 160.80, the Logo Sign Franchise Program, authorizes Mn/DOT to establish this program for the purpose of providing specific information on gas, food, lodging, and camping for the benefit of the motoring public on the the right-of-way of interstate and certain other controlled-access trunk highways.



This program is currently operated by Minnesota Logos, Inc. under an agreement with Mn/DOT. Businesses interested in this program shall contact Minnesota Logos, Inc.

Existing Mn/DOT installed GENERAL MOTORIST SERVICE signs should remain in place at each interchange if all businesses are not accommodated in the Logo Sign Franchise Program. The State Signing Engineer, OTSO, in conjunction with district traffic offices shall review and approve all proposed logo installation locations to verify that Logo signs will not have a negative impact on other required signing and that proper sign spacing is maintained.

6-7.09.10 Major Traffic Generator Signing Program

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.



In addition to the general criteria for all signing programs, the following criteria apply for the Major Traffic Generator Signing Program.

1. 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:

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

2. Major Traffic Generator signs should be installed in accordance with all of the following:

- a. The sign shall have a white legend and border on a green or brown background in accordance with the MN MUTCD.
- b. 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.

3. 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.

4. In the Metro District, the names of major traffic generators may be displayed on Mn/DOT permanent changeable message signs (CMS) located on freeways approaching the downtown areas in accordance with all of the following criteria:

- a. The facility shall have public/private parking for at least of 1000 vehicles within 2000 feet of the facility.
- b. Event frequency and attendance shall be:
 - 1) A minimum of ten events per year with an attendance of at least 5000 persons within a two hour period/event.
 - 2) One day event per year with an attendance of at least 20,000 persons per event.
 - 3) One recurring event, two to seven days in length, per year with a total minimum attendance of 50,000 persons.
- c. Located not more than two miles from the interchange on the freeway where the permanent CMS is located.
- d. Only the facility name(s) shall be displayed on a permanent CMS which is located on a freeway.
- e. The display of a unique event by name (e.g. Winter Carnival, Aquatennial) may be approved on a case by case basis by the district traffic engineer and the RTMC.
- f. If a facility is having an event either concurrent with or overlapping an event with another facility, the duration of the display of each facility name and action message on a permanent CMS will be two seconds. This is based on the total reading time, including the change time between message displays, at vehicle operating speeds on metro area freeways.

6-7.09.12 Regional Shopping Center Signing Program

In addition to the general criteria for all signing programs, the following criteria apply for the Regional Shopping Center Signing Program. Regional Shopping Center signs may be installed on all trunk trunk highways. In order to be considered for signing, all of the following criteria shall be met by the regional shopping center requesting signing:

1. At least 600,000 square feet of retail floor space, all under one roof, available for lease.
2. At least two major department stores owned by a national or regional chain organization.
3. Located within two miles of the trunk highway intersection or interchange.
4. Located outside of the downtown or central business district, except in the Metro District.

**6-7.09.13 Specific Service Signing Program (D9-X6)**

The Specific Service Signing Program was mandated by the 1980 Legislature under Minnesota Statutes 160.292 to 160.297.

See these statutes for complete legislative intent.

- 1981 - permitted the inclusion of motels
- 1984 - permitted the inclusion of restaurants
- 1988 - added rural agricultural businesses and places of worship
- 1989 - added tourist-oriented businesses
- 1996 - added gasoline service station or other retail motor fuel business and optional business panel (logo)

Only Specific Service signs shall be installed on Specific Service sign assemblies.

Definitions:

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



The ESVC is composed of persons outside of Mn/DOT who meet periodically to consider various requests for signing. The chair is a Mn/DOT employee who serves in a non-voting capacity to organize and schedule all functions of the ESVC. This individual serves as secretary and records decisions on sign variance requests. The chair represents the ESVC, not Mn/DOT, on all matters pertaining to the ESVC.

The procedures for this Committee are as follows:

1. A requester who has been denied signing by the district office and is interested in appealing the decision must request a hearing by the ESVC. The requester should contact the chair of the ESVC directly, and will then be advised of procedures and meeting date. The ESVC hears the requester's appeal and Mn/DOT's presentation separately.

The recommendations of the ESVC will be based on pertinent factors, and will always consider the degree of financial hardship to the requester and safety implications.

2. For each signing request, the recommendations made by the ESVC and the state traffic engineer are forwarded to the Commissioner's Office for review. Presentations on each request are made to a special committee (Internal Sign Variance Committee) appointed by the Commissioner for final concurrence or denial. The requester and the district involved will be notified by the chair of the ESVC of the decision made by the Commissioner.

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 and Security. Mn/DOT 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 eighteen (18) characters per line to maximize legibility. Each space between words and each type of punctuation takes up a character on a line.



Adopt-A-Highway signs are not allowed on Metro District freeways. If a section of freeway is approved for litter removal, a 42" x 24" sign shall be installed on the freeway entrance ramp.

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 new 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.

6-8.06.02. *Signing Method*

1. Sites having only geological markers:
 - a. Install advance sign D7-X1, GEOLOGICAL MARKER ½ MILE on RIGHT/LEFT.
 - b. Install sign D7-X2, GEOLOGICAL MARKER with arrow at the entrance road or turnoff.
2. Sites located in other facilities (as listed above):
 - a. Install sign D5-X1C beneath the in place advance sign.
 - b. If there is no advance sign in place for the facility, install sign D5-X1C beneath the directional sign.
3. Signs shall have a white legend and border on brown background.
4. Sign fabrication, installation, and maintenance costs will be paid by Mn/DOT.

6-8.07 Reference Location Sign (D10-1, D10-2, and D10-3)

Reference Location signs, formally 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 maintenance. The zero mile point should begin at the south or west state line, and at the south or west junctions where routes begin. When a Reference location sign cannot be erected in its correct location, it may be moved up to 50 feet in either direction. 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 2D.45 and in Chapter 13 of the Traffic Engineering Manual, Chapter 13.

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

Mn/DOT installed One Tenth Mile markers on the interstate highway system to further enhance the usefulness of the Reference Location Sign System. Fabrication details are specified in Chapter 7.

6-8.08 Rest Area signing

Signing for Rest Areas may be found in the MN MUTCD.

6-8.08.01 *Bus Parking in Rest Areas*

Signing within rest areas provides guidance to separate parking locations for autos and for trucks and trailers.

When the need arises to sign for bus parking in a particular rest area, the following signing and pavement message guidelines are recommended:

1. Fabricate and install a plaque reading Buses above the "Trucks/Trailers", "Autos" or "Trailers/Autos" sign located at the roadway split to the parking areas until such time that the existing sign panels are to be replaced. When the existing sign panels are due to be replaced, add the word "Buses" to the legend of the sign panel.

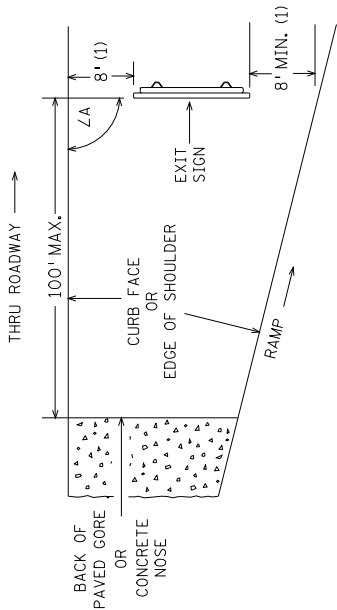
NOTE: The buses should be directed to that parking area which not only has the availability and storage capacity for parking, but also provides adequate year round access to the rest area facilities.
2. To designate the specific bus parking locations, either install pavement markings in the designated parking stalls or fabricate and install a sign reading BUS PARKING ONLY sign along side the designated parking stall(s).

DATE

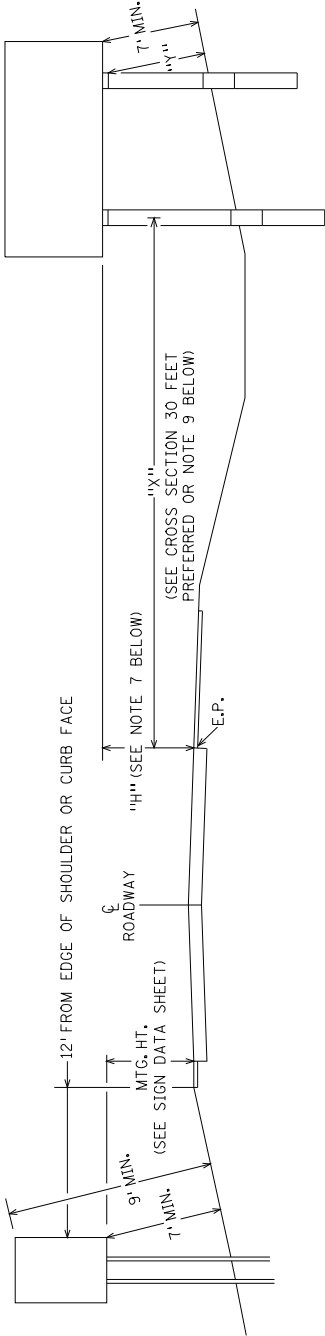
SIGN PLACEMENT

FIGURE 6.1

GORE PLACEMENT

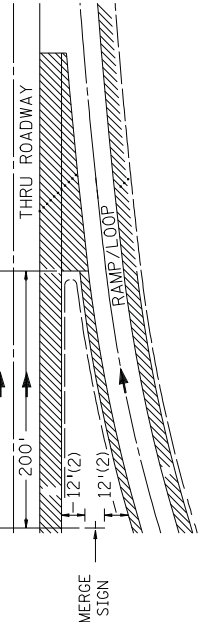


ROADSIDE PLACEMENT



ROUTE MARKER, REGULATORY & WARNING SIGNS - TYPE C
MINOR GUIDE SIGNS - TYPE D

MAJOR 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 OTSO SIGNING UNIT.
- (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 OTSO SIGNING UNIT.

NOTES:

1. IF A SECONDARY SIGN IS MOUNTED BELOW A MAJOR SIGN, THE MAJOR SIGN SHALL BE AT LEAST 8' ABOVE THE PAVEMENT EDGE AND THE SECONDARY SIGN AT LEAST 5'.
2. ALL ROUTE MARKERS, WARNING AND REGULATORY SIGNS SHALL BE AT LEAST 7' ABOVE PAVEMENT EDGE.
3. SIGN FACES SHALL BE VERTICAL.
4. OVERHEAD SIGNS SHALL BE POSITIONED AT RIGHT ANGLES TO THE THRU ROADWAY UNLESS OTHERWISE NOTED.
5. TO AVOID SPECULAR GLARE, A SHALL BE APPROXIMATELY 93° FOR SIGNS LOCATED LESS THAN 30' FROM THE EDGE OF PAVEMENT AND APPROXIMATELY 92° FOR SIGNS LOCATED 30' OR MORE FROM EDGE OF PAVEMENT. THIS APPLIES TO SIGNS TYPE A, C, & D AND INCLUDES SIGNS IN THE GORE.
6. "Y" IS THE PERPENDICULAR DISTANCE FROM THE GROUND LINE TO THE FRICTION FUSE ON THE POST. THIS DISTANCE SHALL BE AT LEAST 7'.
7. WHERE "X" IS LESS THAN 30', "H" SHALL BE 7'±6". WHERE "X" IS 30' OR GREATER, MINIMUM AND PREFERRED "H" IS 5'.
8. LATERAL CLEARANCES GIVEN APPLY TO RIGHT AND OR LEFT SIDE INSTALLATION.
9. WHEN A TYPE A SIGN IS INSTALLED DIRECTLY BEHIND TRAFFIC BARRIER, THE LEFT EDGE OF THE SIGN PANEL SHALL BE LOCATED A MINIMUM OF 4 FEET BEHIND THE FACE OF THE TRAFFIC BARRIER.

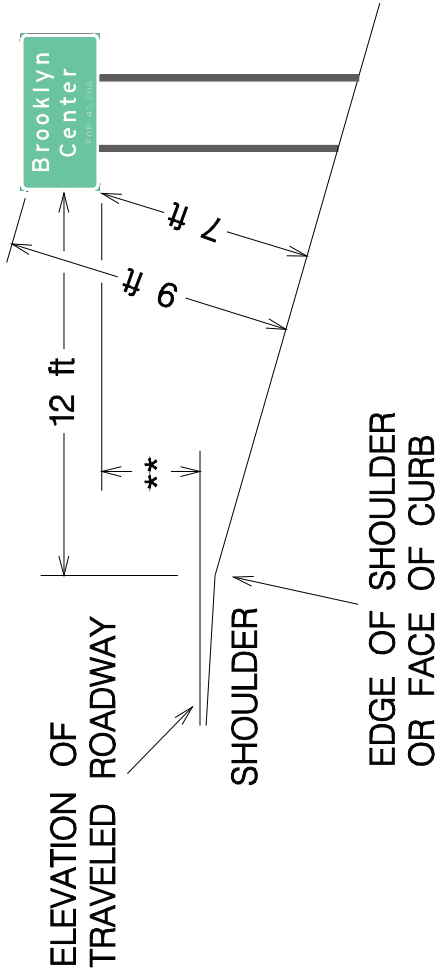
DATE

SIGN PLACEMENT

FIGURE
6.2

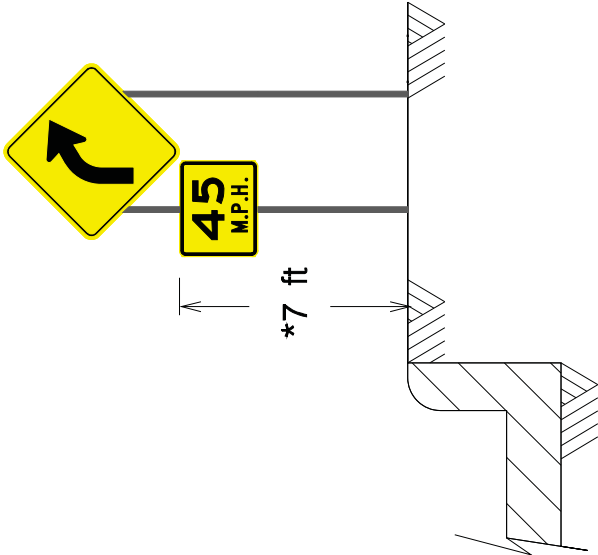
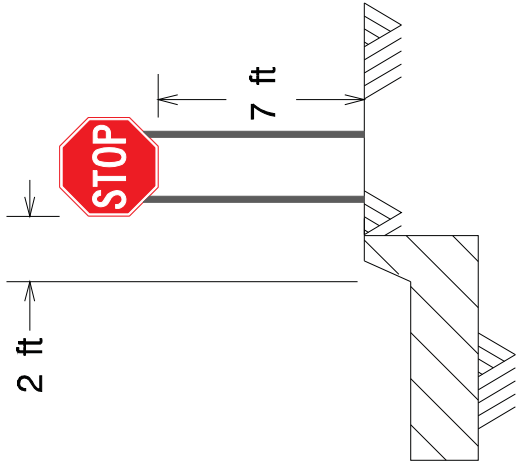
RURAL

TYPICAL SPEEDS
45 MPH AND ABOVE



URBAN

TYPICAL SPEEDS
BELOW 45 MPH

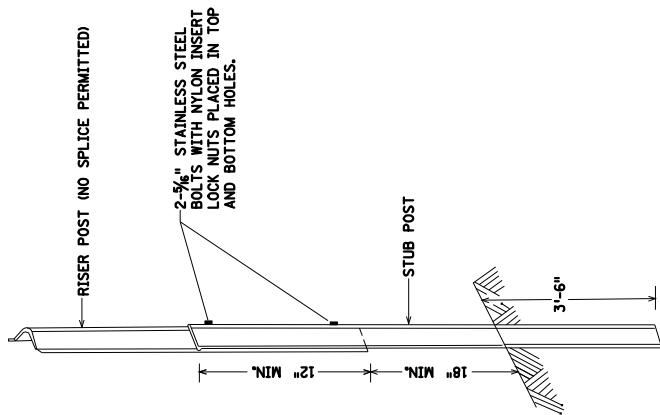
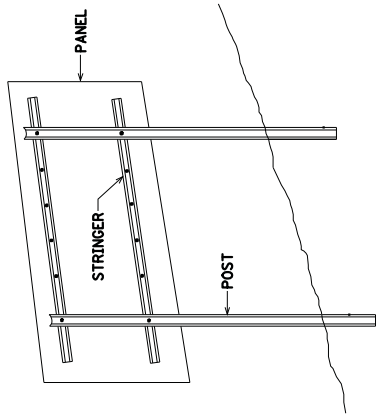
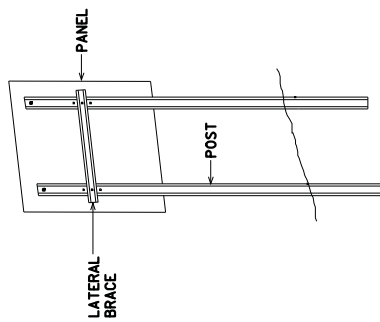
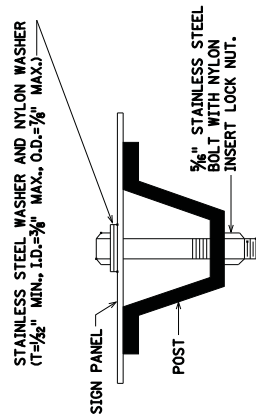


NOTE: All dimensions are minimums.

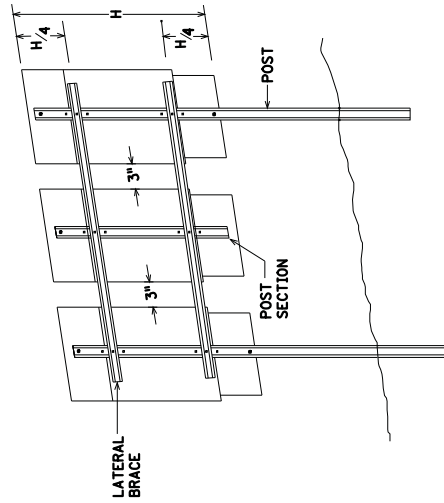
* A secondary sign (e.g. advisory speed) mounted on a single post of a multipost structure does not affect the mounting height of the primary sign.

** 5 Feet Conventional road, 7 Feet Expressway or Freeway.

TYPE C & D POST

U POST SPLICE

- NOTES:
1. USE 3" STUB POSTS, RISER POSTS, STRINGERS, KNEE BRACES, LATERAL BRACES AND KNEE BRACE STUB POSTS. ALL SHALL CONFORM TO MN/DOT 3401.
 2. FOR TYPE D SIGN POSTS LENGTHS AND SPACINGS, SEE SIGN DATA SHEET.
 3. 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 STANDARD SIGNS MANUAL).
 4. MOUNTING (PUNCH CODE) FOR TYPE C SIGN PANELS SHALL BE AS INDICATED IN THE STANDARD SIGNS MANUAL UNLESS OTHERWISE SPECIFIED.
 5. ALL RISER (VERTICAL) POSTS SHALL BE SPLICED. DRIVEN STUB POSTS SHALL BE AT LEAST 7' LONG.
 6. USE STAINLESS STEEL $\frac{5}{8}$ " BOLTS, WASHERS AND NYLON INSERT LOCK NUTS AS SHOWN FOR ALL GROUND MOUNTED AND OVERHEAD MOUNTED SIGNS.
 7. STAINLESS STEEL WASHER WITH SAME DIMENSIONS SHALL BE PROVIDED BETWEEN ALL NYLON WASHERS AND BOLT HEADS.
 8. BRACING STUBS SHALL BE NO MORE THAN 4" ABOVE GROUND AND EMBEDDED AT LEAST $3\frac{1}{2}$ ".
 9. A-FRAME BRACKET SHALL BE STEEL CONFORMING TO MN/DOT 3306 AND GALVANIZED IN ACCORDANCE WITH MN/DOT 3394.
 10. COLLARS SHALL BE USED TO SHIM OVERLAYS AND DEMOUNTABLE LEGEND AWAY FROM PANEL WHERE INTERFERENCE WITH BOLT HEADS IS ENCOUNTERED. MN/DOT 3352.2A5.
 11. 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.
 12. 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.
 13. WHERE 3 OR MORE TYPE C SIGNS ARE INSTALLED SIDE BY SIDE, THEY SHALL BE REINFORCED LATERALLY BY AT LEAST 2 BRACES, BOLTED AT EACH POST AND POST SECTION AND LOCATED APPROXIMATELY AT THE QUARTER POINTS AS SHOWN IN MODIFIED TYPE C INSTALLATION.

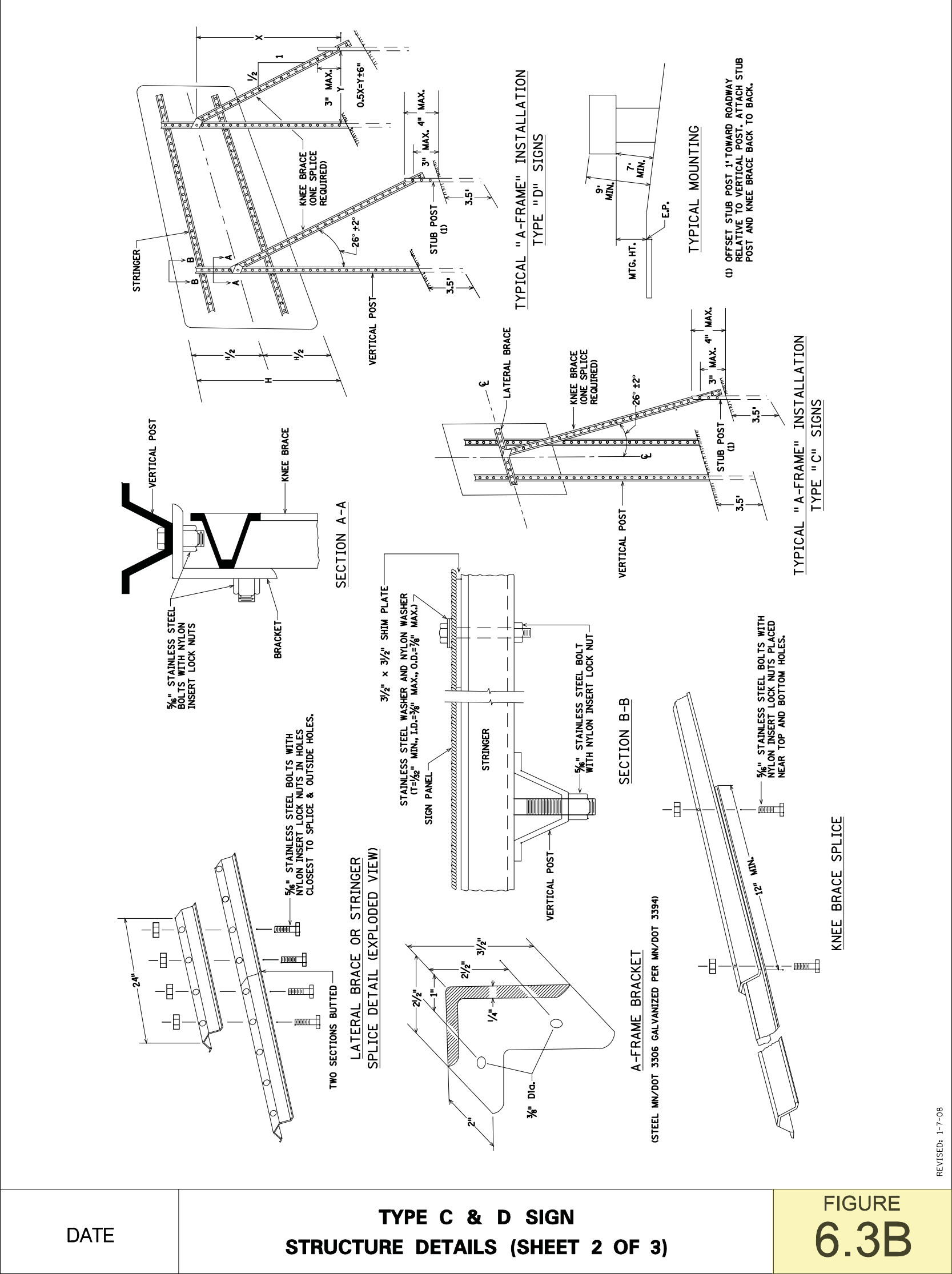


MODIFIED TYPE C INSTALLATION

TYPE C & D SIGN
STRUCTURE DETAILS (SHEET 1 OF 3)

DATE _____

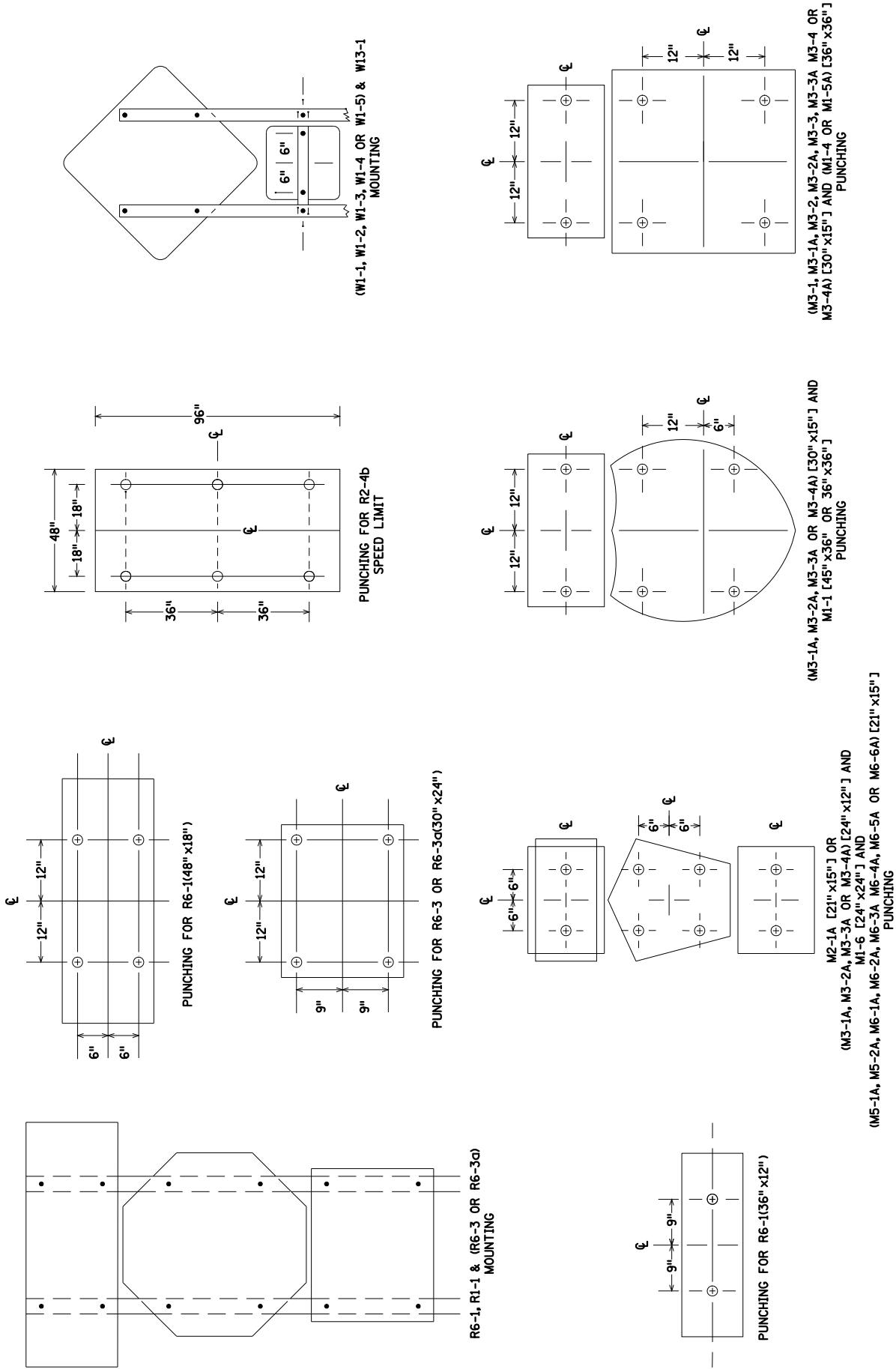
FIGURE
6.3A



DATE

TYPE C & D SIGN
STRUCTURE DETAILS (SHEET 3 OF 3)

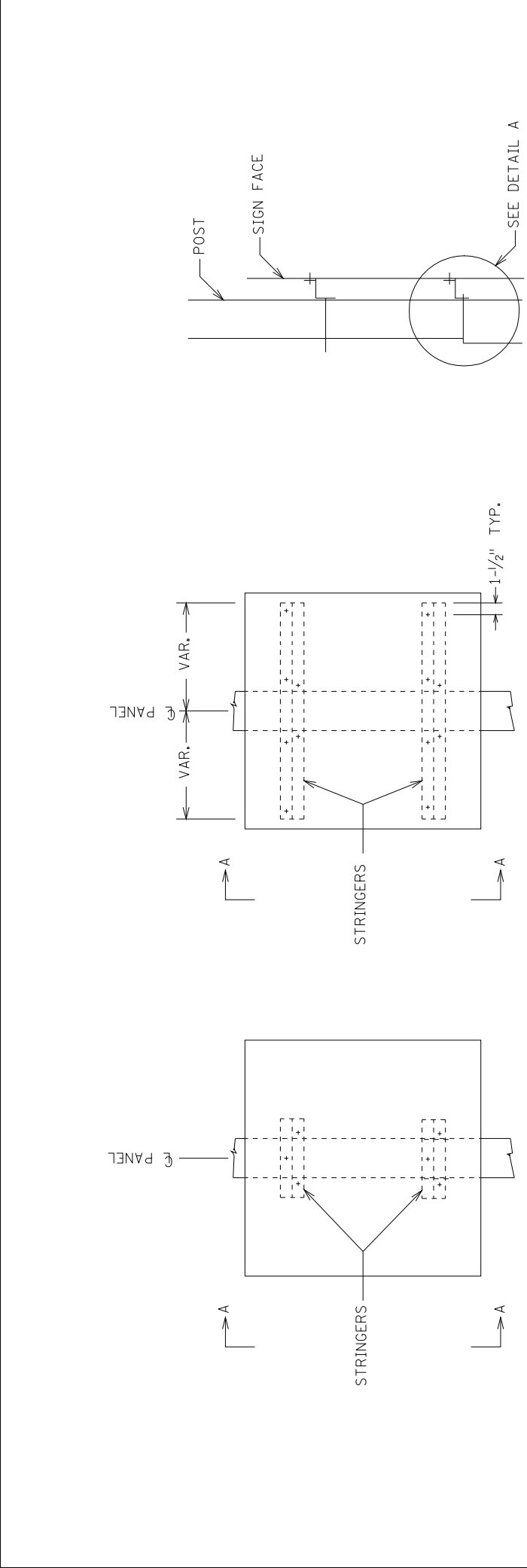
FIGURE
6.3C



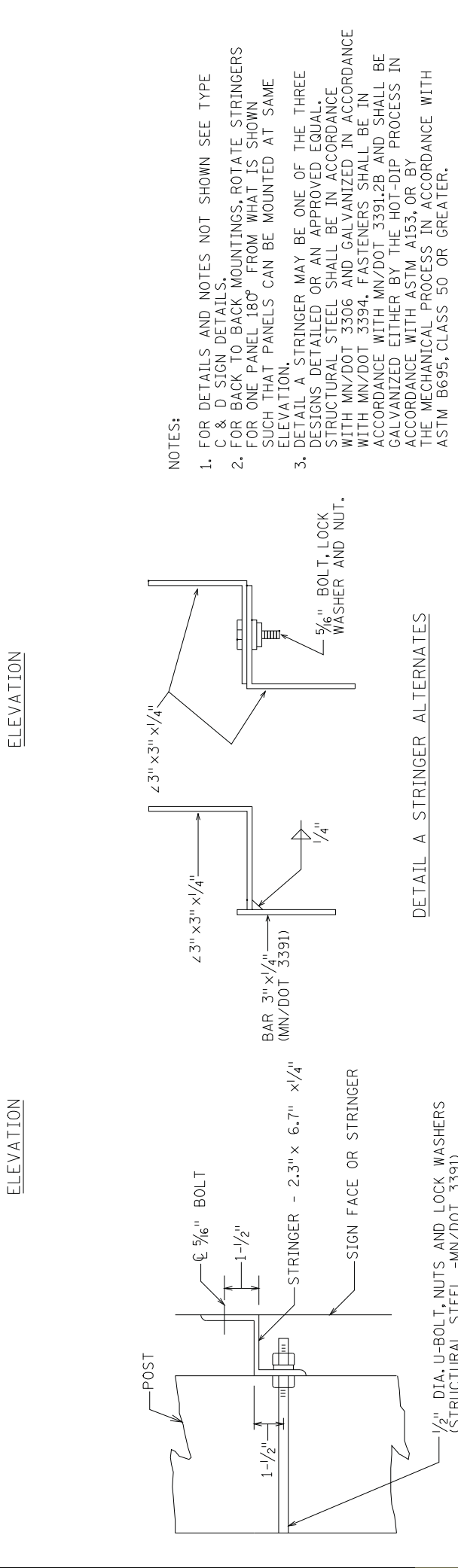
DATE

**TYPE C SIGNS MOUNTED ON O-POSTS,
OH SIGN POSTS OR SIGNAL STANDARDS**

FIGURE
6.3D



TYPE "C" SIGNS WITH SINGLE POST PUNCHING

ELEVATION

1/2" DIA. U-BOLT, NUTS AND LOCK WASHERS
(STRUCTURAL STEEL -MN/DOT 339I)

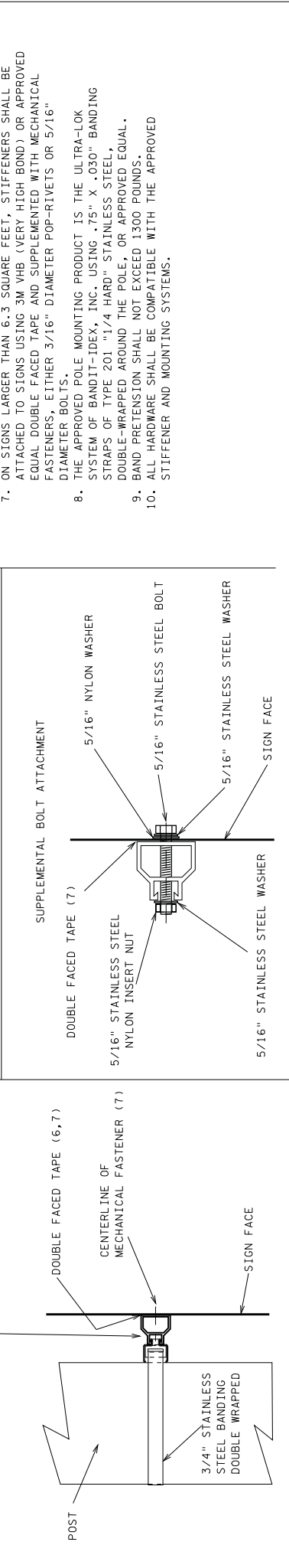
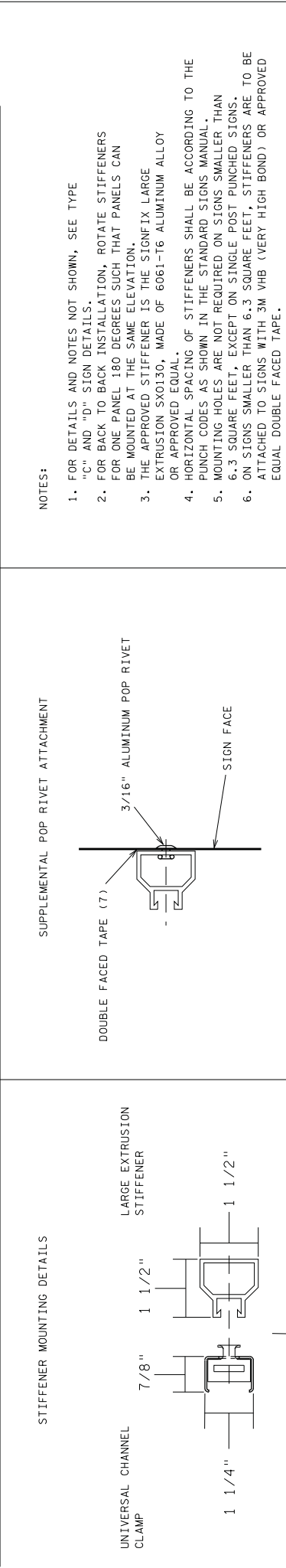
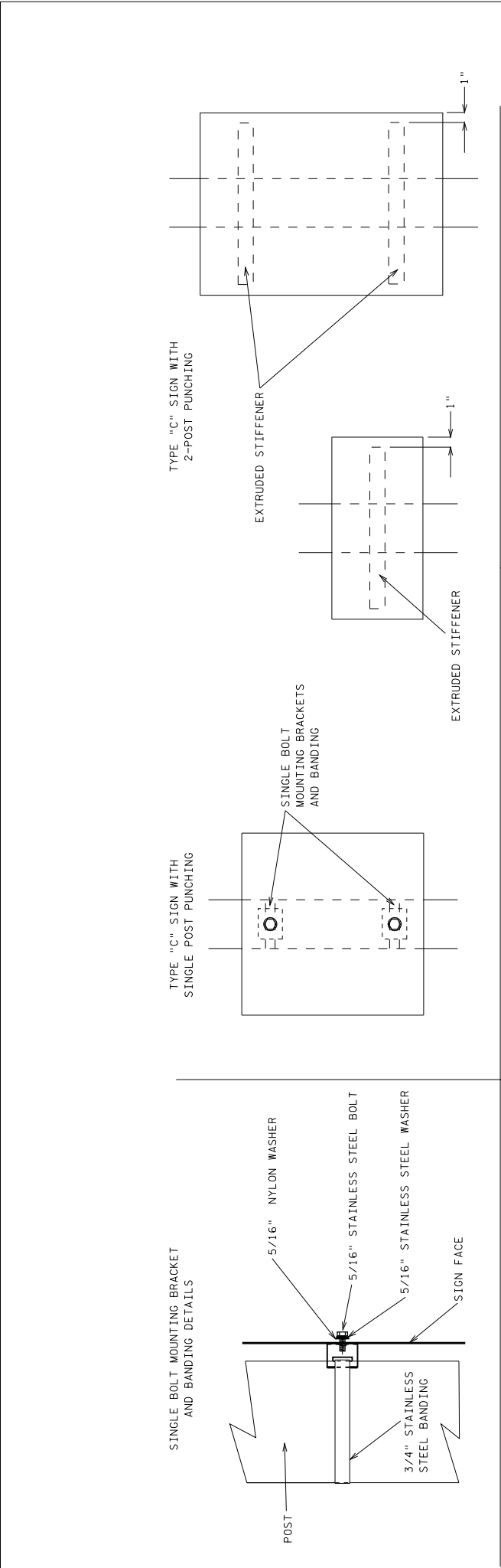
- NOTES:

Revised 3-13-00

DATE

ALTERNATE TYPE C & D MOUNTING SYSTEM

FIGURE 6.3E



NOTES:

1. FOR DETAILS AND NOTES NOT SHOWN, SEE TYPE "C" AND "D" SIGN DETAILS.
2. FOR BACK TO BACK INSTALLATION, ROTATE STIFFENERS FOR ONE PANEL 180 DEGREES SUCH THAT PANELS CAN BE MOUNTED AT THE SAME ELEVATION.
3. THE APPROVED STIFFENER IS THE SIGNIX LARGE EXTRUSION SX0130, MADE OF 6061-T6 ALUMINUM ALLOY OR APPROVED EQUAL.
4. HORIZONTAL SPACING OF STIFFENERS SHALL BE ACCORDING TO THE PUNCH CODES AS SHOWN IN THE STANDARD SIGNS MANUAL.
5. MOUNTING HOLES ARE NOT REQUIRED ON SIGNS SMALLER THAN 6.3 SQUARE FEET, EXCEPT ON SINGLE POST PUNCHED SIGNS.
6. ON SIGNS SMALLER THAN 6.3 SQUARE FEET, STIFFENERS ARE TO BE ATTACHED TO SIGNS WITH 3M VHB (VERY HIGH BOND) OR APPROVED EQUAL DOUBLE FACED TAPE.
7. ON SIGNS LARGER THAN 6.3 SQUARE FEET, STIFFENERS SHALL BE ATTACHED TO SIGNS USING 3M VHB (VERY HIGH BOND) OR APPROVED EQUAL DOUBLE FACED TAPE AND SUPPLEMENTED WITH MECHANICAL FASTENERS, EITHER 3/16" DIAMETER POP-RIVETS OR 5/16" DIAMETER BOLTS.
8. THE APPROVED POLE MOUNTING PRODUCT IS THE ULTRA-LOK SYSTEM OF BANDIT-INDEX, INC. USING .75" X .030" BANDING STRAPS OF TYPE 201 "1/4 HARD" STAINLESS STEEL, DOUBLE-WRAPPED AROUND THE POLE, OR APPROVED EQUAL.
9. BAND PRETENSION SHALL NOT EXCEED 1300 POUNDS.
10. ALL HARDWARE SHALL BE COMPATIBLE WITH THE APPROVED STIFFENER AND MOUNTING SYSTEMS.

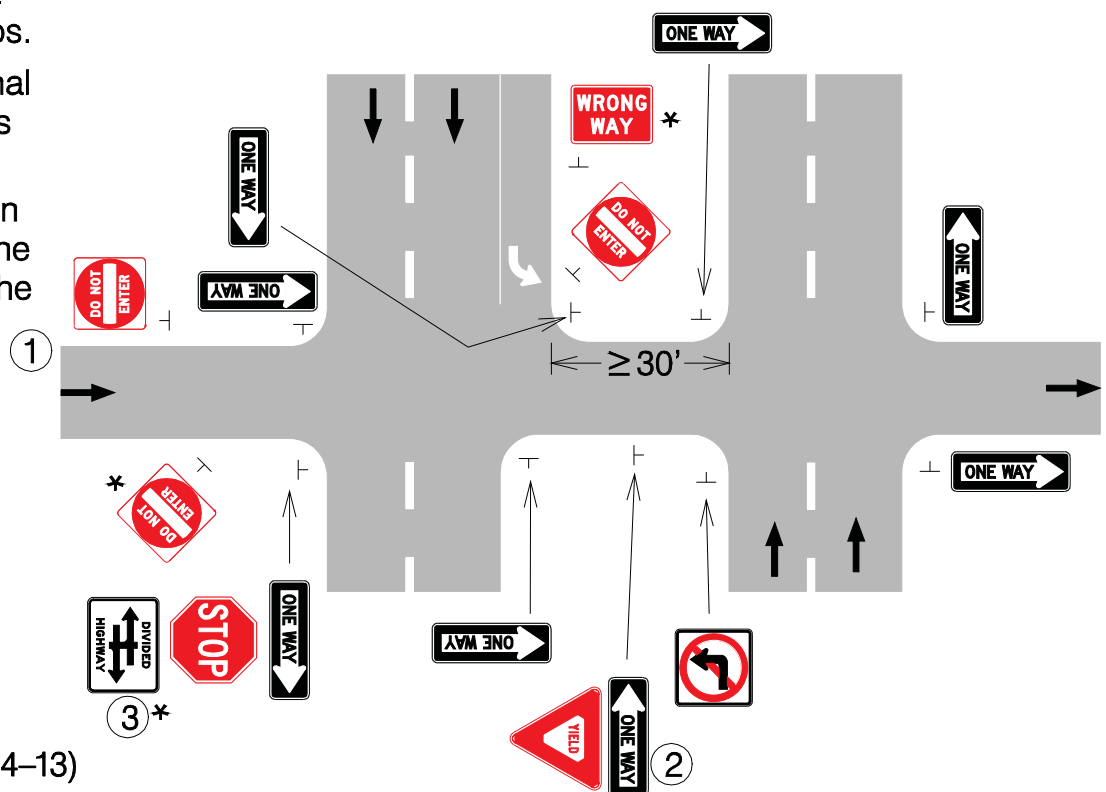


- ① See FIGURES 6.11 and 6.12 for regulatory signs on ramps.
- ② See FIGURE 6.7B for optional location for ONE WAY signs above YIELD signs.
- ③ The DIVIDED HIGHWAY sign should not be used when the roadway is divided only at the junction.

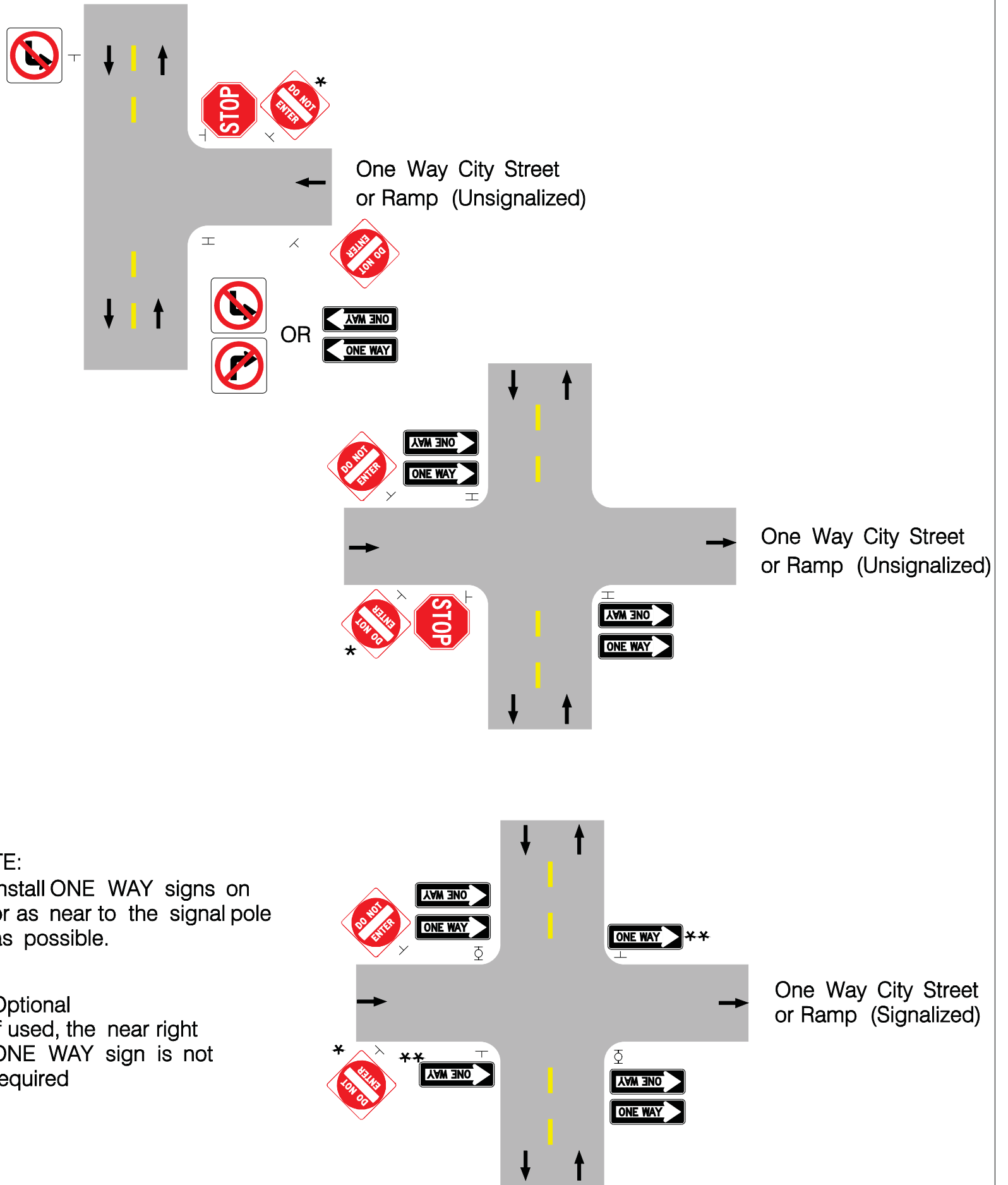
1. See Chapter 7 for application of markings.

	Hazard Marker (X4-2)
	Alignment Delineator (X4-7)
	Cylinder Style Delineator (X4-13)

MEDIAN 30 FT. OR GREATER



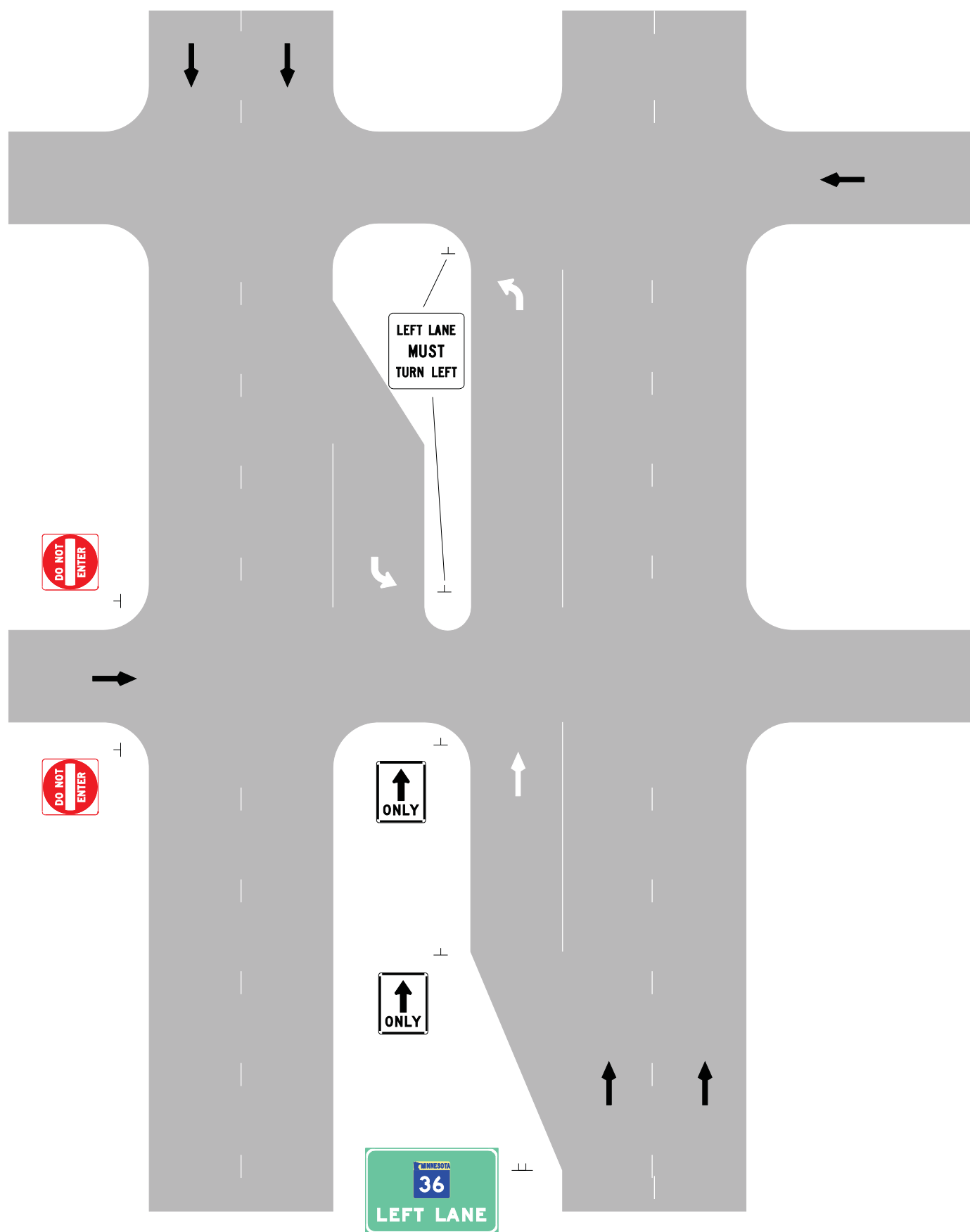
DATE	REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTIONS WITH A ONE-WAY STREET/RAMP	FIGURE 6.9
------	--	----------------------



DATE

HIGHWAY INTERSECTION WITH ONE-WAY STREET/RAMP

FIGURE
6.12

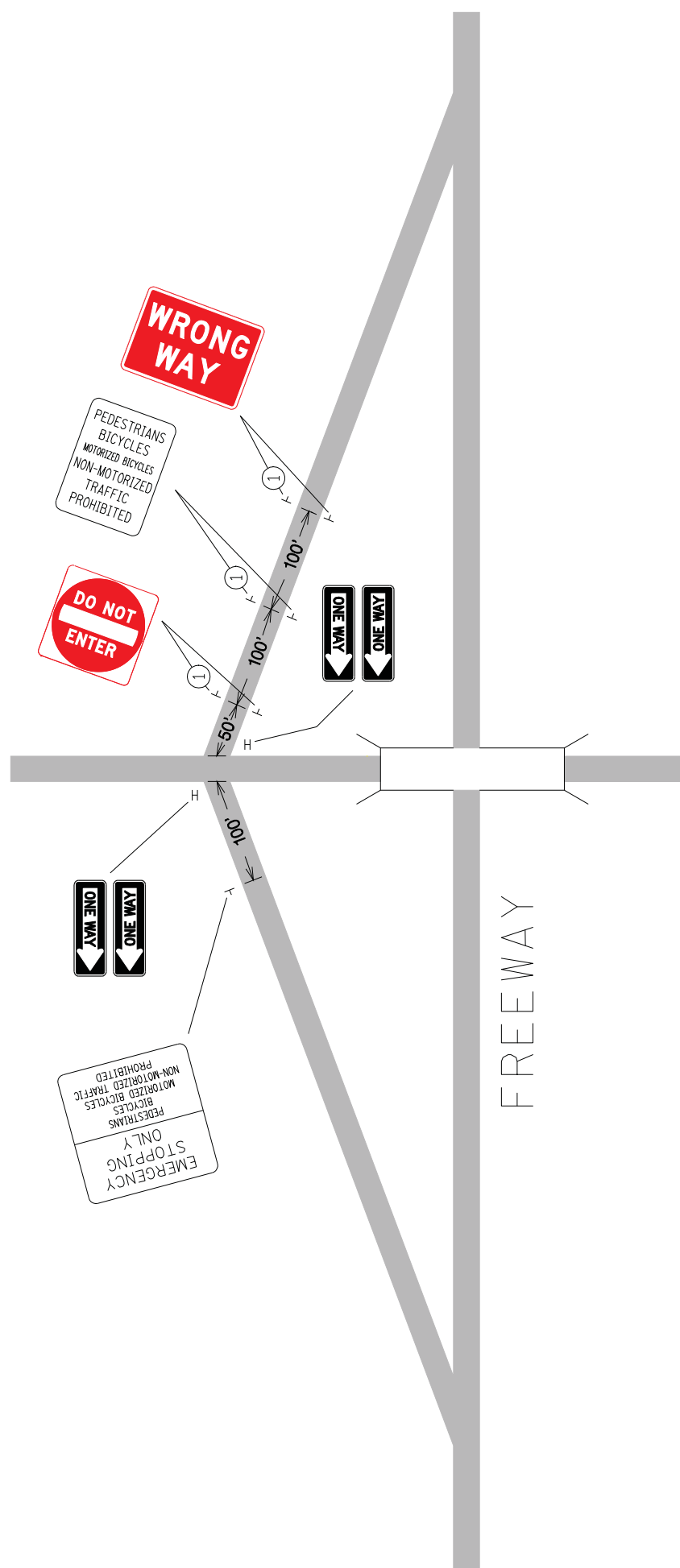


NOTE:
1. See Chapter 7 for application of markings.

DATE

EXTENDED LEFT TURN LANE

FIGURE
6.13



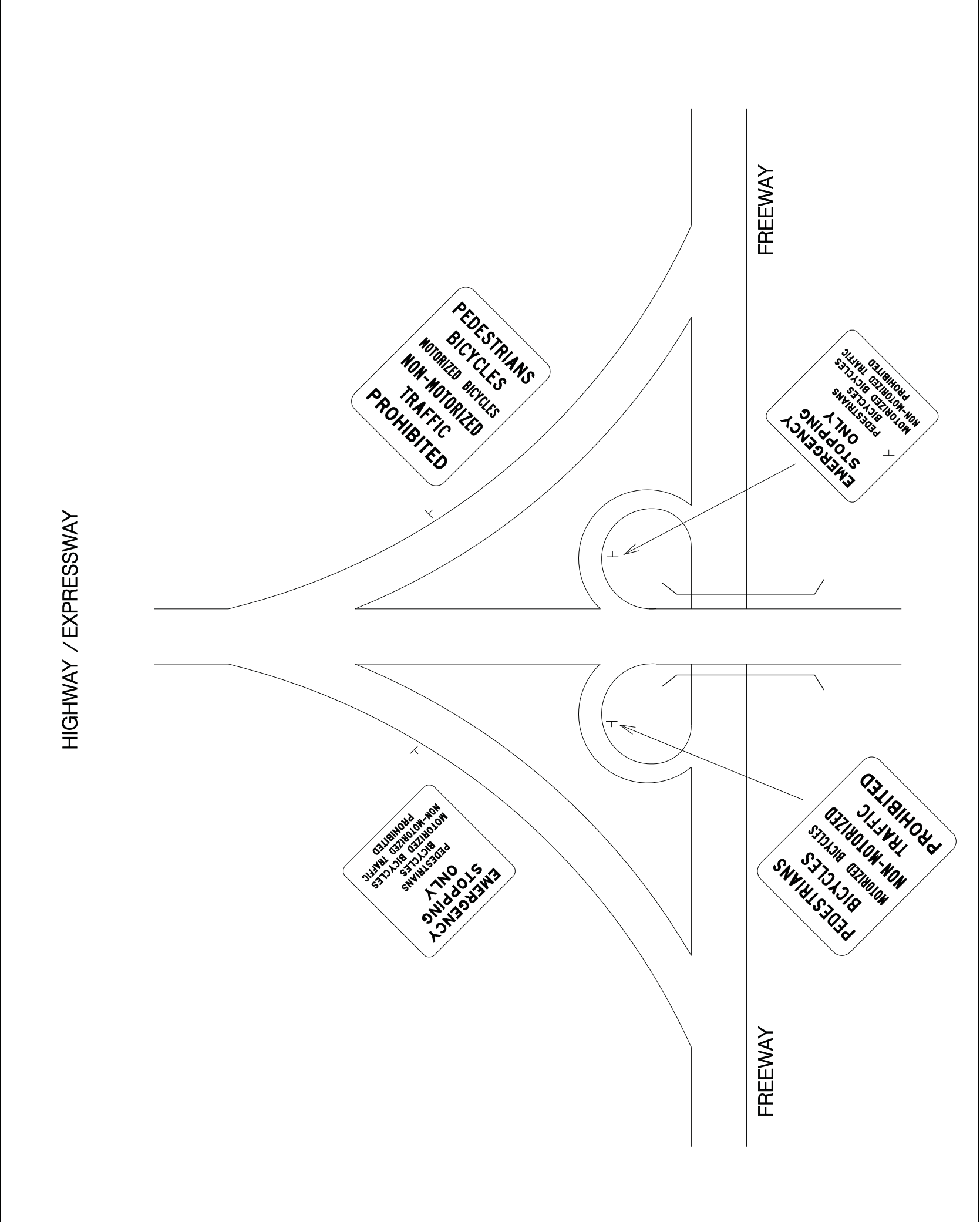
NOTE:

① Additional sign on left required when ramp is 3 lanes or wider.

DATE _____

STANDARD SIGN PLACEMENT REGULATORY, WRONG WAY, AND EXCLUSIVE SIGNS ON FREEWAY DIAMOND INTERCHANGE RAMPS

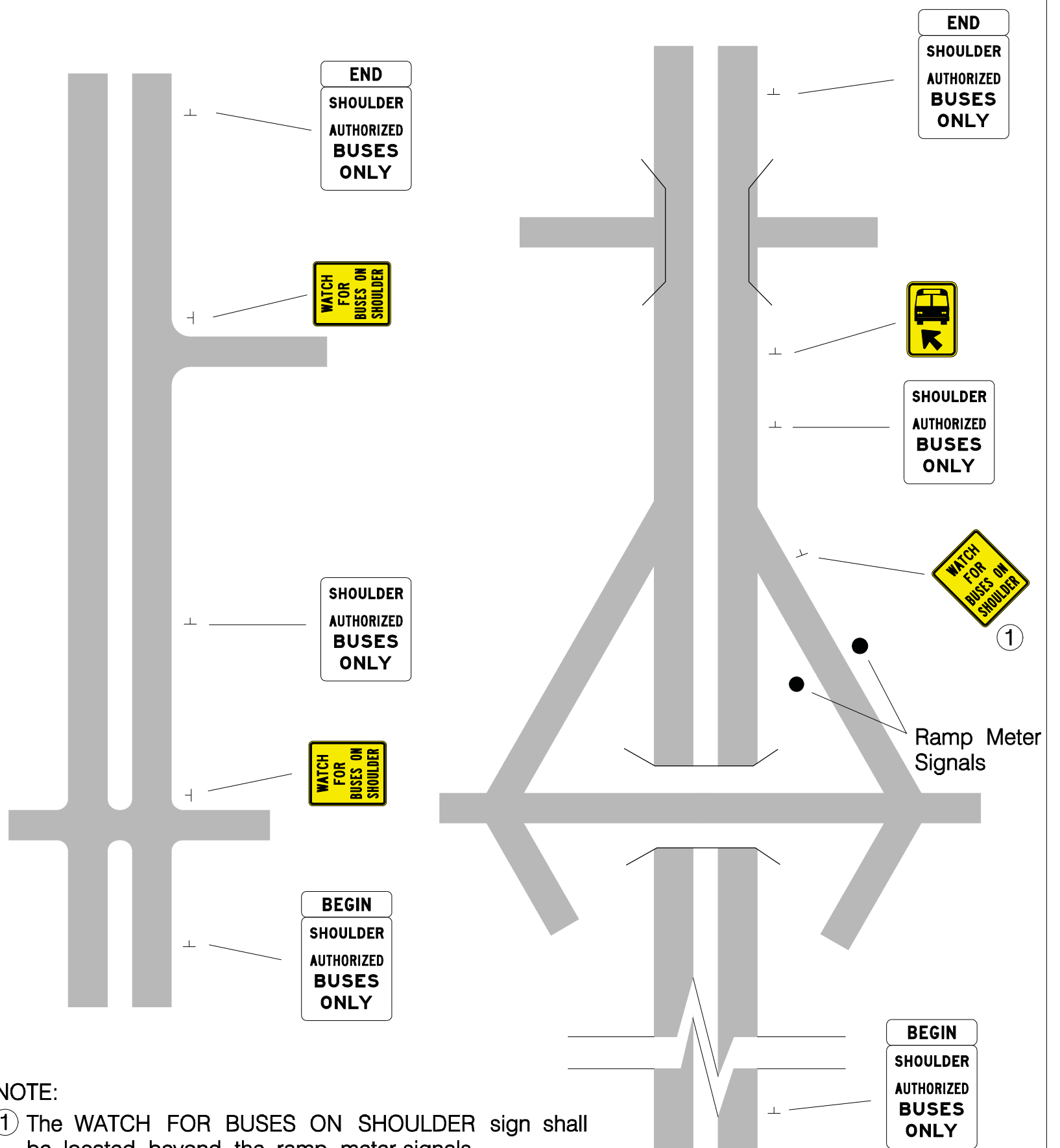
FIGURE
6.14



DATE

**REGULATORY SIGNS ON
CLOVERLEAF INTERCHANGE RAMPS**

**FIGURE
6.15**



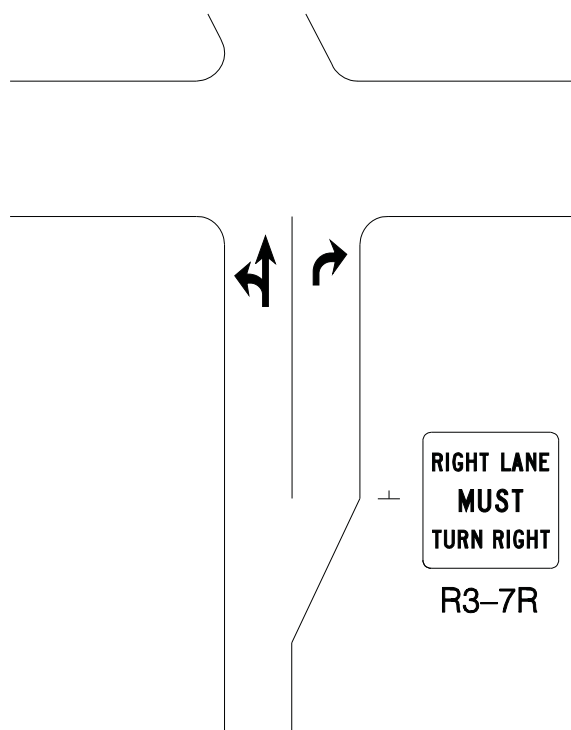
NOTE:

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

DATE

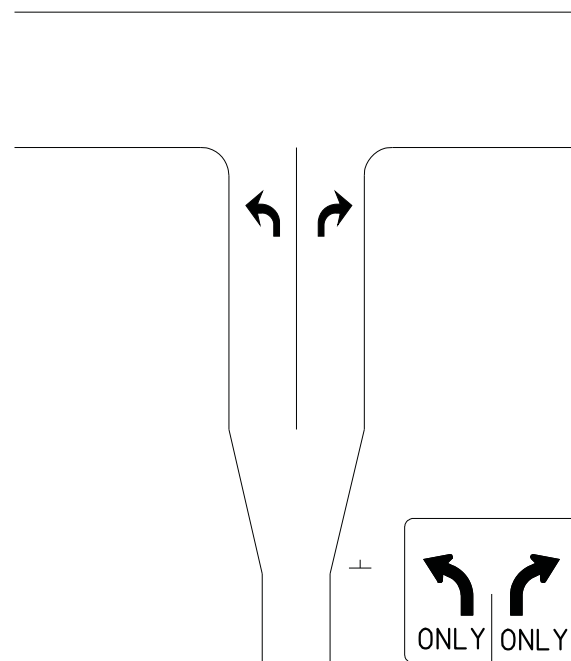
AUTHORIZED BUS ONLY SHOULDER SIGNING

FIGURE
6.16



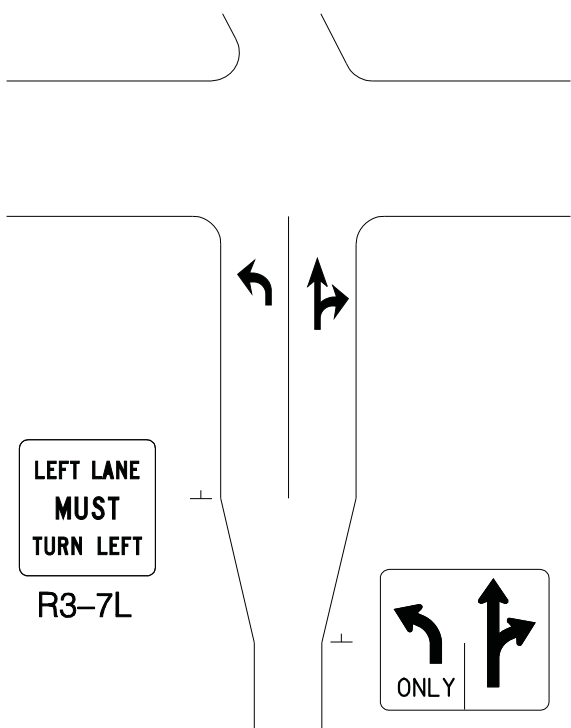
RIGHT LANE
MUST
TURN RIGHT
R3-7R

SINGLE RIGHT OR
LEFT TURN LANE



ONLY ONLY
R3-30AA

R3-30AA

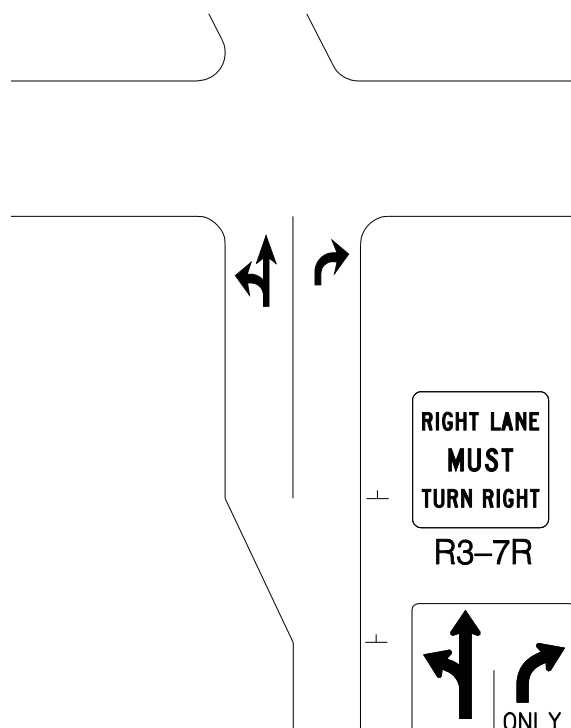


LEFT LANE
MUST
TURN LEFT
R3-7L

ONLY
R3-30AD

R3-30AD

SHARED THROUGH/RIGHT
OR LEFT TURN LANES W/
OR W/O THROUGH LANES



RIGHT LANE
MUST
TURN RIGHT
R3-7R

ONLY
R3-30DA

R3-30DA

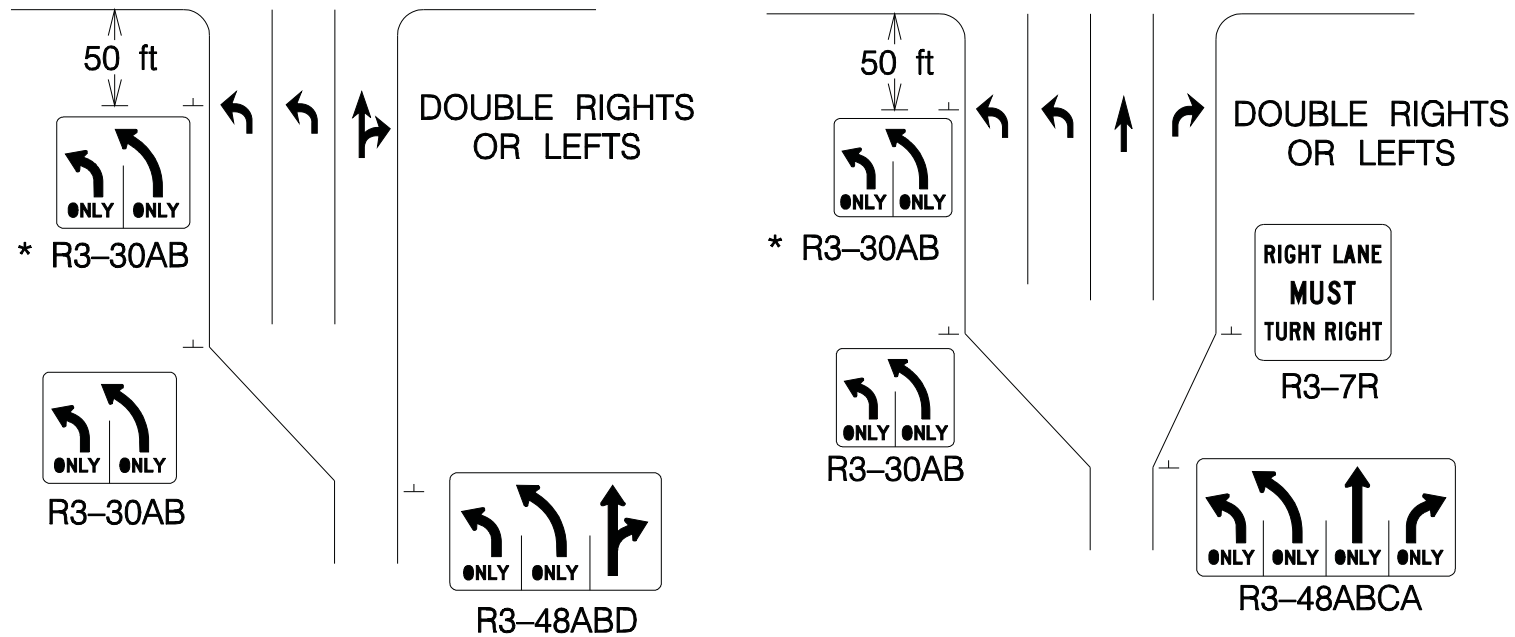
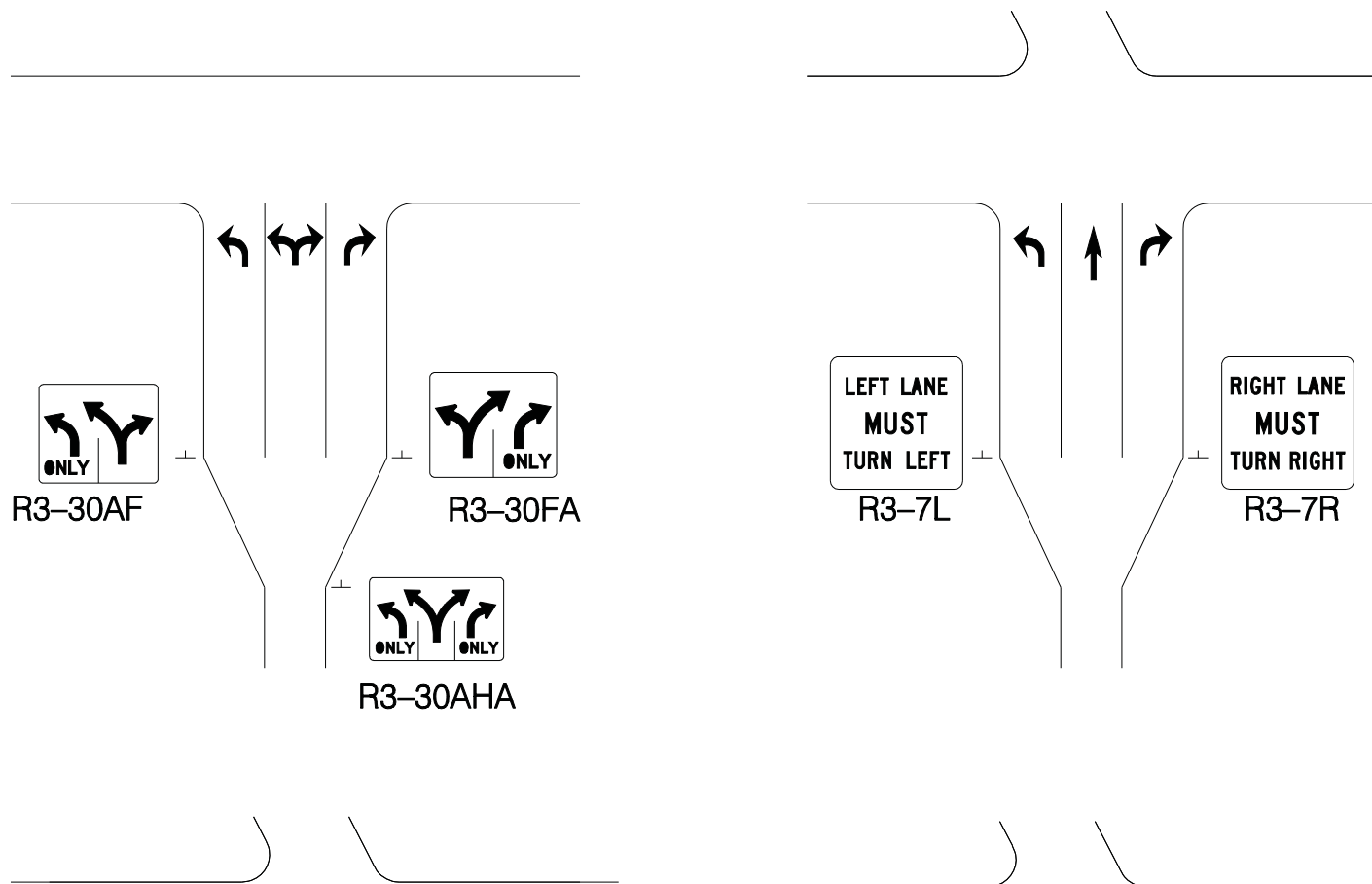
NOTE:

1. ARROWS ARE NOT PAVEMENT MARKING ARROWS

DATE

LANE DESIGNATION ON RAMPS (1 OF 2)

FIGURE
6.18A



* REQUIRED IF TURN LANE IS LONGER THAN 300 FEET

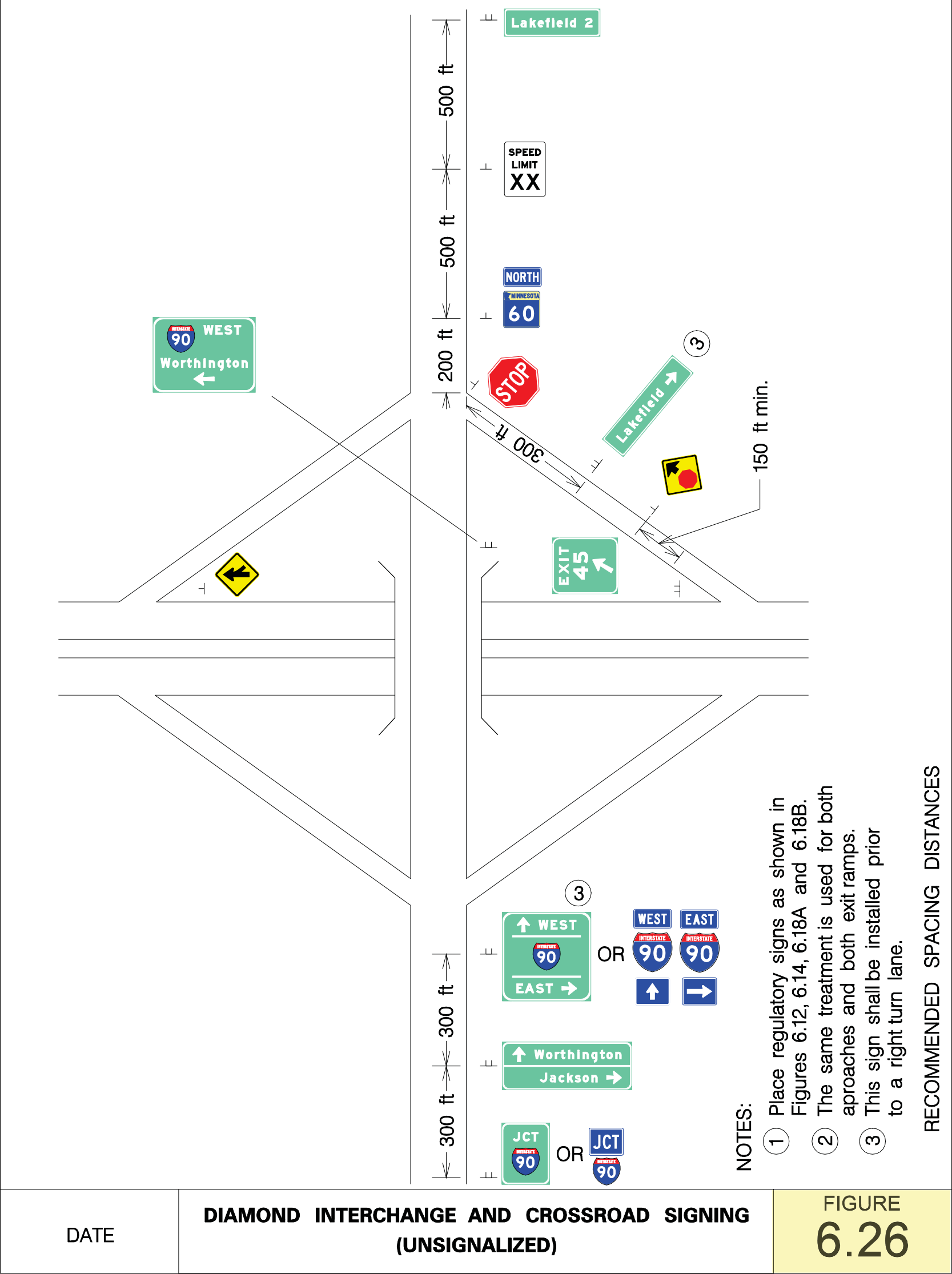
NOTE:

1. ARROWS ARE NOT PAVEMENT MARKING ARROWS

DATE

LANE DESIGNATION ON RAMPS (2 OF 2)

FIGURE
6.18B

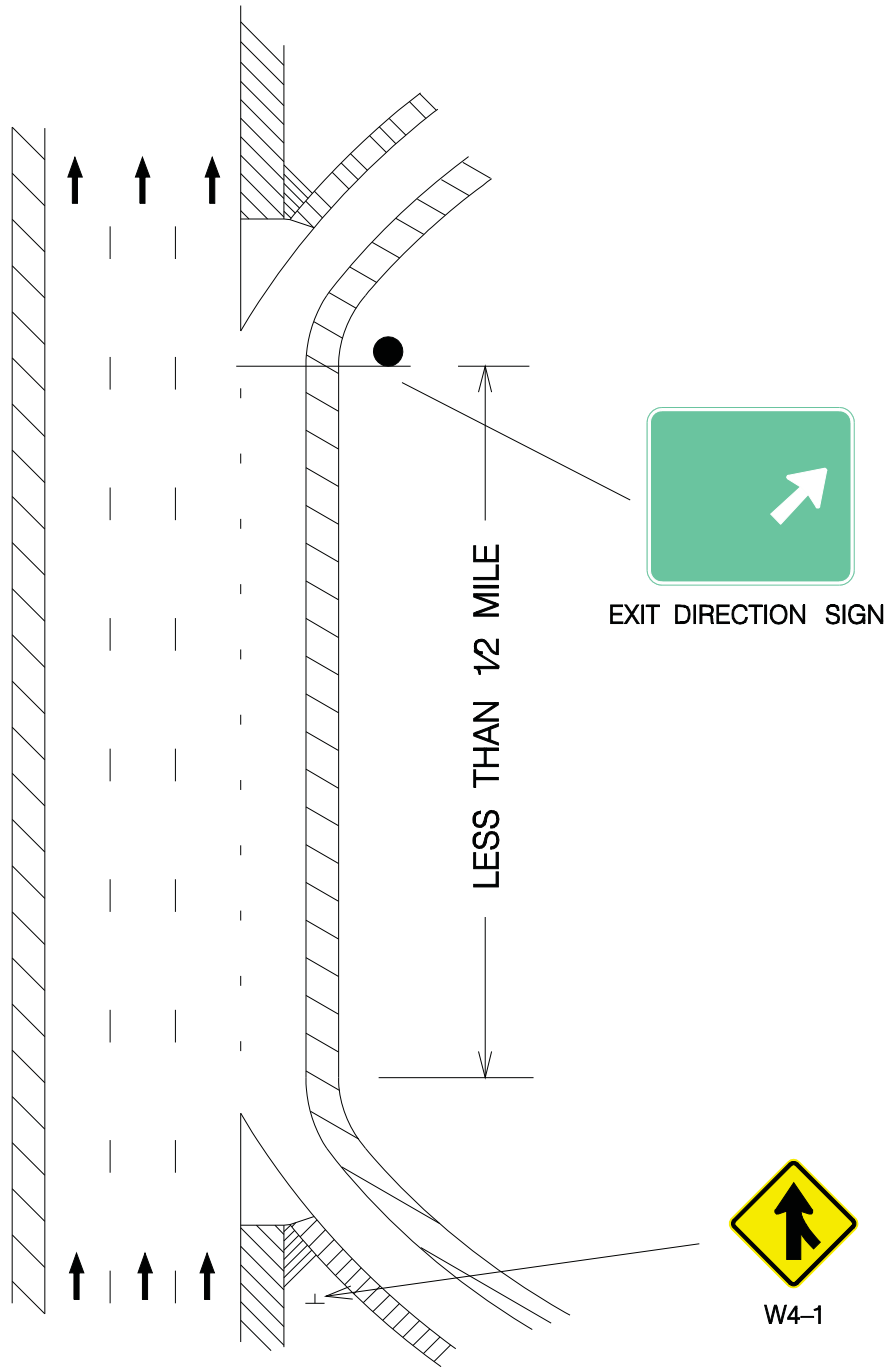




- ① Place regulatory signs as shown in Figures 6.12, 6.14, 6.18A and 6.18C.
- ② The same treatment is used for both approaches and both exit ramps.
- ③ This sign shall be installed prior to a right turn lane.
- ④ This sign may be used if Sign C is installed, but shall be used if Sign B is installed.

RECOMMENDED SPACING DISTANCES

DATE	DIAMOND INTERCHANGE AND CROSSROAD SIGNING (SIGNALIZED)	FIGURE 6.27
------	---	-----------------------



DENOTES SHOULDER AREA

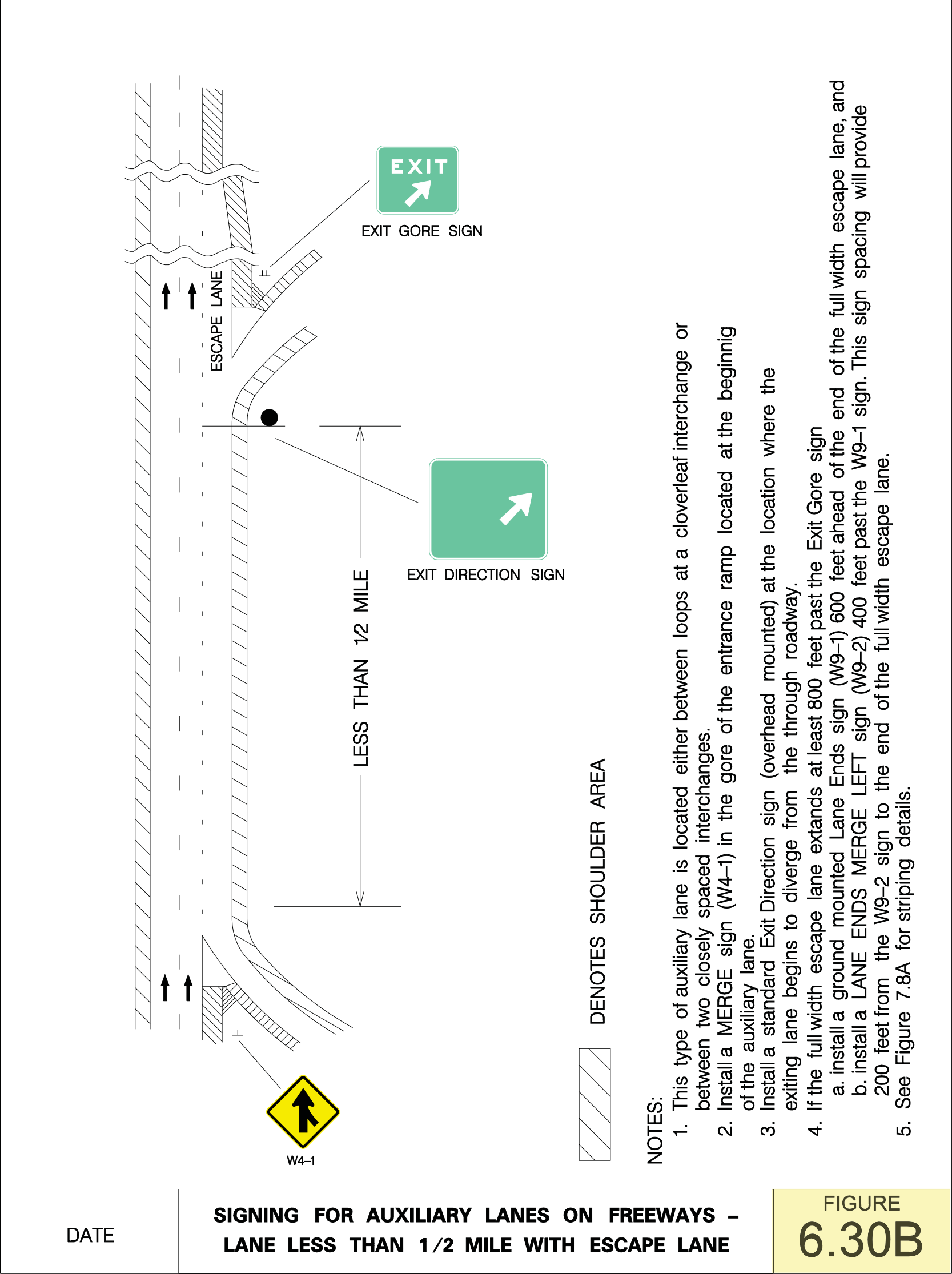
NOTES:

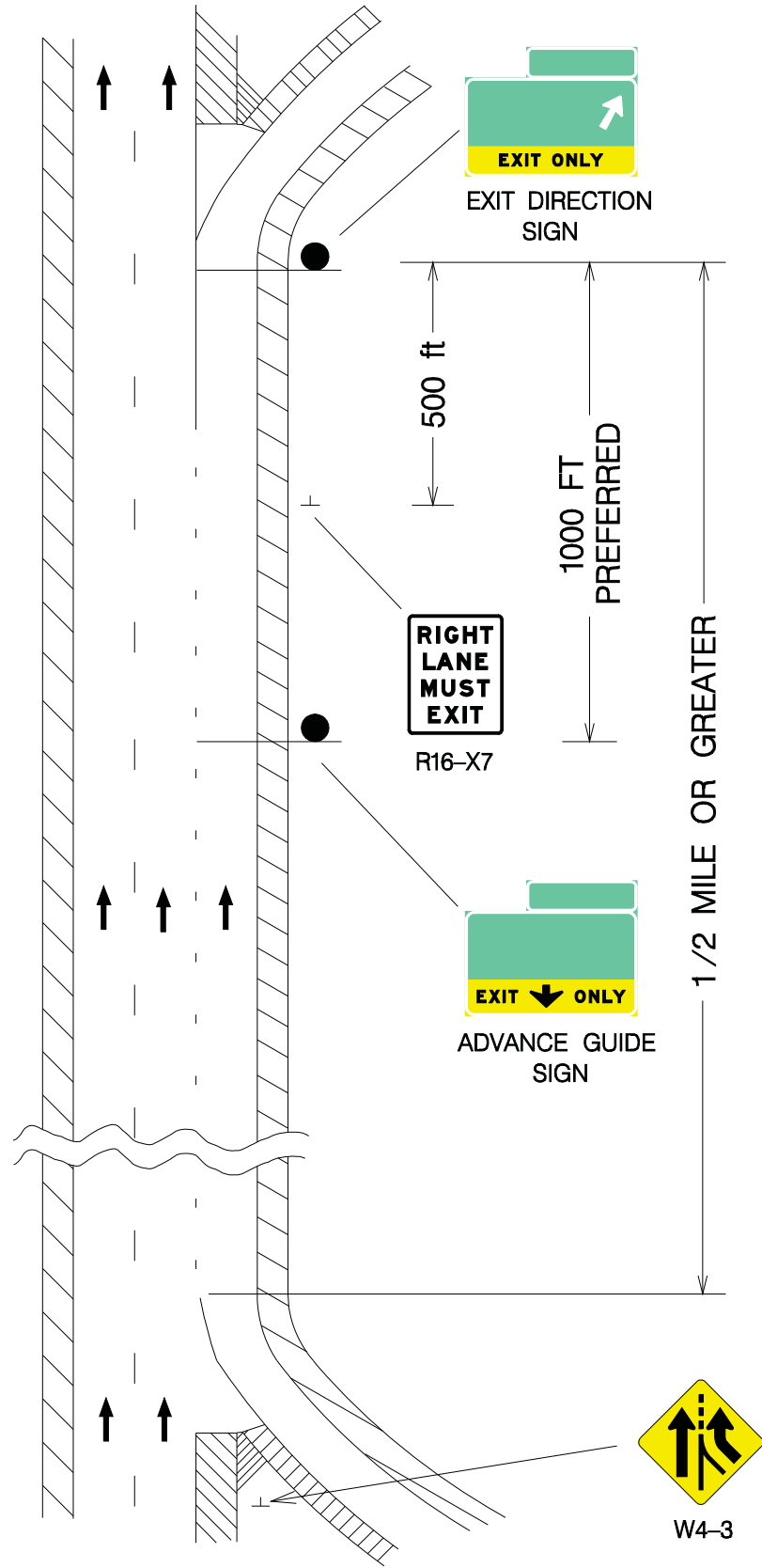
1. This type of auxiliary lane is located either between loops at a cloverleaf interchange or between two closely spaced interchanges.
2. Install a MERGE sign (W4-1) in the gore of the entrance ramp located at the beginning of the auxiliary lane.
3. Install a standard Exit Direction sign (overhead mounted) at the location where the exiting lane begins to diverge from the through roadway.
4. See Figure 7.8A for striping details.

DATE

**SIGNING FOR AUXILIARY LANES ON FREEWAYS -
LANE LESS THAN 1/2 MILE WITHOUT ESCAPE LANE**

**FIGURE
6.30A**





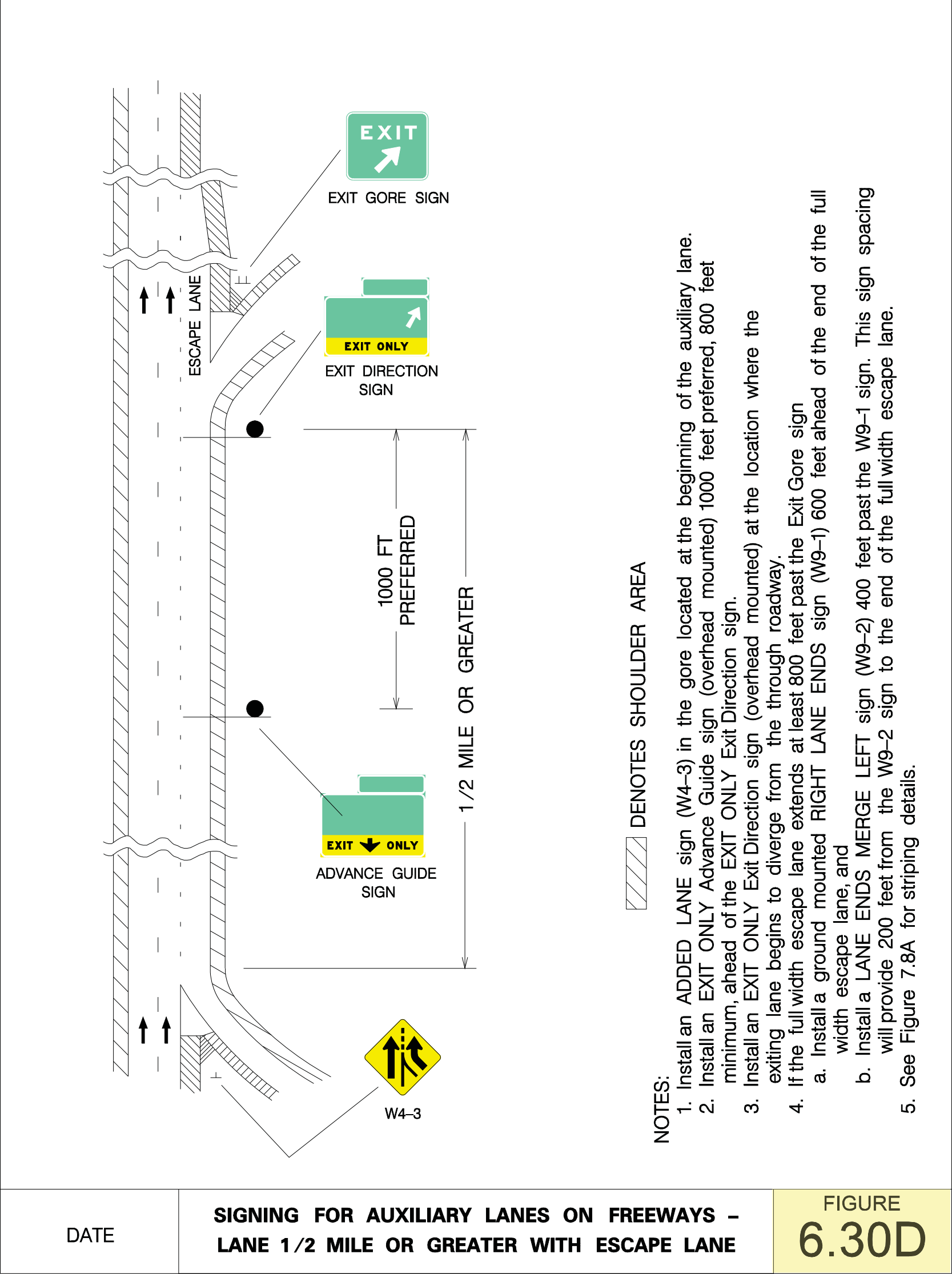
NOTES:

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 feet preferred, 800 feet minimum, ahead of the EXIT ONLY Exit Direction sign.
3. Install a RIGHT LANE MUST EXIT sign (R16-X7) 500 feet ahead of the EXIT ONLY Exit Direction sign.
4. Install an EXIT ONLY Exit Direction sign (overhead mounted) at the location where the exiting lane begins to diverge from the through roadway.
5. See Figure 7.8A for striping details.

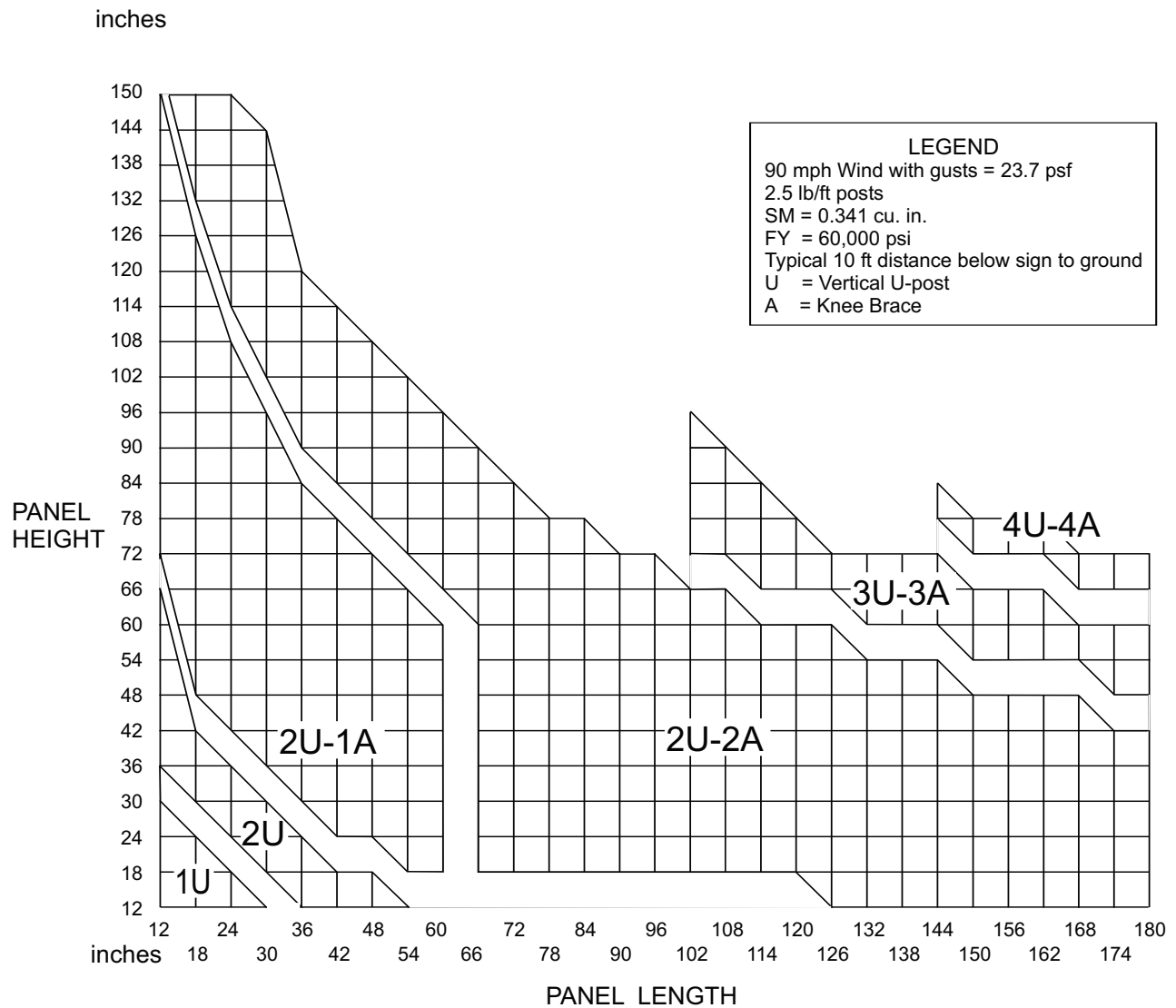
DATE

**SIGNING FOR AUXILIARY LANES ON FREEWAYS -
LANE 1/2 MILE OR GREATER WITHOUT ESCAPE LANE**

**FIGURE
6.30C**



TYPE "A" SIGNS with Breakaway I-Beams

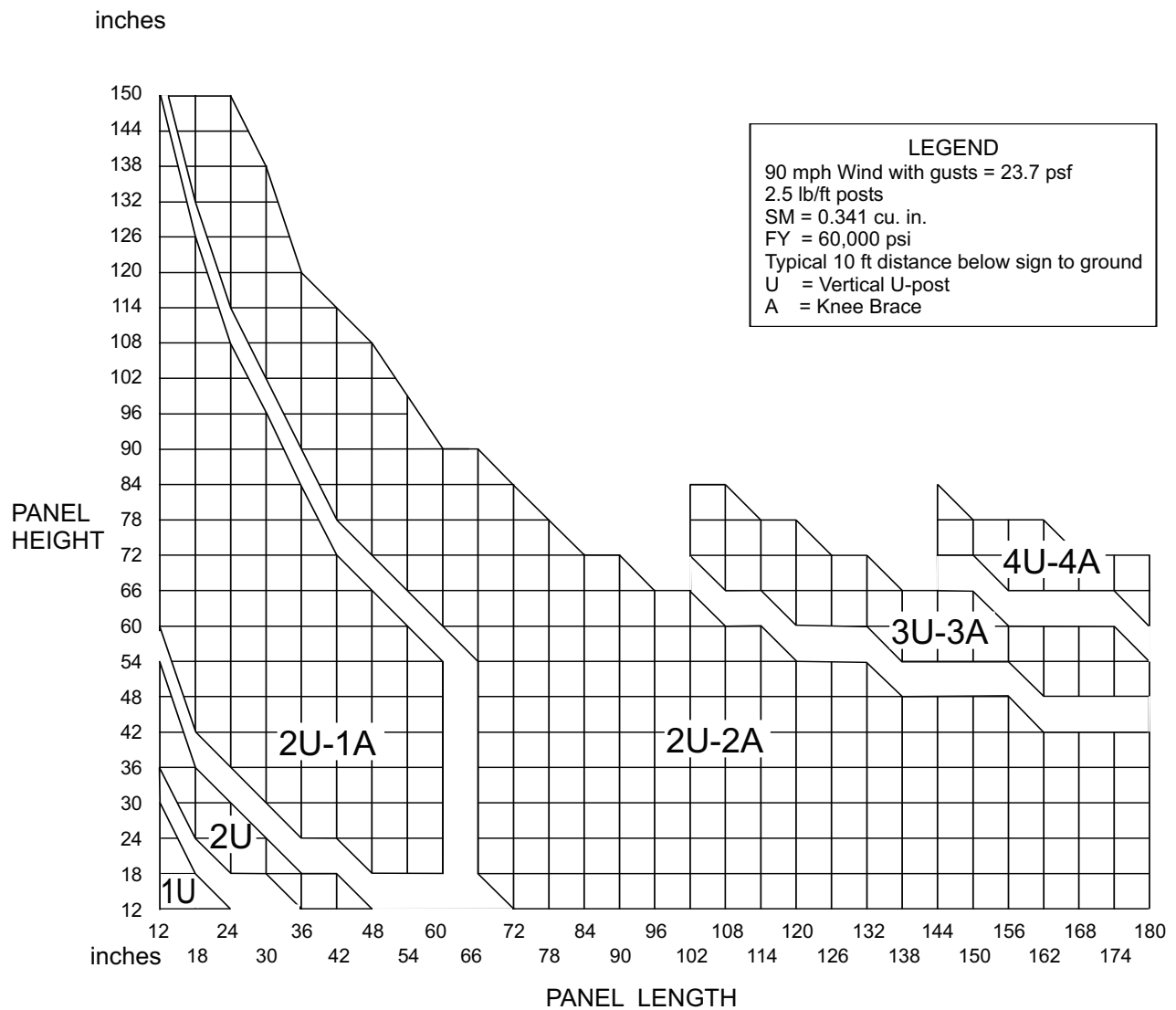


February, 2008

U-POST STRUCTURE CHART FOR
GROUND-MOUNTED SIGNS using 3lb/ft Posts

CHART
6.2

TYPE "A" SIGNS with Breakaway I-Beams



January 1, 1996

U-POST STRUCTURE CHART FOR
GROUND-MOUNTED SIGNS using 2.5 lb/ft Posts

CHART
6.3

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.

July 1, 1997

SIGN POST SPACING CHART

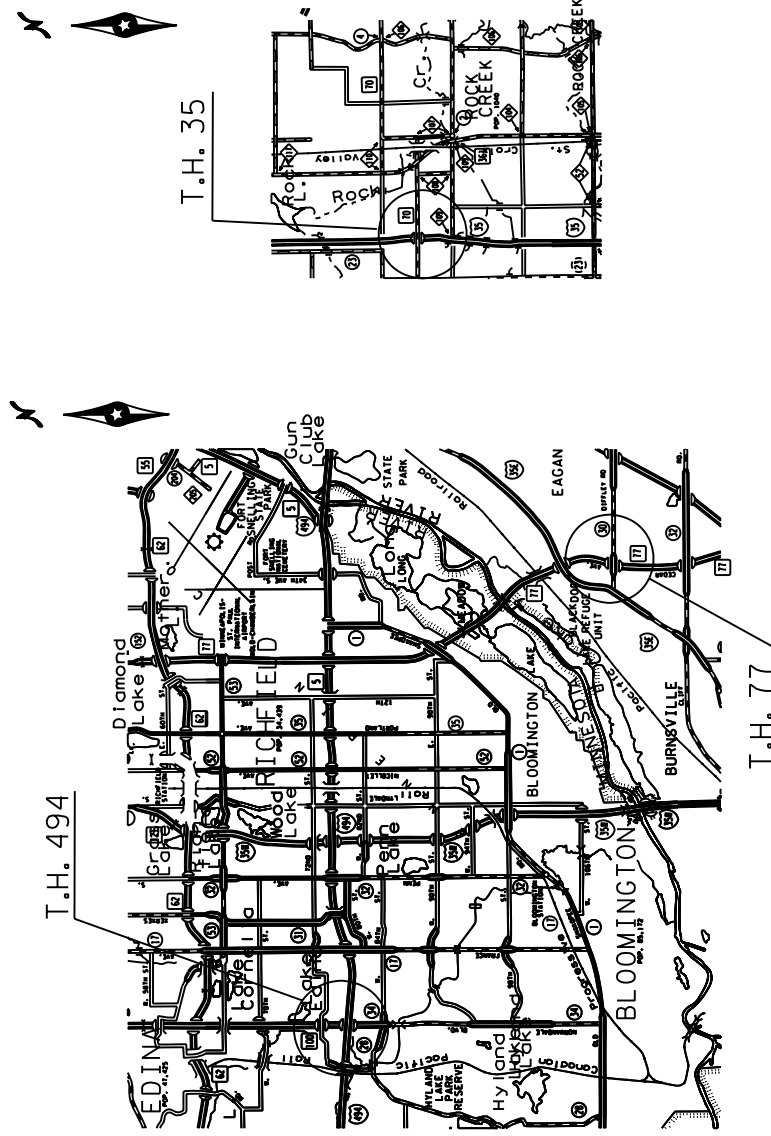
 CHART
6.4

4. SAMPLE PLAN SET

MINNESOTA DEPARTMENT OF TRANSPORTATION

CONSTRUCTION PLAN FOR TRAFFIC SIGNS AND DEVICES

TRUNK HIGHWAY NO. 77, T.H. 494 & T.H. 35



PLAN 100'
INDEX MAP 3300'

PLAN REVISIONS	
DATE	SHEET NO.



FOR PLANS & UTILITIES SYMBOLS SEE TECHNICAL MANUAL
PROJ. NO. _____ CHARGE IDENTIFIER _____

FED. PROJ. NO. _____

GOVERNING SPECIFICATIONS

THE 2005 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	ESTIMATED QUANTITIES
3-10	DATA SHEETS
11	PUBLIC UTILITIES
12-26	ROADWAY LAYOUTS
27-42	SIGN PANEL LAYOUTS
43	STANDARD SIGN DRAWINGS
44-47	PLACEMENT DETAILS
48-70	STRUCTURAL DETAILS
71-73	CROSS SECTIONS

THIS PLAN CONTAINS 73 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.

DATE _____ LIC. NO. _____ ENGR. MICHAEL B. WEISS
DESIGN SQUAD: RICK SUNSTROM
RECOMMENDED FOR APPROVAL DISTRICT TRANSPORTATION ENGINEER 20
RECOMMENDED FOR APPROVAL DISTRICT TRAFFIC ENGINEER 20
RECOMMENDED FOR APPROVAL 20
RECOMMENDED FOR APPROVAL 20
RECOMMENDED FOR APPROVAL 20
RECOMMENDED FOR APPROVAL 20
OFFICE OF LAND MANAGEMENT APPROVAL STATE PRE-LETTING ENGINEER 20
DIRECTOR, LAND MANAGEMENT 20
APPROVED 20 STATE DESIGN ENGINEER

I HEREBY CERTIFY THAT THE FINAL FIELDS REVISIONS, IF ANY, OF THIS PLAN WERE MADE BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA

DATE _____ LIC. NO. _____

STATE PROJ. NO. _____

SHEET NO. 1 OF 73 SHEETS

DISTRICT #: 0001
PLOT NAME: 0001
PATH & FILENAME: 0001

DISTRICT #: 0001
PLOT NAME: 0001
PATH & FILENAME: 0001

STATEMENT OF ESTIMATED QUANTITIES					
SHEET NO.	CHART I.D.	ITEM NO.	ITEM	UNIT	ESTIMATED QUANTITIES
		2021.501	MOBILIZATION	LUMP SUM	1
		2563.601	TRAFFIC CONTROL	LUMP SUM	1
10	J	2564.511	CONCRETE FOOTINGS (TYPE OH SPREAD)	CU. YD.	103
10	J	2564.511	CONCRETE FOOTINGS (TYPE OH SHAFT)	CU. YD.	14
10	K	2564.513	MEDIAN BARRIER FOOTING	EACH	1
3	A	2564.522	STRUCT. STEEL - POSTS FOR TYPE A SIGNS	POUND	8402
10	J, K	2564.522	STRUCT. STEEL - POSTS FOR OH SIGNS (DESIGN B)	POUND	62987
10	J	2564.522	STRUCT. STEEL - TRUSSES FOR OH SIGNS (DESIGN B)	POUND	70098 (P)
10	J	2564.522	STRUCT. STEEL - PANEL MTG. POSTS FOR OH SIGNS (DESIGN B)	POUND	4913 (P)
3	A	2564.531	SIGN PANELS TYPE A	SQ. FT.	767 (P)
4	B	2564.531	SIGN PANELS TYPE C	SQ. FT.	856
5, 6	C	2564.531	SIGN PANELS TYPE D	SQ. FT.	894
7	D	2564.531	SIGN PANELS TYPE E	SQ. FT.	42 (P)
7	E	2564.531	SIGN PANELS TYPE E	SQ. FT.	176 (P)
9	I	2564.531	SIGN PANELS TYPE OH	SQ. FT.	1744 (P)
8	F	2564.531	SIGN PANELS TYPE OVERLAY	SQ. FT.	222
8	H	2564.550	DELINATOR TYPE X4-6	EACH	58
8	G	2564.551	REFERENCE POST MARKER	EACH	2
8	H	2564.552	HAZARD MARKER X4-2	EACH	8
8	H	2564.553	CLEARANCE MARKER X4-4	EACH	3

ESTIMATED QUANTITIES

STATE PROJ. NO.

SHEET NO. 2 OF 73 SHEETS

CHECKED BY: RAS

CERTIFIED BY

Michael R. Wins

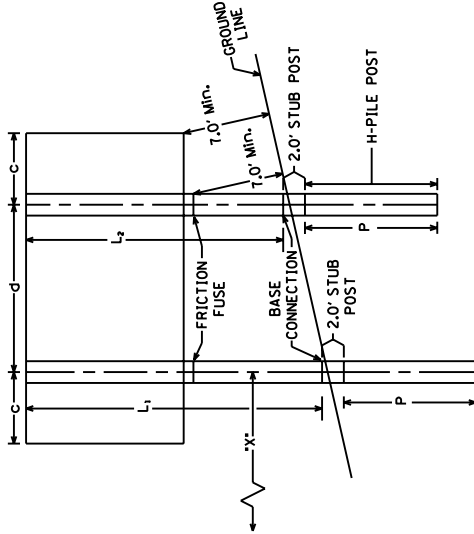
LIC. NO. 10502

DATE 01/05/02

\$DATE\$

SIGN TYPE A (H PILE FOOTINGS)

SIGN NO.	LOCATION	PANEL		POST					PILE			TOTAL WEIGHT STRUCTURAL STEEL (LBS.)	"X" (FT.)	"H" (FT.)	
		SIZE (IN.)	AREA (SQ. FT.)	SIZE	QUANT.	L1 (FT.)	L2 (FT.)	ADDITIONAL STEEL PER POST (LBS.)	WEIGHT (LBS.)	C (IN.)	d (IN.)				P (FT.)
A-1	369+75 SB TH 77	204 x 96	136.00	W 8 x 28	2	18.0	20.0	143	1350.00	42	120	12	672.00	40	5
A-2	370+00 NB TH 77	180 x 54	67.50	W 4 x 13	2	13.0	15.0	59	482.00	37	106	12	312.00	30	5
A-3	157+00 NB TH 35	210 x 150	218.75	W 8 x 24	2	19.5	16.5	118	1100.00	43	124	12	576.00	30	5
A-4	170+00 SB TH 35	174 x 90	108.75	W 6 x 20	2	19.0	17.0	104	928.00	36	102	12	480.00	30	5
A-5	204+00 NB TH 35	210 x 162	236.25	W 8 x 31	2	24.0	23.5	143	1758.50	43	124	12	744.00	30	5
TOTAL			767.25											8402.50	



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 48 and 49 for Structural Details, Type A Signs (Breakaway).
- 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 pavement edge to the bottom edge of panel.
- P is the length of H-pile post.
- See sheet 71 for cross section.
- See sheet 27-29 for sign panels.

SIGN PANELS TYPE C

SIGN NO.	QUANT.	NO. & TYPE	POSTS		MTG HT. (FT.)	PANEL			CODE NO.	PANEL LEGEND
			KNEE BRACES QUANT.	LEN. (FT.)		SIZE (IN.)	AREA (SQ. FT.)	TOTAL AREA (SQ. FT.)		
C-1	5	2-U	1	16	7	36 x 36	9.00	45.00	R1-1	STOP
C-2	1	2-U	1	18	7	48 x 18	6.00	6.00	R6-1(R)	ONE WAY ➡
C-3	2	2-U		15		36 x 36	9.00	9.00	R1-1	STOP
C-4	2	2-U	1	17	7	36 x 48	12.00	10.00	R2-1	SPEED LIMIT 55
C-5	1	2-U	1	18	7	48 x 60	20.00	20.00	R2-1	SPEED LIMIT 65
C-6	1	2-U	2	21	7	48 x 96	32.00	32.00	R2-4b	SPEED LIMIT 70 MIN. 40
C-7	2	2-U	1	13	7	36 x 30	7.50	15.00	R3-30AB	LANE CONTROL
C-8	1	2-U	1	15	7	54 x 30	11.25	11.25	R3-30ACA	LANE CONTROL
C-9	1	2-U	1	13	7	30 x 30	6.25	6.25	R3-7	LEFT LANE MUST TURN LEFT
C-10	1	2-U	1	15	7	30 x 30	6.25	6.25	R3-7	LEFT LANE MUST TURN LEFT
C-11	2	1-0		10	7	30 x 30	6.25	12.50	R3-7	LEFT LANE MUST TURN LEFT
C-12	6	2-U	1	15	7	30 x 30	6.25	37.50	R3-7	RIGHT LANE MUST TURN RIGHT
C-13	7	2-U	1	14	7	30 x 36	7.50	52.50	R4-7	KEEP RIGHT
C-14	4	2-U		16	7	48 x 48	16.00	64.00	R5-1	DO NOT ENTER
C-15	4	2-U		14	7	36 x 36	9.00	36.00	R5-1	DO NOT ENTER
C-16	4	2-U		16	7	42 x 30	8.75	35.00	R5-1A	WRONG WAY
C-17	4	1-U		15	7	18 x 24	3.00	12.00	R5-10d	PEDS BIKES PROHIBITED
C-18	1	2-U		14	7	48 x 18	6.00	6.00	R6-1(L)	ONE WAY ⬅
C-19	6	2-U		15	7	48 x 18	6.00	36.00	R6-1(L)	ONE WAY ⬅
C-20	6	2-U	1	16	7	36 x 36	9.00	54.00	R16-X4	EMERGENCY STOP ONLY
C-21	3	2-U	1	17	7	48 x 48	16.00	48.00	W3-1A	STOP AHEAD
C-22	1	2-U	1	17	7	48 x 48	16.00	16.00	W3-3	STONAL AHEAD
C-23	6	2-U	1	17	7	48 x 48	16.00	96.00	W4-1(R)	MERGE
C-24	2	2-U	1	17	7	48 x 48	16.00	32.00	W4-3(R)	ADDED LANE
C-25	2	1-0				48 x 60	20.00	40.00	W13-2	EXIT 25 M.P.H.
C-26	1	2-U	1	17	7	30 x 15	3.13	3.13	M3-3A	SOUTH
C-27	1	2-U	1	17	7	30 x 15	3.13	3.13	M3-3A	SOUTH
C-28		2-U	1	16	7	24 x 12	2.00	2.00	M3-4A	MINNESOTA 77
C-29	1	2-U	1	16	7	24 x 24	4.00	4.00	M1-5A	MINNESOTA 70
						24 x 12	2.00	2.00	M3-2A	EAST
C-30	1	2-U	1	16	7	24 x 24	4.00	4.00	M1-5A	MINNESOTA 70
						24 x 12	2.00	2.00	M3-2	EAST
C-31	1	2-U	1	15	7	48 x 48	16.00	16.00	R5-1	COUNTY 30
										DO NOT ENTER
TOTAL									856.50	

SPECIFIC NOTES:

- (1) Mounting height is minimum, see sheet 51 for Typical Mounting.
- (2) For punching and mounting details, see sheet 52.
- (3) Mounted back to back.
- (4) Mounted in concrete, see sheet 47.
- (5) Mounted on bridge median island, see sheet 54.
- (6) Mounted on bridge rail, see sheet 55.

GENERAL NOTES:

1. Post lengths are approximate and include embedment but do not include additional length required for splice.
2. See sheets 50-52 for structural details.
3. See Standard Signs Manual for punching code, and detailed drawings of Type C sign panels.

SIGN PANELS TYPE D									
SIGN NO.	QUANT.	POSTS			PANEL			PANEL LEGEND	
		NO. & TYPE	KNEE BRACES QUANT.	LEN. (FT.)	SPACING (IN.)	MTG. HT. (FT.)	SIZE (IN.)	AREA (SQ. FT.)	TOTAL AREA (SQ. FT.)
(3) D-1	2	2-U	2	16	42	7	72 x 60	30.00	60.00
(4) D-2	1	2-U	2	18	42	7	72 x 84	42.00	42.00
(4) D-3	1	2-U	2	18	42	7	72 x 84	42.00	42.00
(4) D-4	1	2-U	2	18	42	7	72 x 84	42.00	42.00
(4) D-5	1	2-U	2	18	42	7	72 x 84	42.00	42.00
(4) D-6	2	2-U	2	18	42	7	72 x 84	42.00	84.00
(4) D-7	1	2-U	2	17	54	7	96 x 48	32.00	32.00
D-8	1	2-U	2	15	78	7	126 x 24	21.00	21.00
D-9	1	2-U	2	18	30	7	42 x 54	15.75	15.75
D-10	1	2-U	2	18	30	7	42 x 54	15.75	15.75
D-11	1	2-U	2	15	78	7	126 x 24	21.00	21.00
D-12	1	2-U	2	17	30	7	48 x 66	22.00	22.00
D-13	1	2-U	2	19	54	7	78 x 78	42.25	42.25
D-14	1	2-U	2	18	30	7	54 x 66	24.75	24.75
(2) D-15	1	1-O					54 x 66	24.75	24.75
SUB TOTAL									531.25

PLOTTED/REVISED: 8/8/2017

DISTRICT: 300
PLOT NAME: 300
PATH & FILENAME: 300

D SIGN DATA SHEET

SEE SHEET 6 FOR NOTES

DRAWN BY: CHECKED BY: RAS CERTIFIED BY: Michael R. Woods

STATE PROJ. NO. 5 OF 73 SHEETS

LIC. NO. 10502 DATE 8/8/2017

SIGN PANELS TYPE D										
SIGN NO.	QUANT.	POSTS			SPACING (IN.)	MTG HT. (FT.) (1)	PANEL		PANEL LEGEND	
		NO. & TYPE	KNEE BRACES QUANT.	LEN. (FT.)			SIZE (IN.)	AREA (SQ. FT.)		TOTAL AREA (SQ. FT.)
D-16	1	2-U	2	19	54	7	78 x 78	42.25	42.25	
D-17	1	2-U	2	18	30	7	48 x 66	22.00	22.00	
D-18	1	2-U	2	16	66	7	108 x 36	27.00	27.00	
D-19	1	2-U	2	16	66	7	108 x 36	27.00	27.00	
D-20	2	2-U	2	17	30	7	42 x 54	15.75	31.50	
D-21	1	2-U	2	17	66	7	108 x 54	40.50	40.50	
D-22	1	2-U	2	19	54	7	78 x 78	42.25	42.25	
D-23	1	2-U	2	18	54	7	78 x 66	35.75	35.75	
D-24	1	3-U	3	18	45	7	114 x 66	52.25	52.25	
D-25	1	2-U	2	19	54	7	78 x 78	42.25	42.25	
D-26	1	2-U	2	17	66	7	108 x 54	40.50	40.50	
SUB TOTAL									362.75	
TOTAL									894.00	

SPECIFIC NOTE:

- (1) Mounting height is minimum, see sheet 51 for Typical Mounting.
- (2) Mounted on bridge rail, see sheet 55.
- (3) See Standard Signs Manual (E5-1).
- (4) See Standard Signs Manual (E5-1a).

GENERAL NOTES:

1. Post lengths are approximate and include embedment, but do not include additional length required for splice.
2. See sheets 50 to 52 for structural details.
3. See Standard Signs Manual for Type D stringer and panel-joint details.
4. See sheets 30-35 for sign panels.

SIGN PANELS TYPE EA						
SIGN NO.	QUANT.	LOCATION	PANEL		POSTS	
			SIZE (IN.)	AREA (SQ. FT.)	NO.	SPACING
EA-1	2	A-3, A-5	102 x 30	21.25	3	36
TOTAL				42.50		EXIT 165

SIGN PANELS TYPE EO						
SIGN NO.	QUANT.	LOCATION	PANEL		POSTS	
			SIZE (IN.)	AREA (SQ. FT.)	NO.	SPACING
EO-1	4	OH 369-494(L), OH 371-494, OH 372-494(R), OH 373-494(R)	96 x 30	20.00	2	54
EO-2	4	OH 369-494(R), OH 370-494(R), OH 372-494(L), OH 373-494(L)	96 x 30	20.00	2	54
EO-3	1	OH 370-494(L)	78 x 30	16.25	2	48
TOTAL				176.25		EXIT 8

GENERAL NOTES:
1. See sheets 56 for structural details.
2. Post spacing may be varied to miss members of OH sign structures.
3. See sheets 36 and 37 for sign panels.

F SIGN PANELS TYPE OVERLAY					
CODE NO.	QUANT.	SIZE (IN.)	AREA (SQ. FT.)	TOTAL (SQ. FT.)	LEGEND
M1-1	6	24 x 24	4.00	24.00	INTERSTATE 35
M1-1	1	30 x 24	5.00	5.00	INTERSTATE 35E
M1-5B	1	36 x 36	9.00	9.00	MINNESOTA 13
M1-5B	2	36 x 36	9.00	18.00	MINNESOTA 70
M1-5B	6	24 x 24	4.00	24.00	MINNESOTA 77
M1-5B	1	24 x 24	4.00	4.00	MINNESOTA 95
M1-5B	4	45 x 36	11.25	45.00	MINNESOTA 100
M1-6A	1	36 x 36	9.00	9.00	COUNTY 28
M1-X4A	3	36 x 36	9.00	27.00	COUNTY 30
M1-X4A	2	24 x 24	4.00	8.00	COUNTY 30
M1-X4A	1	36 x 36	9.00	9.00	COUNTY 32
M1-X4A	1	24 x 24	4.00	4.00	COUNTY 32
M1-6A	4	36 x 36	9.00	36.00	COUNTY 34
TOTAL				222.00	

G REFERENCE POST MARKER (5)			
CODE NO.	QUANTITY	SIZE (IN.)	LEGEND
D10-1	2	12 x 24	5
TOTAL	2		

H DELINEATORS & MARKERS			
	TYPE	QUANT.	LOCATION
(1)	WHITE(X4-6)	34	EXIT NOSE
(1)	YELLOW(X4-6)	24	EXIT NOSE
(2)(4)	(X4-2)	8	EXIT NOSE
(3)(4)	(X4-4)L	3	ISLAND

SPECIFIC NOTES:

- (1) See Standard Signs Manual for Guide Delineator X4-6.
- (2) See Standard Signs Manual for Hazard Marker X4-2.
- (3) See Standard Signs Manual for Clearance Marker X4-4 (12"x 36").
- (4) Install on 3 lb/ft post (Mn/DOT 3401).
- (5) See Standard Signs Manual for Reference Post Marker.

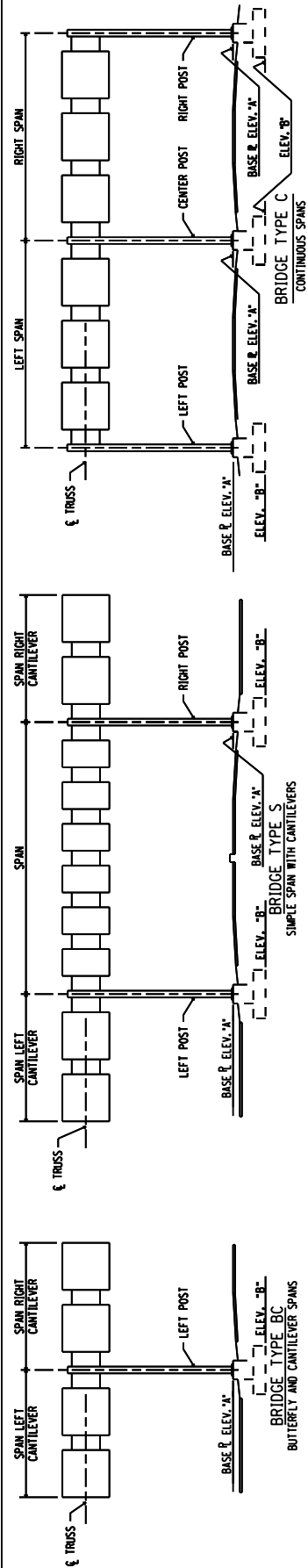
GENERAL NOTES:

1. For Delineator and Marker placement, see sheet 46.
2. See roadway layouts for delineator and marker locations.

OVERLAY, DELINEATOR & MARKER DATA SHEET			
DRAWN BY:	CHECKED BY: RAS	CERTIFIED BY: <i>Michael P. Weiss</i>	STATE PROJ. NO. _____
		DATE: 10/5/02	SHEET NO. 8 OF 73 SHEETS

SIGN PANELS TYPE OH							
SIGN NO.	LOCATION	PANEL		PANEL		PANEL	
		SIZE (IN.)	AREA (SQ. FT.)	SIZE (IN.)	AREA (SQ. FT.)	SIZE (IN.)	AREA (SQ. FT.)
OH 1-77	340+00 NB	120 x 132	110.00				110.00
OH 2-77	340+00 SB	120 x 108	90.00				90.00
OH 3-77	215+25 NB	150 x 132	137.50	144 x 114	114.00		251.50
OH 4-77	417+25 SB	144 x 114	114.00				114.00
OH 369-494	455+00 EB	120 x 84	70.00	210 x 114	166.25		236.25
OH 370-494	466+20 WB	186 x 132	170.50	216 x 114	171.00		341.50
OH 371-494	1+70 Loop D	120 x 84	70.00				70.00
OH 372-494	480+50 WB	174 x 132	159.50	126 x 90	78.75		238.25
OH 373-494	531+00 WB	174 x 132	159.50	168 x 114	133.00		292.50
TOTAL							1744.00

GENERAL NOTE:
1. See sheets 38-42 for sign panels.



OVERHEAD SIGN STRUCTURES

OVERHEAD SIGN STRUCTURES																		
SIGN NO.	STATION	BRIDGE TYPE	TRUSS TYPE	SPAN LENGTHS				LOW STEEL ELEVATION SEE ST-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	
									A	B		A	B		A	B		
OH 1-77	340+00 NB	BC	A	33'-0"				118.65	101.14	94.7	4E							
OH 2-77	340+00 SB	BC	A	32'-6"				117.88	101.68	93.66	4E							
OH 3-77	215+25 NB	BC	B	42'-3"				118.67	100.12	(3)	7E							
OH 4-77	417+25 SB	BC	A	36'-0"				117.99	101.12	99.85	7E							
OH 369-494	455+00 EB	BC	A	43'-3"				118.67	100.18	93.51	4E							
OH 370-494	466+20 WB	S	B			96'-6"		118.67	102.27	(4)	4							
OH 371-494	1+70 Loop D	BC	A	32'-0"				118.33	100.46	93.57	4E						99.19	93.16
OH 372-494	480+50 WB	BC	A	31'-0"				117.33	99.94	92.68	3E							
OH 373-494	531+00 WB	BC	A	33'-0"				118.76	103.41	94.99	4E							

TABULATION OF OVERHEAD SIGN STRUCTURE QUANTITIES (2)

SIGN NO.	OH 1-77	OH 2-77	OH 3-77	OH 4-77	OH 369-494	OH 370-494	OH 371-494	OH 372-494	OH 373-494	TOTALS
STRUCT. STEEL POSTS	8607	6938	7017	8718	7696	7923	7863	5631	1813	62206
STRUCT. STEEL TRUSSES	3874	4305	7098	4920	10024	16212	11808	8536	3321	70098
STRUCT. STEEL WALKWAY SUPPORTS										
STRUCT. STEEL WALKWAY GRATING										
STRUCT. STEEL PANEL MTG. POSTS	517	404	635	472	684	687	495	675	344	4913
CONCRETE FOOTINGS (SPREAD)	11.2	13.4		16.7	11.6	11.0	11.3	11.5	16.0	102.7
CONCRETE FOOTINGS (SHAFT)			14.1							14.1

SPECIFIC NOTES:

- Center line elevation = 100.00.
- Based on tabulated elevations and dimensions.
- Revise if necessary using quantity tables on ST-2.
- Shaft footing.
- Median barrier footing, see sheet 57.

K MEDIAN BARRIER FOOTING

SIGN NO.	LOCATION	POST STEEL (LBS.)
OH 370-494	466+20 WB	781
TOTAL		781

GENERAL NOTES:

- The subscript E on the post type denotes the post which has the hand hole and provisions for grounding, i.e. post type 3E.
- 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.
- Left and right designations are shown looking in direction of traffic flow.
- See sheets 59 to 70 for details.
- See sheets 72-73 for cross section.

OH SIGN DATA SHEET

DRAWN BY:	CHECKED BY: RAS	CERTIFIED BY: <i>Michael P. Weiss</i>	DATE: 10/5/02	STATE PROJ. NO.	SHEET NO. 10 OF 73 SHEETS
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GENERAL NOTES:

- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO UTILIZE THE GOPHER ONE CALL EXCAVATION NOTICE SYSTEM (PHONE 651-454-0002), 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

AT&T BROADBAND	ONVOY
CITY OF APPLE VALLEY	METROPOLITAN COUNCIL (TRANSIT)
CITY OF EAGAN	METROPOLITAN COUNCIL (WASTE)
CITY OF MENOTA HEIGHTS	MN/DOT
DAKOTA COUNTY HIGHWAY DEPT.	MOBILE PIPE LINE COMPANY
DAKOTA ELECTRIC	XCEL ENERGY
NORTHERN NATURAL GAS	PEOPLES NATURAL GAS
FRONTIER COMMUNICATIONS, INC	BOARD OF WATER COMMISSIONERS OF THE CITY OF ST PAUL
KOCH PIPELINE COMPANY, C.P.	WILLIAMS ENERGY SERVICE
MCI WORLDWIDE NETWORK SERVICE, INC.	
MCLEOD USA	

DRAWN BY:

CHECKED BY: RAS

CERTIFIED BY: *Michael R. Weiss*

LIC. NO. 10502

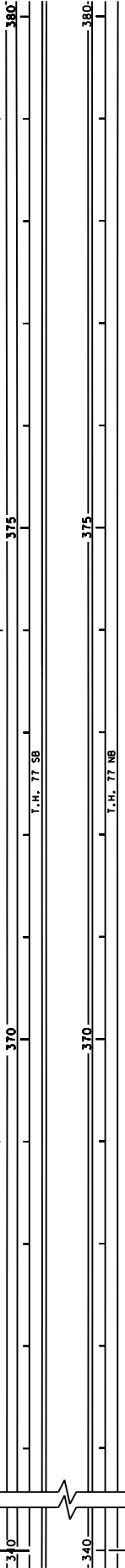
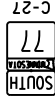
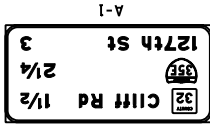
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STATE PROJ. NO.

UTILITIES

SHEET NO. 11 OF 73 SHEETS

EAGAN



PLOTTED/REVISED: sssgdatEcsss

DISTRICT: sssgPLOTNAMEss
PLOT NAME: sssgPLOTNAMEss
PATH & FILENAME: sssgPATHFILENAMEss

DRAWN BY:

CHECKED BY: RAS

CERTIFIED BY: *Michael R. Wins*

LIC. NO. 10502

DATE 10/5/02

DATE 10/5/02

STATE PROJ. NO.

T. H. 77 STA. 365 + 00 - 380 + 00

SHEET NO. 12 OF 73 SHEETS

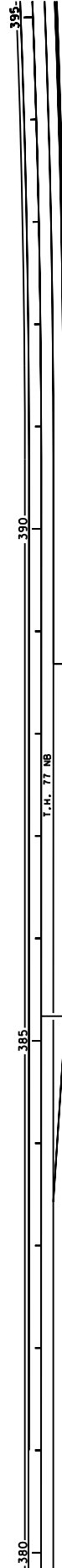
EAGAN



MILE
5



T.H. 77 SB



T.H. 77 NB

SEE SHEET 46 FOR DELINEATION
(PLAN A)



305

MILE
5

13

St Paul
Shakopee

EXITS 3/4 MILE

COUNTY
30

Diffley Rd

OH 3-77



C-21

SEE SHEET 44 FOR
SIGN PLACEMENT



D-1

Minnesota Zoo

D-8



D-9

PLOTTED/REVISED: \$\$\$DATE\$\$\$

DISTRICT #: \$\$\$DISTRICT\$\$\$
PLOT NAME: \$\$\$PLOTNAME\$\$\$
PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$

T. H. 77 STA. 380+00 - 395+00

STATE PROJ. NO.

SHEET NO. 13 OF 73 SHEETS

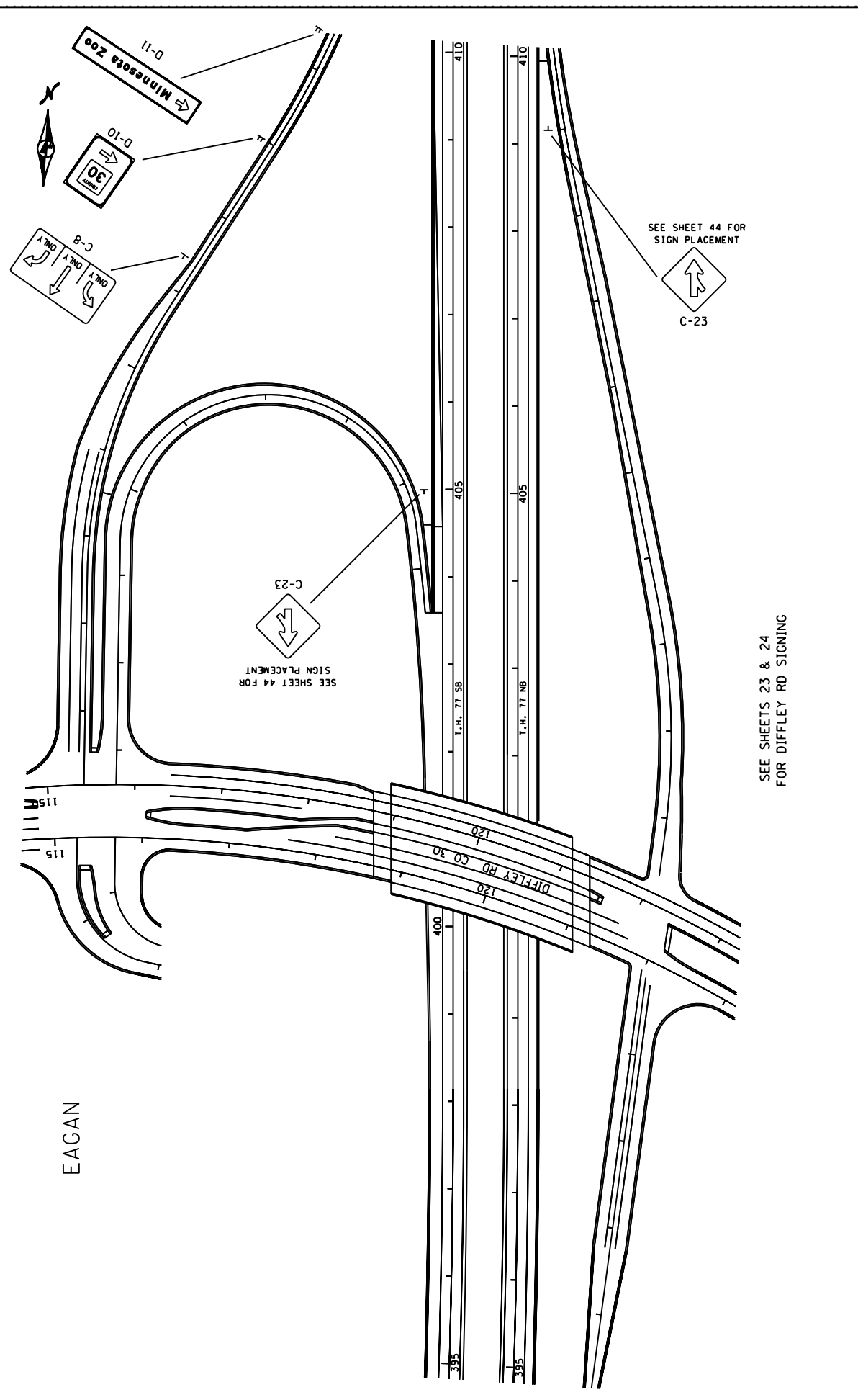
DATE

LIC. NO. 10502

CERTIFIED BY: *Michael R. Weiss*

CHECKED BY: RAS

DRAWN BY:

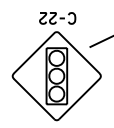
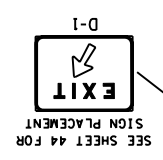


DISTRICT #: 8001234567
 PLOT NAME: 8001234567
 PATH & FILENAME: 8001234567

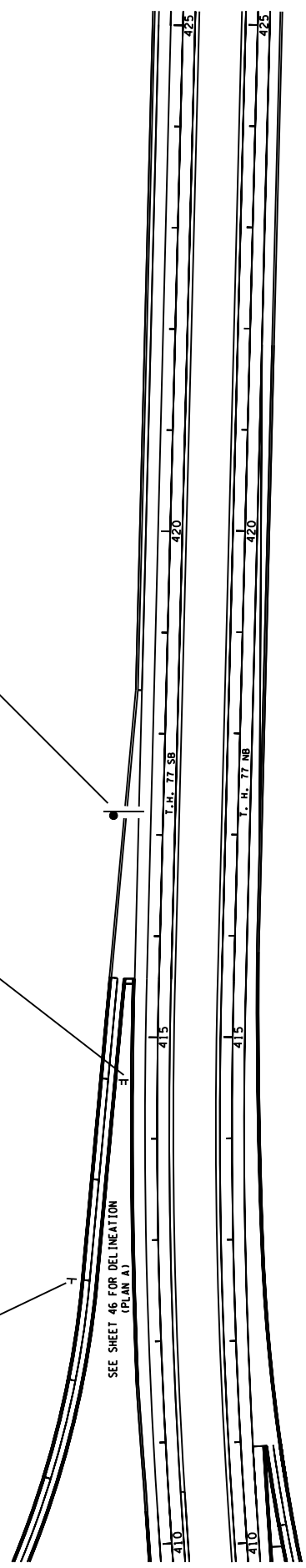
DRAWN BY:	CHECKED BY: RAS	CERTIFIED BY: <i>Michael B. Weiss</i>	LIC. NO. 10502	DATE 10/05/02	STATE PROJ. NO.	SHEET NO. 14	OF 73	SHEETS
T. H. 77	STA. 395+00 - 410+00							



EAGAN



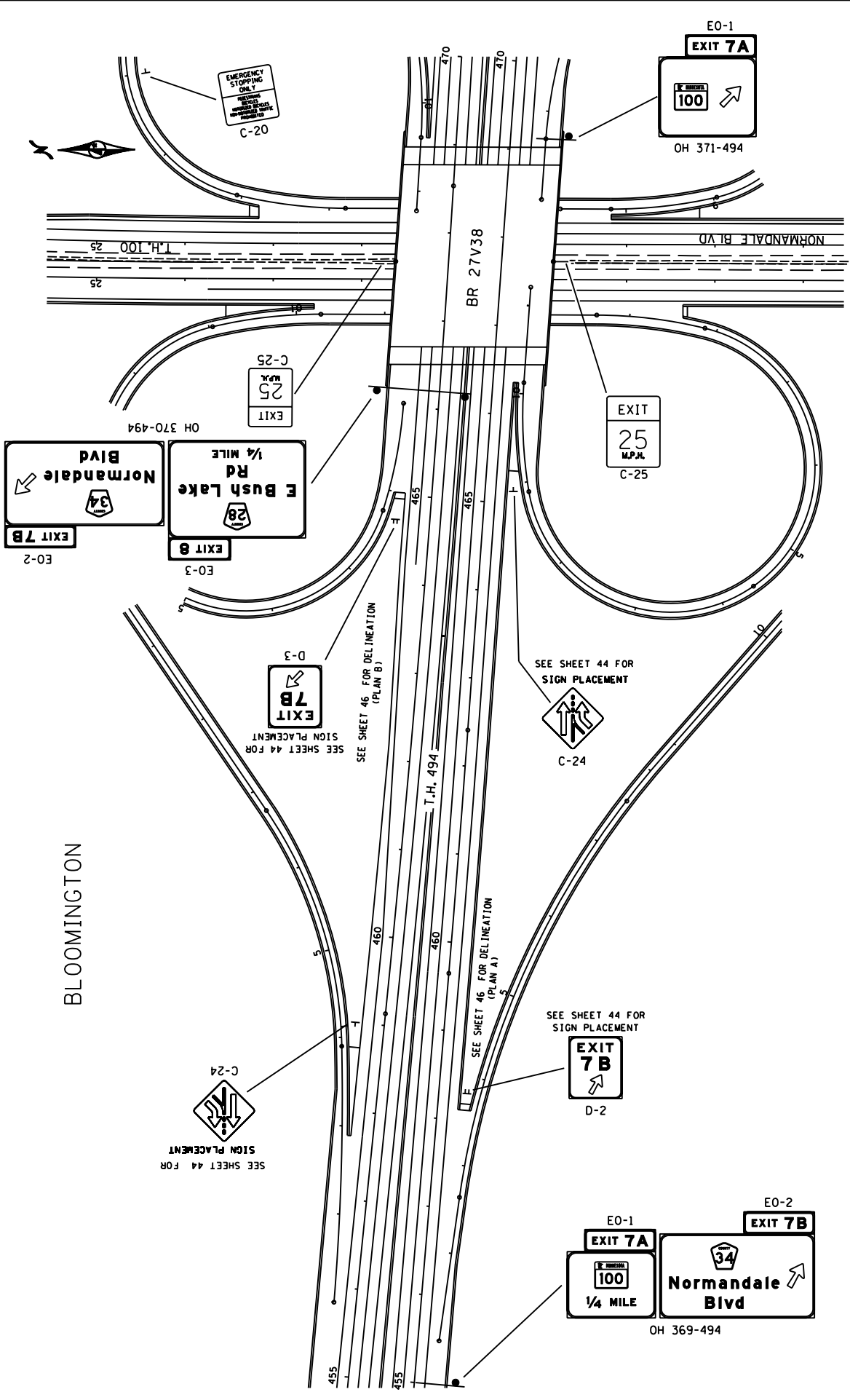
SEE SHEET 46 FOR DELINEATION
(PLAN A)



PLOTTED/REVISED: \$\$\$DATE\$\$\$

DISTRICT #: \$\$\$DISTRICT\$\$\$
PLOT NAME: \$\$\$PLOTNAME\$\$\$
PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$

DRAWN BY:	CHECKED BY: RAS	CERTIFIED BY: <i>Michael B. Weiss</i> REGISTERED PROFESSIONAL ENGINEER	DATE: 10/05/02	LIC. NO. 10502	STATE PROJ. NO.	T. H. 77 STA. 410+00 - 425+00
					SHEET NO. 15	OF 73 SHEETS



BLOOMINGTON

EXIT 7B
Normandale Blvd
OH 370-494
E0-2

EXIT 8
E Bush Lake Rd
1/4 MILE
OH 370-494
E0-3

EXIT 7B
SEE SHEET 44 FOR
SIGN PLACEMENT
D-3

SEE SHEET 44 FOR
SIGN PLACEMENT
C-24

SEE SHEET 44 FOR
SIGN PLACEMENT
C-24

SEE SHEET 44 FOR
SIGN PLACEMENT
EXIT 7B
D-2

EXIT 7A
100
1/4 MILE
OH 369-494
E0-1

EXIT 7B
34
Normandale Blvd
OH 369-494
E0-2

EXIT
25
M.P.H.
C-25

EXIT 7A
100
OH 371-494
E0-1

EMERGENCY
STOPPING
ONLY
C-20



PLOTTED/REVISED: 8/22/2011

DISTRICT: 3
PLOT NAME: 330PLOTNAME.dwg
PATH & FILENAME: 330PLOTNAME.dwg

T. H. 494 STA. 455+00 - 470+00	STATE PROJ. NO.	DATE	DRAWN BY:
SHEET NO. 16 OF 73 SHEETS	LIC. NO. 10502	MICHAEL R. WILSON	CHECKED BY: RAS
		CERTIFIED BY:	



BLOOMINGTON

OH 372-494

EXIT ONLY
100
EXIT 7A
E0-1

EXIT 7B
E0-2

Normandale Blvd
1/4 MILE
34

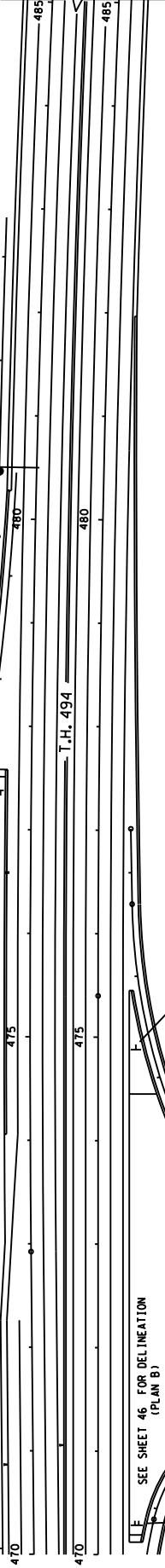
D-5

EXIT 7A
SEE SHEET 44 FOR
SIGN PLACEMENT

C-23

SEE SHEET 44 FOR
SIGN PLACEMENT

SEE SHEET 46 FOR DELINEATION
(PLAN A)



SEE SHEET 46 FOR DELINEATION
(PLAN B)

SEE SHEET 44 FOR
SIGN PLACEMENT

EXIT 7A

D-4

SEE SHEET 44 FOR
SIGN PLACEMENT

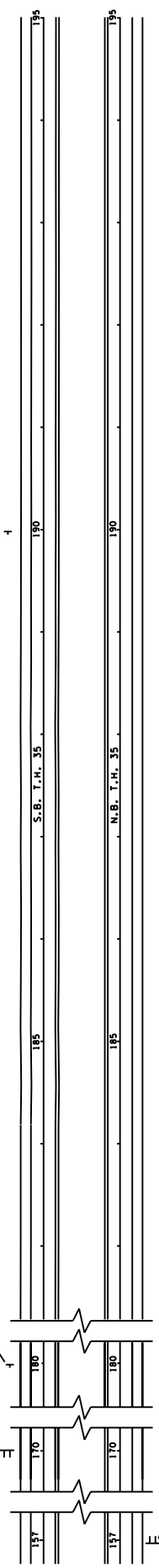
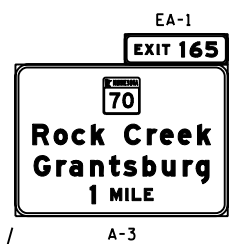
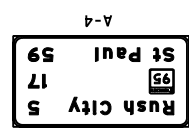
C-23

C-20

PLOTTED/REVISED: \$\$\$DATE\$\$\$

DISTRICT #: \$\$\$DISTRICT\$\$\$
PLOT NAME: \$\$\$PLOTNAME\$\$\$
PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$

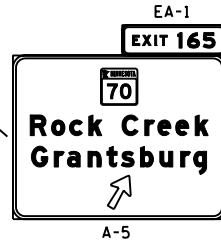
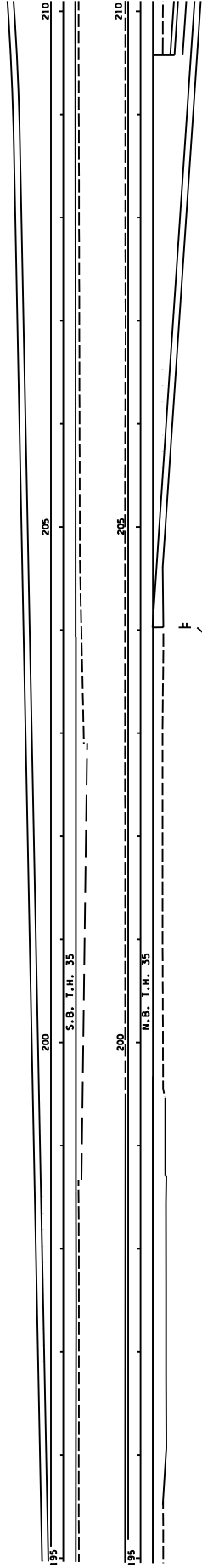
DRAWN BY:	CHECKED BY: RAS	CERTIFIED BY: <i>Michael R. Weiss</i> REGISTERED PROFESSIONAL ENGINEER	DATE: 10/05/02	LIC. NO. 10502	STATE PROJ. NO.	T. H. 494 STA. 470+00 - 485+00
					SHEET NO. 17 OF 73 SHEETS	



PLOTTED/REVISED: sssDATEssss

DISTRICT #: sssDISTRICTss
PLOT NAME: sssPLOTNAMEss
PATH & FILENAME: sssPATHFILENAMEssss

DRAWN BY:	CHECKED BY: RAS	CERTIFIED BY: <i>Michael R. Wiers</i> DESIGN PROFESSIONAL ENGINEER	STATE PROJ. NO.	T. H. 35	STA. 157 + 00 - 195 + 00
			SHEET NO. 19	OF 73	SHEETS



T. H. 35 STA. 195 + 00 - 210 + 00

STATE PROJ. NO.

DATE

LIC. NO. 10502

CERTIFIED BY *Michael R. Wiers*

CHECKED BY: RAS

DRAWN BY:

DISTRICT 1

PLANNING

DESIGN

CONSTRUCTION

MAINTENANCE

UTILITY

TRAFFIC

ENVIRONMENTAL

ARCHITECTURAL

LANDSCAPE

ART

PAINT

CONCRETE

ASPHALT

GRAVEL

SAND

WATER

SEWER

GAS

TELEPHONE

CABLE

POWER

WATER

SEWER

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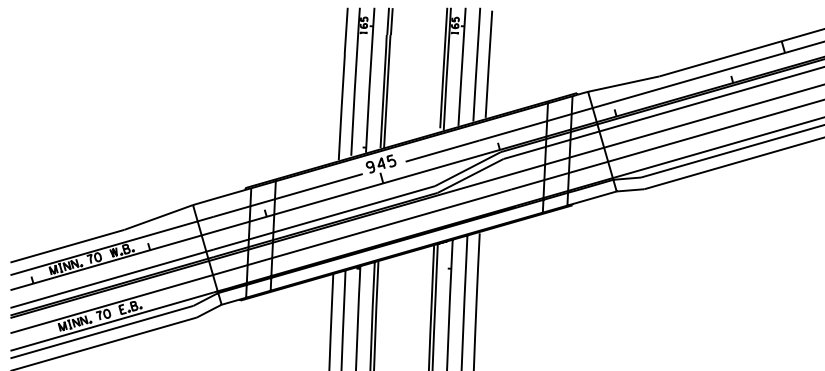
SEE SHEET 44 FOR
SIGN PLACEMENT



SEE SHEETS 25 & 26 FOR
MINNESOTA TO SIGNING

SEE SHEET 46 FOR DELINEATION
(PLAN A)

SEE SHEET 44 FOR
SIGN PLACEMENT



PLOTTED/REVISED: 8/28/2018

DISTRICT: 165
PLOT NAME: 165
PATH & FILENAME: 165

T. H. 35 STA. 210 + 00 - 225 + 00

STATE PROJ. NO.

DATE

LIC. NO.

CERTIFIED BY: Michael P. Wachs

CHECKED BY: RAS

DRAWN BY:

SHEET NO. 21 OF 73 SHEETS



D-19
Grantsburg
Rock Creek



D-6
EXIT
165
SEE SHEET 44 FOR
SIGN PLACEMENT

SEE SHEETS 25 & 26 FOR
MINNESOTA TO SIGNING

SEE SHEET 46 FOR DELINEATION
(PLAN A)

SEE SHEET 44 FOR
SIGN PLACEMENT



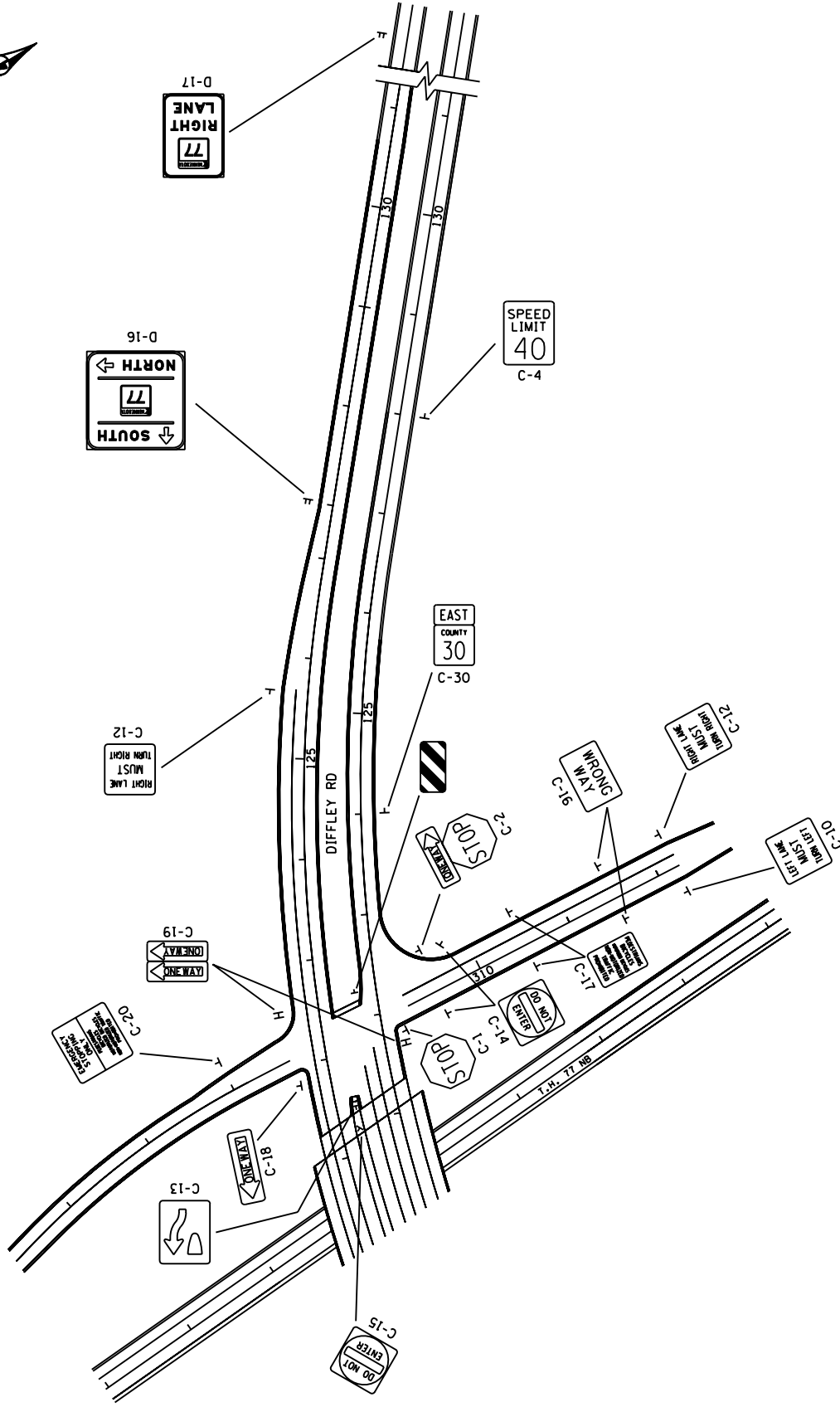
PLOTTED/REVISED: 8/22/2017

DISTRICT: 2
PLOT NAME: 880PLOTNAME088
PATH & FILENAME: 880PATHFILENAME088

DRAWN BY:	CHECKED BY: RAS	CERTIFIED BY: <i>Michael R. Wauson</i>	LIC. NO. 10502	DATE 8/22/2017	T. H. 35 STA. 225 + 00 - 240 + 00	
					STATE PROJ. NO.	SHEET NO. 22 OF 73 SHEETS



EAGAN



PLOTTED/REVISED: sss@DATEssss

DISTRICT #: sss@DISTRICTss
PLOT NAME: sss@PLOTNAMEss
PATH & FILENAME: sss@PATHFILENAMEssss

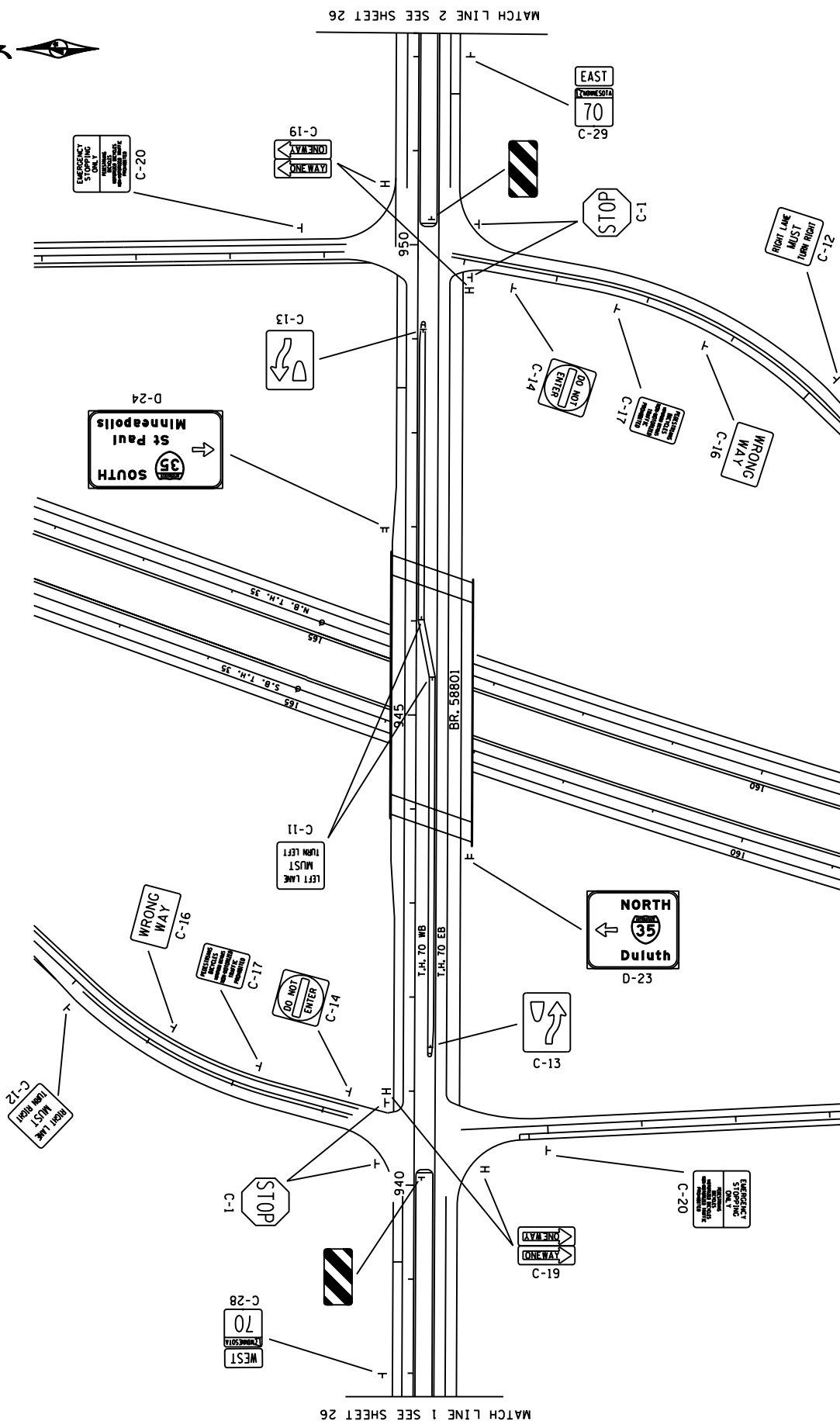
DIFFLEY ROAD INTERCHANGE 2 OF 2

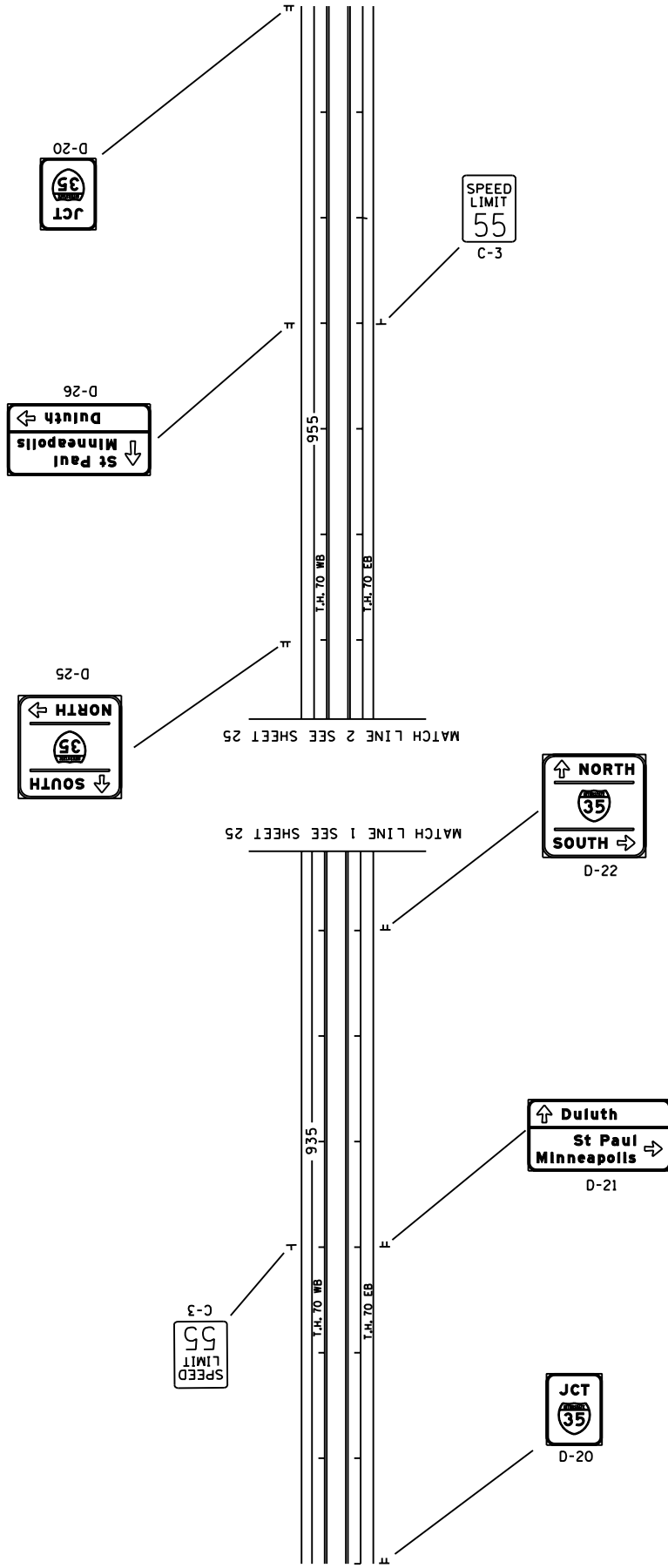
STATE PROJ. NO. SHEET NO. 24 OF 73 SHEETS

CERTIFIED BY: *Michael P. Wiers* LIC. NO. 10502 DATE: sss@DATEss

CHECKED BY: RAS

DRAWN BY:

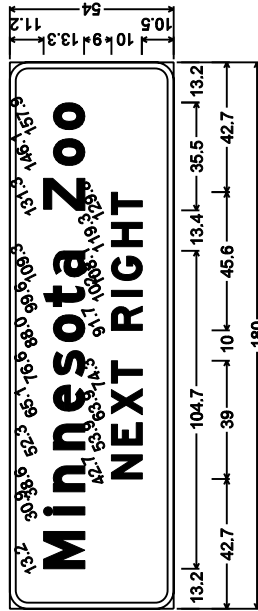




PLOTTED/REVISED: 8/20/2018

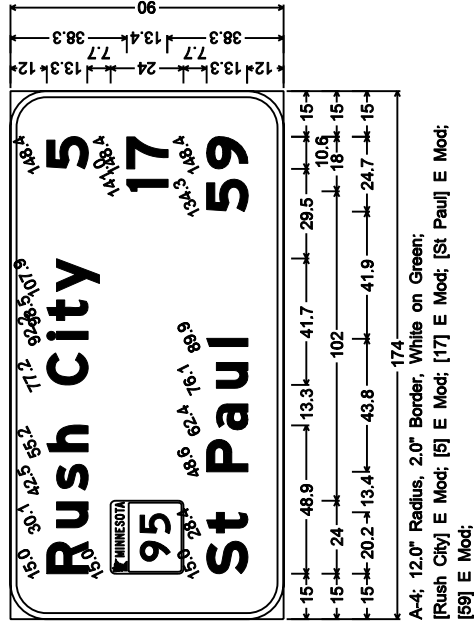
DISTRICT: 1
PLOT NAME: 88888888888888888888
PATH & FILENAME: 88888888888888888888

MINN. 70 INTERCHANGE SHEET 2 OF 2			
DRAWN BY:	CHECKED BY: RAS	CERTIFIED BY: <i>Michael R. Wines</i> LICENSED PROFESSIONAL ENGINEER	STATE PROJ. NO. _____
		DATE: 10/02/2018	SHEET NO. 26 OF 73 SHEETS



A-2; 6.0" Radius, 2.0" Border, White on Brown;
[Minnesota Zoo] E Mod; [NEXT RIGHT] E Mod;

DISTRICT: \$ODISTRICT\$
 PLOT NAME: \$OPILOTNAME\$
 PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$



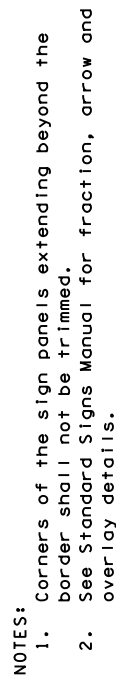
TYPE A SIGN PANELS

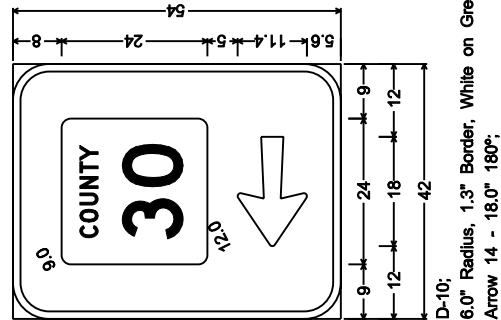
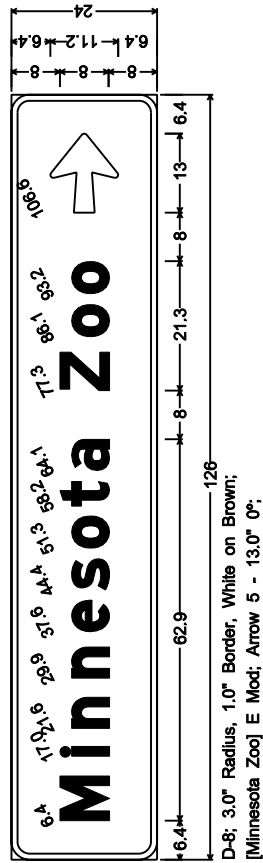
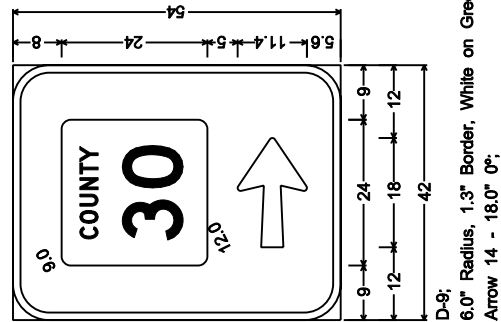
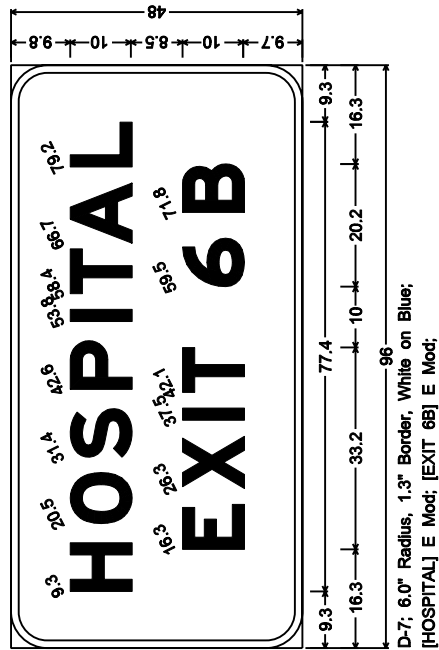
0502 DATE

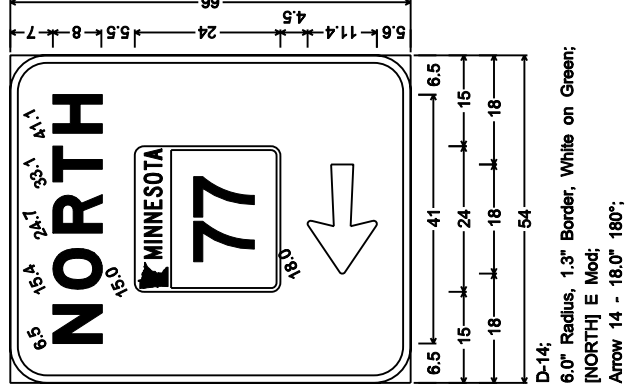
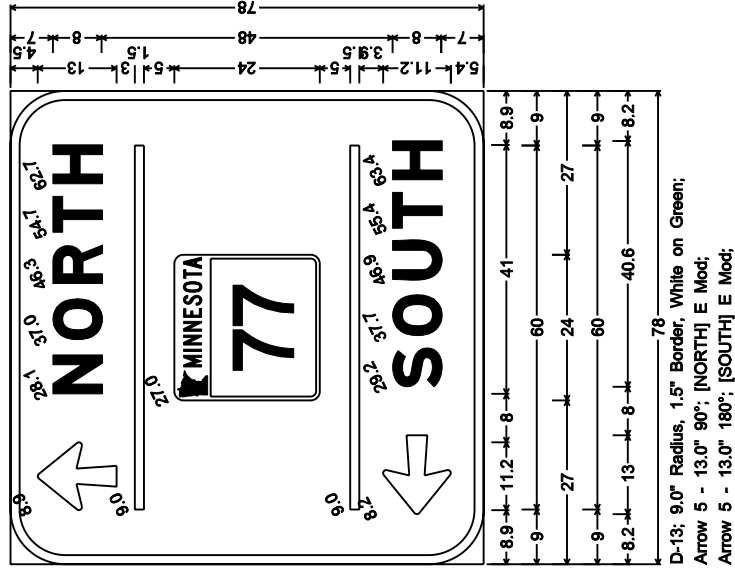
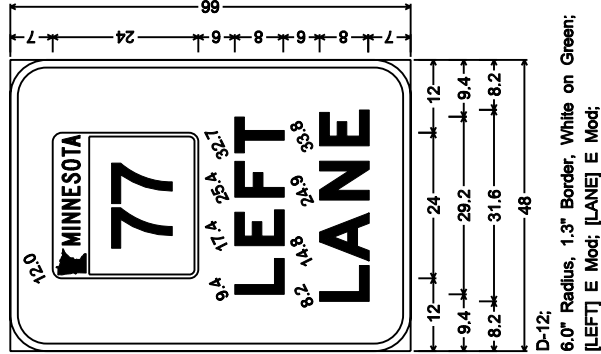
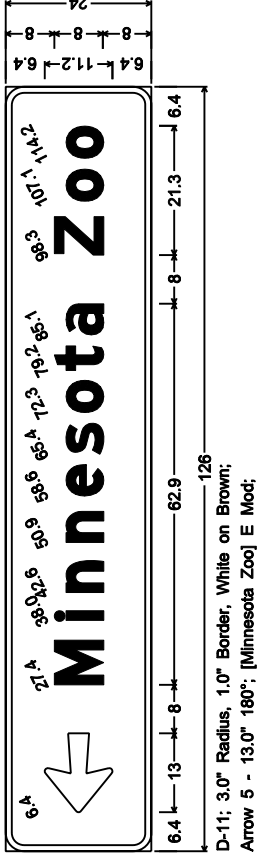
SHEET NO. 28

SHEETS

DISTRICT : \$DISTRICT\$
PLOT NAME: \$PLOTNAME\$
PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$







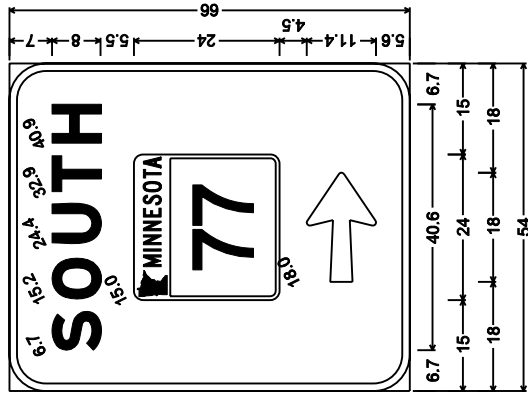
PLOTTED/REVISED: \$\$\$DATE\$\$\$

DISTRICT #: \$\$\$DISTRICT\$\$\$
PLOT NAME: \$\$\$PLOTNAME\$\$\$
PATH & FILENAME: \$\$\$PATH&FILENAME\$\$\$

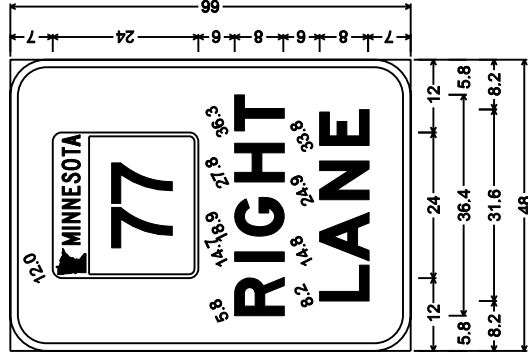
SEE SHEET 35 FOR NOTES

TYPE D SIGN PANELS

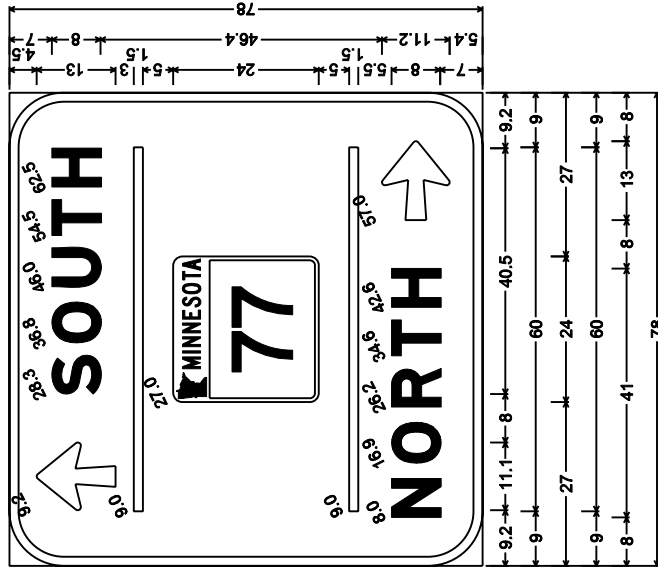
DRAWN BY: _____ CHECKED BY: RAS _____ CERTIFIED BY: *Michael D. Weiss* _____ LIC. NO. 10502 _____ DATE: 10/15/15 _____ STATE PROJ. NO. _____ SHEET NO. 31 OF 73 SHEETS



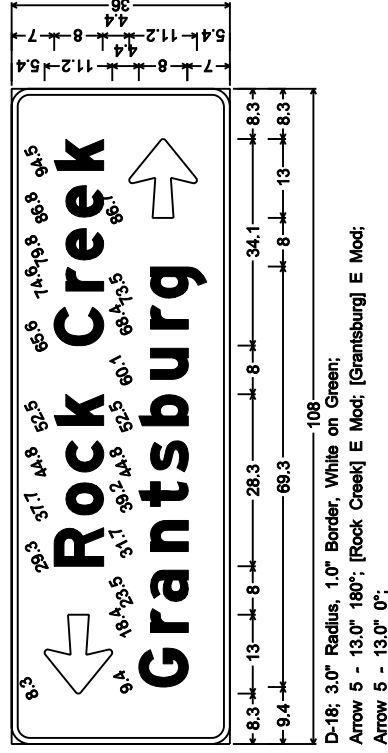
D-15;
6.0" Radius, 1.3" Border, White on Green;
[SOUTH] E Mod; Arrow 14 - 18.0" 0°;



D-17;
6.0" Radius, 1.3" Border, White on Green;
[RIGHT] E Mod; [LANE] E Mod;



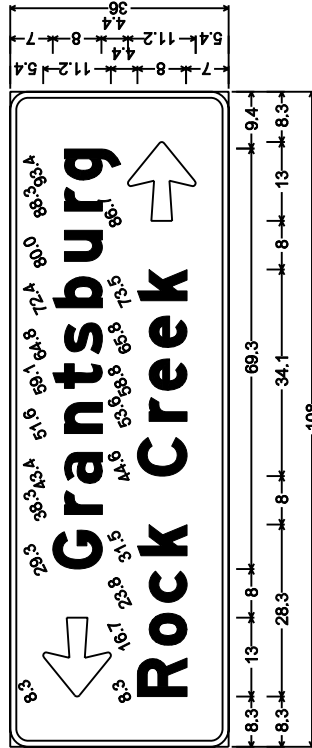
D-16: 9.0" Radius, 1.5" Border, White on Green;
Arrow 5 - 13.0" 90°; [SOUTH] E Mod; [NORTH] E Mod;
Arrow 5 - 13.0" 0°;



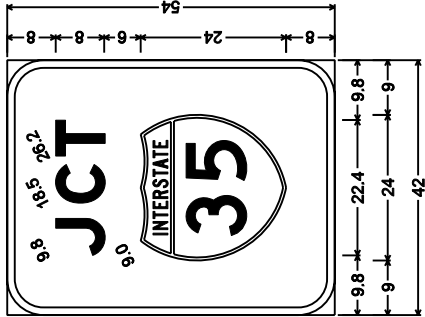
D-18; 3.0" Radius, 1.0" Border, White on Green;
Arrow 5 - 13.0" 180°; [Rock Creek] E Mod; [Grantsburg] E Mod;
Arrow 5 - 13.0" 0°;

PLOTTED/REVISED: 05/04/2011

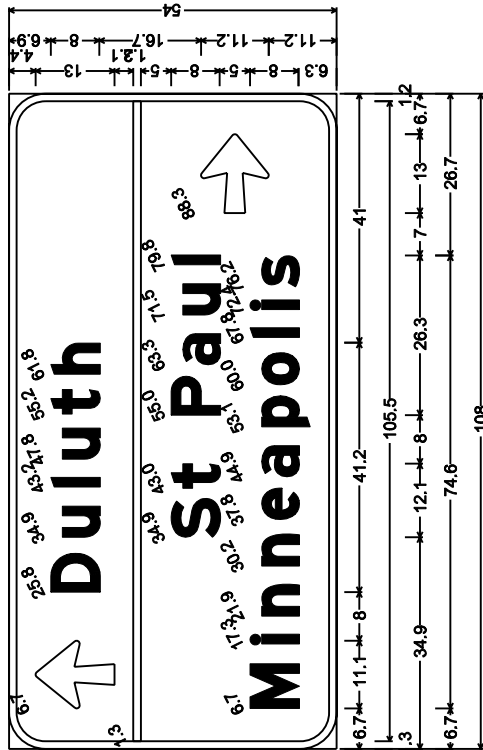
DISTRICT: 05
PLOT NAME: 050411
PATH & FILENAME: 050411



D-19: 3.0" Radius, 1.0" Border, White on Green;
Arrow 5 - 13.0" 180°; [Grantsburg] E Mod; [Rock Creek] E Mod;
Arrow 5 - 13.0" 0°;



D-20:
6.0" Radius, 1.3" Border, White on Green;
[JCT] E Mod;



D-21: 6.0" Radius, 1.3" Border, White on Green;
Arrow 5 - 13.0" 90°; [Duluth] E Mod; [St Paul] E Mod; [Minneapolis] E Mod;
Arrow 5 - 13.0" 0°;

SEE SHEET 35 FOR NOTES

TYPE D SIGN PANELS

STATE PROJ. NO.

SHEET NO. 33

OF 73 SHEETS

CHECKED BY: RAS

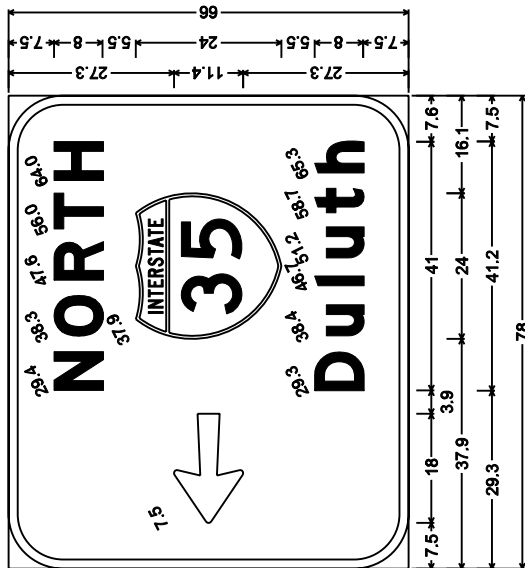
CERTIFIED BY: Michael R. Wachs

DATE: 05/04/2011

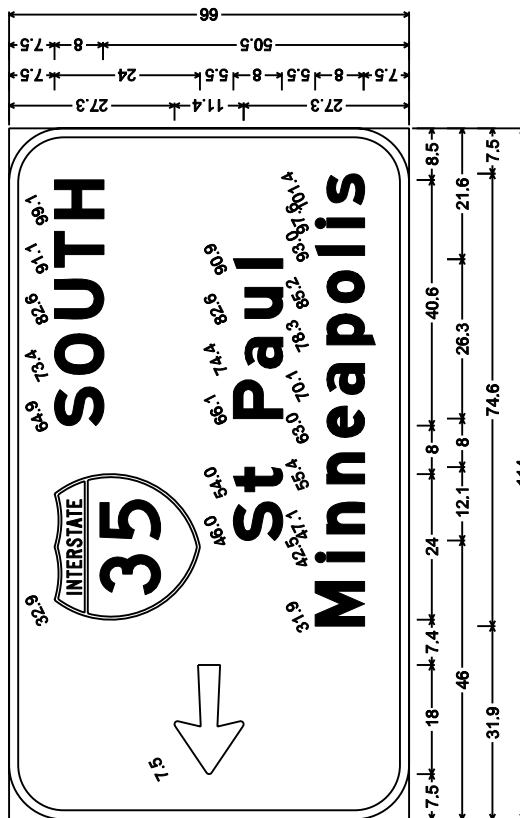
STATE PROJ. NO.

SHEET NO. 33

OF 73 SHEETS



D-23; 9.0" Radius, 1.5" Border, White on Green;
Arrow 14 - 18.0" 180°; [NORTH] E Mod;
[Duluth] E Mod;



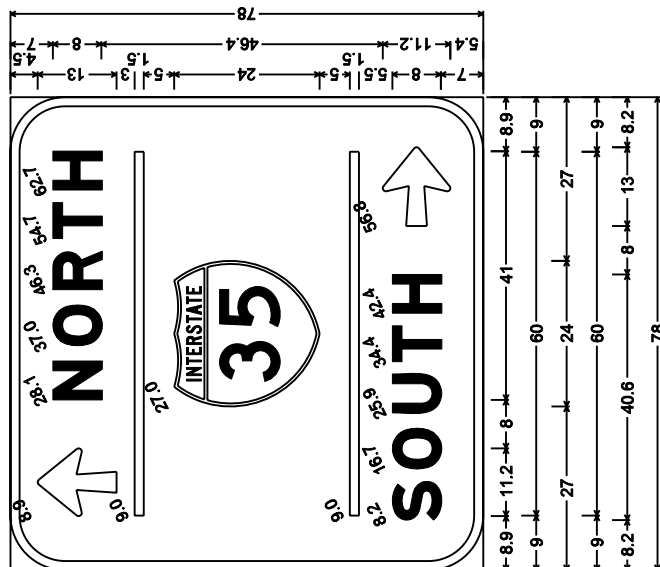
D-24; 9.0" Radius, 1.5" Border, White on Green; 114
Arrow 14 - 18.0" 180°; [SOUTH] E Mod; [St Paul] E Mod; [Minneapolis] E Mod;

SEE SHEET 35 FOR NOTES

TYPE D SIGN PANELS

STATE PROJ. NO.

SHEET NO. 34 OF 73 SHEETS



Arrow 5 - 13.0" 0°;
Arrow 5 - 13.0" 0°;

PLOTTED/REVISED: \$\$\$DATE\$\$\$

DISTRICT: \$DISTRICT\$
PLOT NAME: \$PLOT\$NAME\$
PATH & FILENAME: \$\$\$PATH\$FILENAME\$\$\$

DRAWN BY:

CHECKED BY: RAS

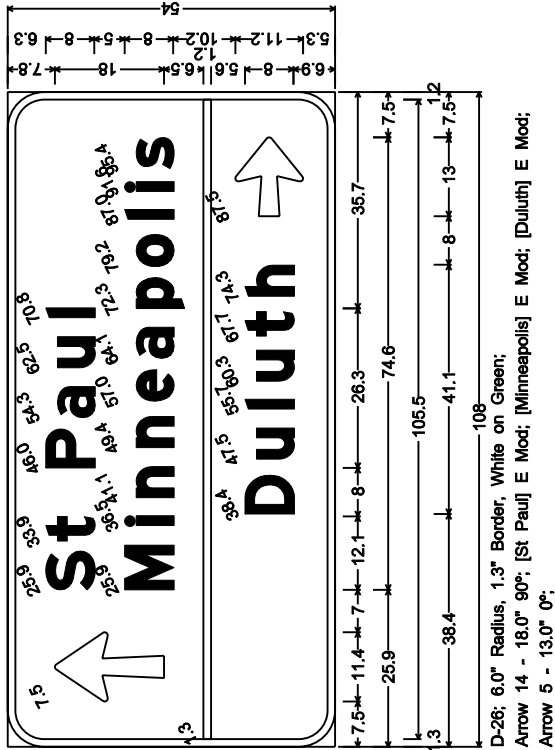
CERTIFIED BY

Michael B. Weiss

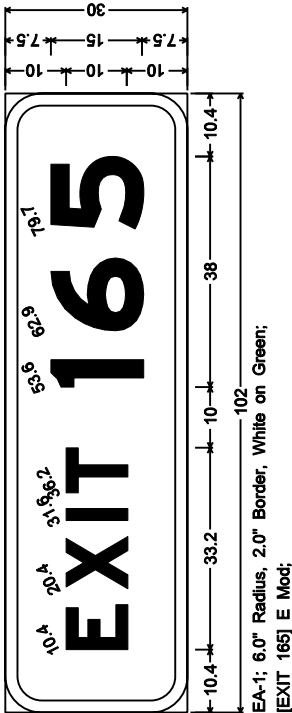
DATE \$DATE \$

STATE PROJ. NO.

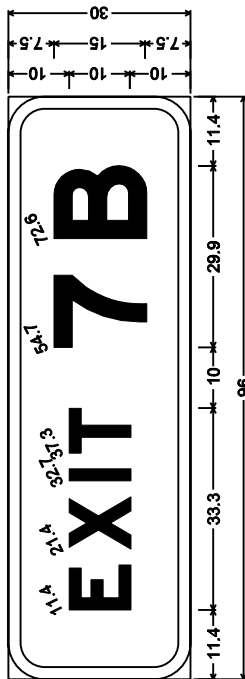
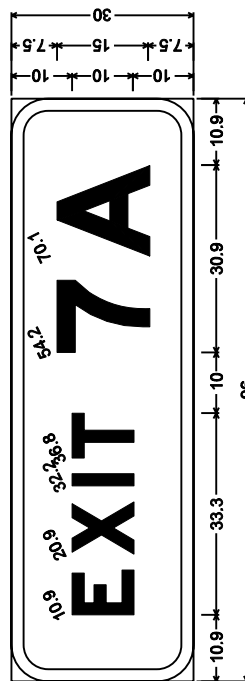
SHEET NO. 34 OF 73 SHEETS



1. Corners of the sign panels extending beyond the border shall not be trimmed.
2. See Standard Signs Manual for arrow, fraction and overlay details.

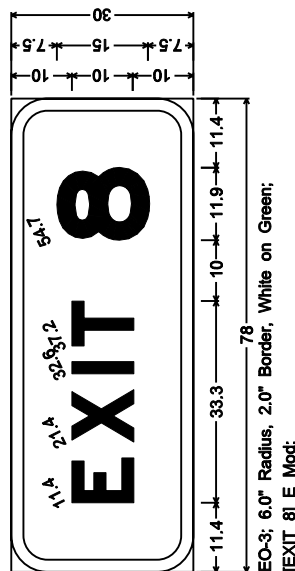


NOTE:
1. Corners of the sign panels extending beyond the border shall not be trimmed.



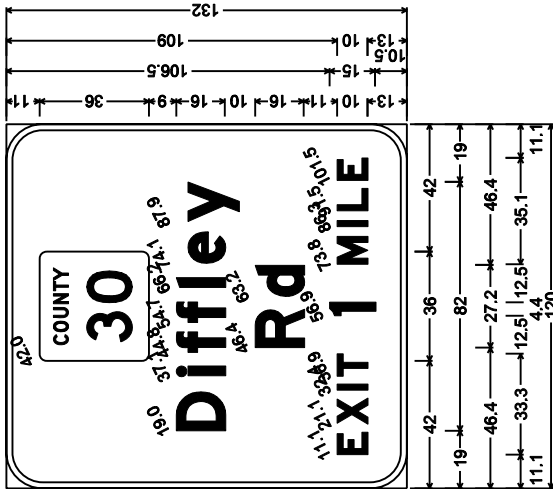
NOTE:

- 1.1. Corners of the sign panels extending beyond the border shall not be trimmed.

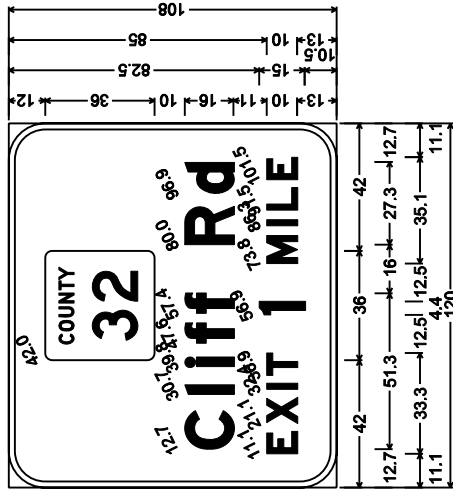


PLOTTED/REVISED: 05/05/2017

DISTRICT #: 0001
PLOT NAME: 0001
PATH & FILENAME: 0001



OH 1-77;
12.0" Radius, 2.0" Border, White on Green;
[Diffley] E Mod; [Rd] E Mod;
[EXIT 1 MILE] E Mod;



OH 2-77;
12.0" Radius, 2.0" Border, White on Green;
[Cliff Rd] E Mod; [EXIT 1 MILE] E Mod;

SEE SHEET 42 FOR NOTES

TYPE OH SIGN PANELS

DRAWN BY:

CHECKED BY: RAS

CERTIFIED BY:

Michael B. Weiss
Professional Engineer
0001

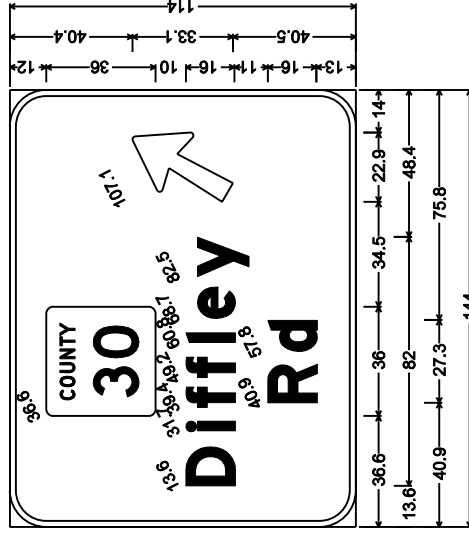
LIC. NO. 10502

DATE 05/05/2017

STATE PROJ. NO.

SHEET NO. 38 OF 73 SHEETS

DISTRICT : \$SDISTRICT\$
PLOT NAME: \$SDPLOTNAME\$
PATH & FILENAME: \$SDPATHFILENAME\$



OH 3-77(L);
12.0" Radius, 2.0" Border, White on Green;
[St Paul] E Mod; [Shakopee] E Mod;
[EXITS 3/4 MILE] E Mod;

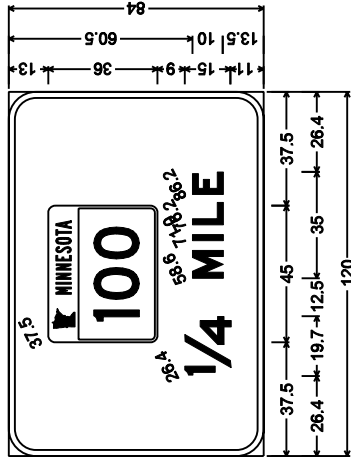
TYPE OH SIGN PANELS

10502 DATE \$DATE\$

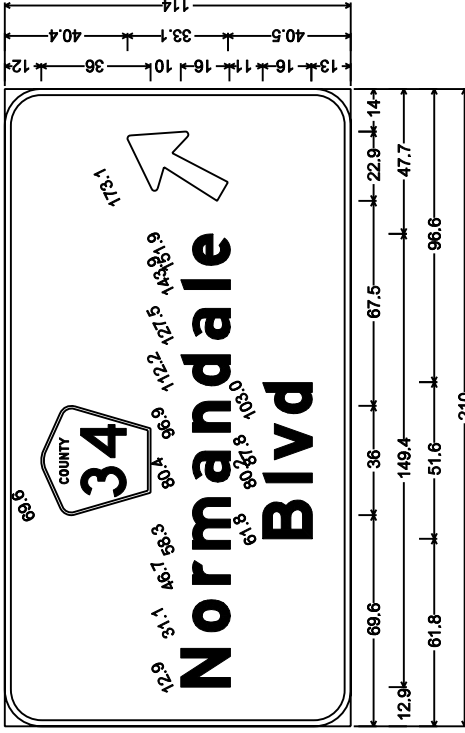
CERTIFIED BY

DRAWN BY:

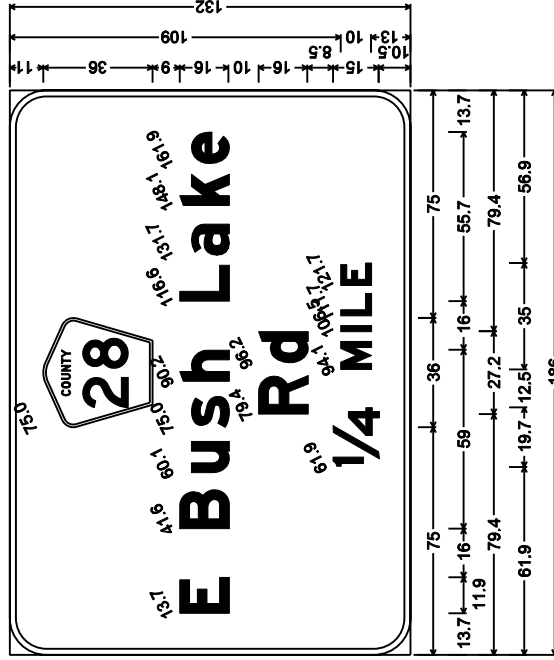
SHEETS



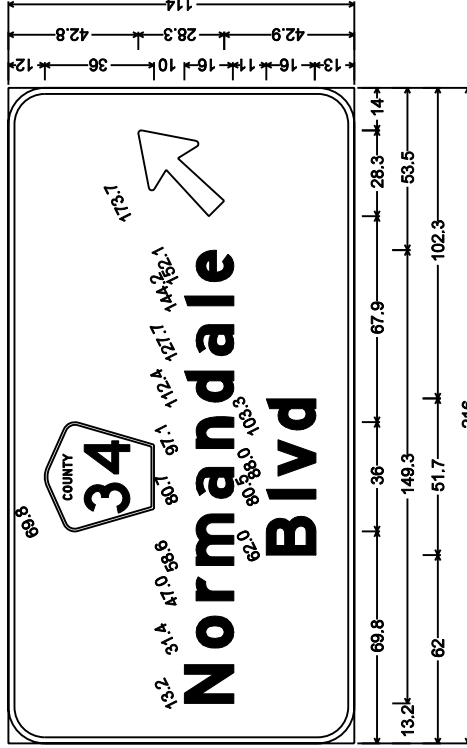
OH 369-494(L);
9.0" Radius, 2.0" Border, White on Green;
[1/4 MILE] E Mod;



OH 369-494(R) ; 12.0" Radius, 2.0" Border, White on Green;
[Normandale] E Mod; [Blvd] E Mod; Arrow 17 - 36.0" 60°;



OH 370-494(L); 12.0" Radius, 2.0" Border, White on Green;
[E Bush Lake] E Mod; [Rd] E Mod; [1/4 MILE] E Mod;



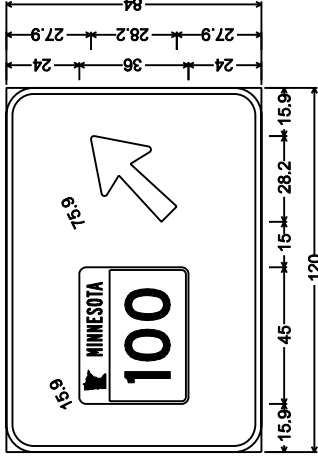
OH 370-494(R) ; 12.0" Radius, 2.0" Border, White on Green;
[Normandale] E Mod; [Blvd] E Mod; Arrow 17 - 36.0" 45°;

PLOTTED/REVISED: \$\$\$DATE\$\$\$

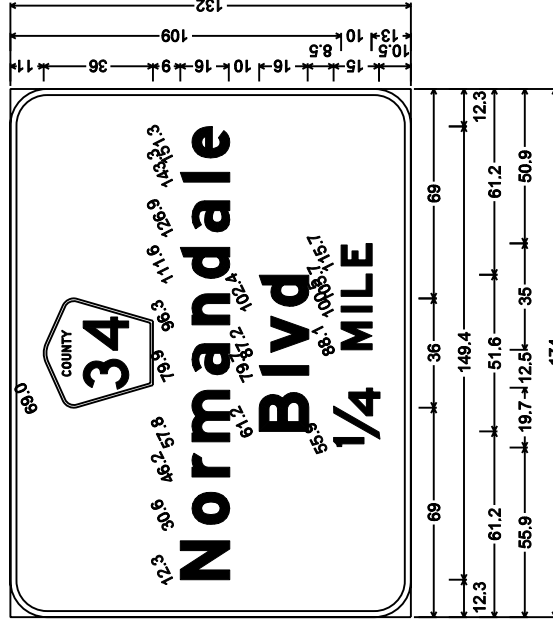
DISTRICT #: \$\$\$DISTRICT\$\$\$
PLOT NAME: \$\$\$PLOTNAME\$\$\$
PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$

SEE SHEET 42 FOR NOTES

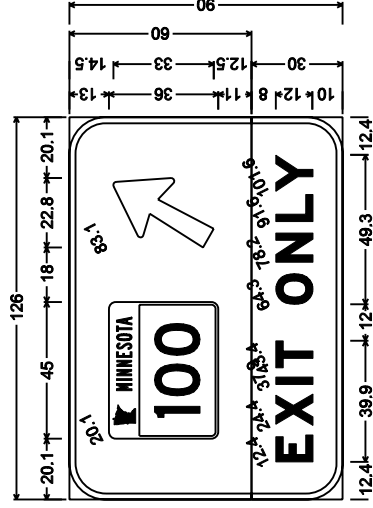
DRAWN BY:	CHECKED BY: RAS	CERTIFIED BY: <i>Michael P. Walsh</i> Professional Engineer	DATE: 10/05/02	LIC. NO.: 10502	STATE PROJ. NO.	TYPE OH SIGN PANELS	SHEET NO. 40	OF 73	SHEETS
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OH 371-494;
9.0" Radius, 2.0" Border, White on Green;
Arrow 17 - 36.0" 45°;



OH 372-494(L); 12.0" Radius, 2.0" Border, White on Green;
[Normandale] E Mod; [Blvd] E Mod; [1/4 MILE] E Mod;



OH 372-494(R);
12.0" Radius, 2.0" Border, White on Green;
Arrow 17 - 36.0" 60°;
12.0" Radius, 2.0" Border, White on Yellow;
[EXIT ONLY] Black E Mod;

SEE SHEET 42 FOR NOTES

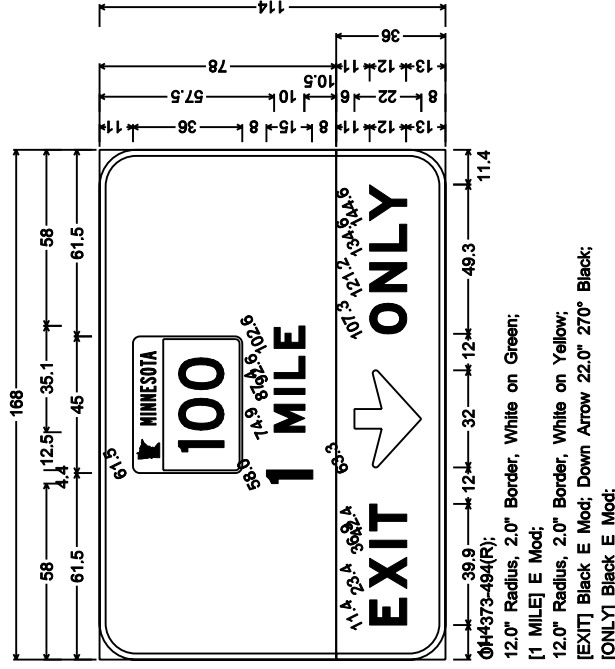
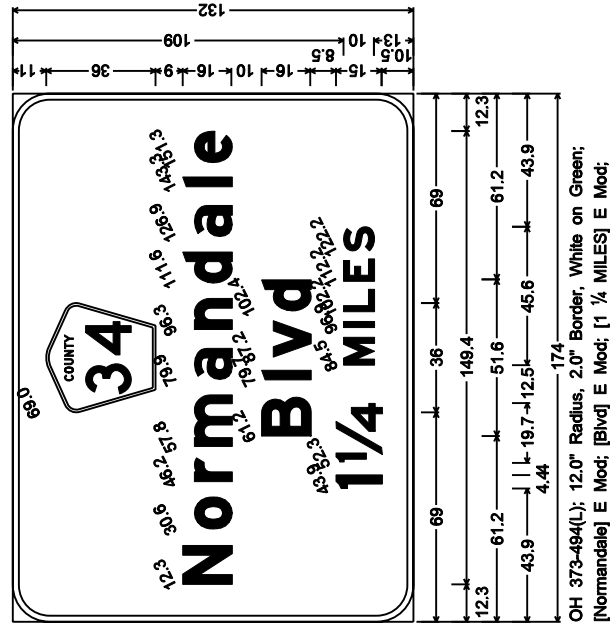
TYPE OH SIGN PANELS

STATE PROJ. NO. SHEET NO. 41 OF 73 SHEETS

CHECKED BY: RAS

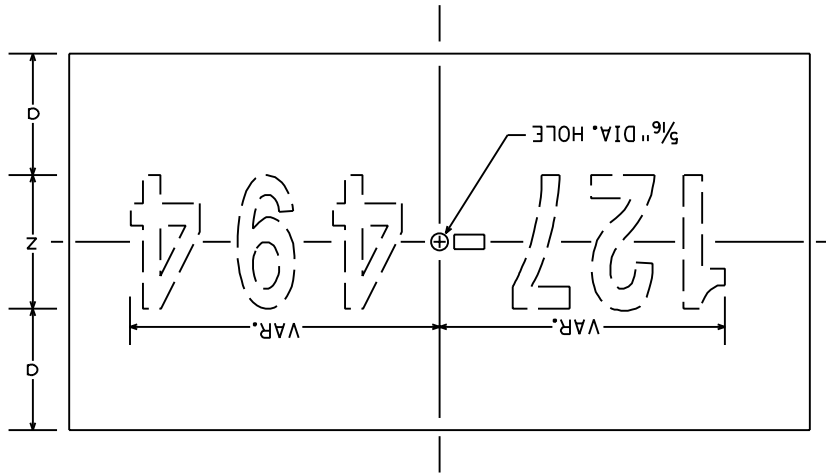
CERTIFIED BY: Michael R. Weiss

LIC. NO. 10502 DATE 05/05/2011



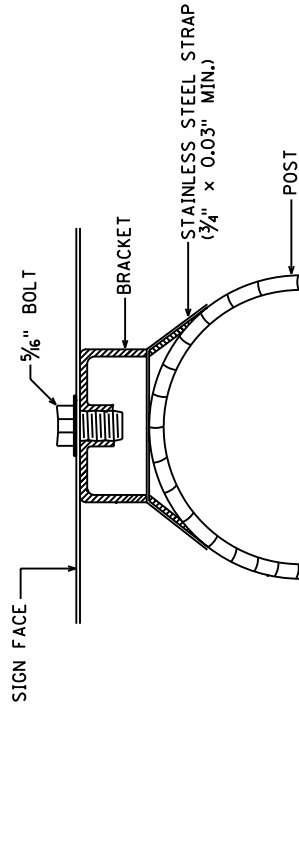
NOTES:

1. Corners of the sign panel extending beyond the border shall not be trimmed.
2. See Standard Signs Manual for arrow, fraction and overlay details.



NOTES: 1) ALL DIMENSIONS AND SIZES SHOWN ARE IN INCHES.
2) USE APPROPRIATE NUMERALS.
3) PLATE MATERIAL - (MN/DOT 3352.2A1B).
4) GREEN BACKGROUND - (MN/DOT 3352.2A2B).
5) WHITE NUMERALS OR LETTERS - (MN/DOT 3352.2A2B).

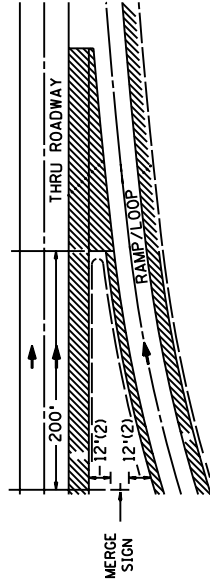
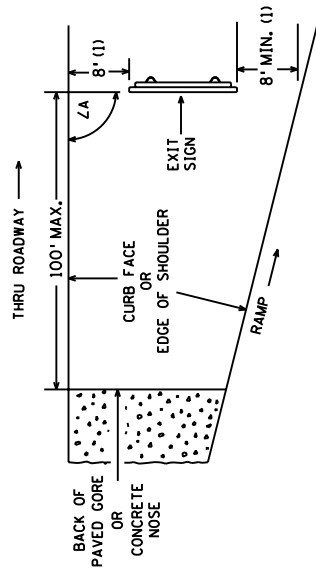
SIZE DIMENSION	RADIUS MARGIN BORDER	2	PUNCH CODE																									
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
12x6																												2-C



GALVANIZED OR STAINLESS
STEEL BRACKET, BOLT AND
WASHER.

STRAP MOUNTING DETAIL

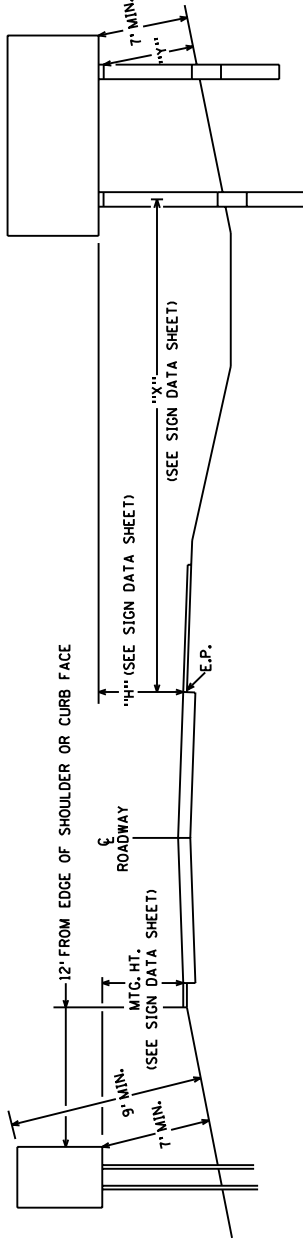
GORE PLACEMENT



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 OTSO SIGNING UNIT.
- (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 OTSO SIGNING UNIT.

ROADSIDE PLACEMENT



ROUTE MARKER, REGULATORY & WARNING SIGNS - TYPE C MINOR GUIDE SIGNS - TYPE D

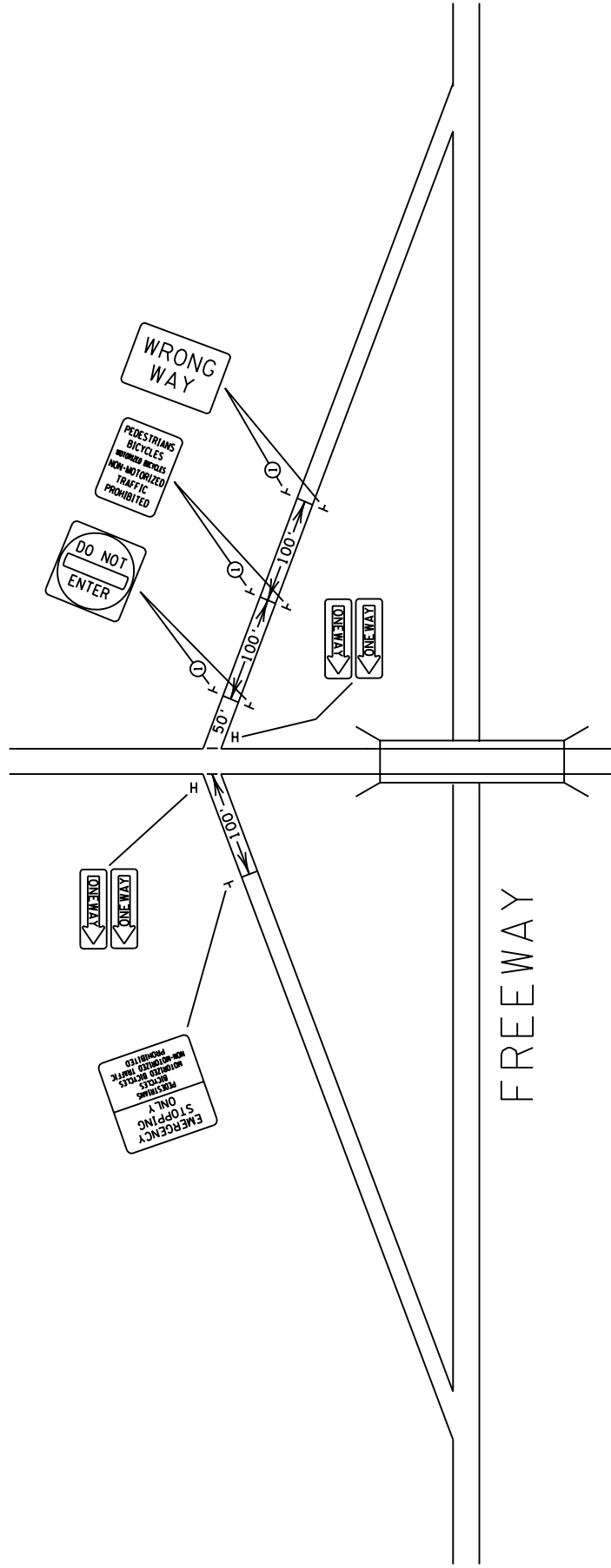
MAJOR GUIDE SIGN - TYPE A

NOTES:

1. IF A SECONDARY SIGN IS MOUNTED BELOW A MAJOR SIGN, THE MAJOR SIGN SHALL BE AT LEAST 8' ABOVE THE PAVEMENT EDGE AND THE SECONDARY SIGN AT LEAST 5'.
2. ALL ROUTE MARKERS, WARNING AND REGULATORY SIGNS SHALL BE AT LEAST 6' ABOVE PAVEMENT EDGE EXCEPT WHERE HEAVY PEDESTRIAN TRAFFIC IS ENCOUNTERED THEY SHALL BE 7'.
3. SIGN FACES SHALL BE VERTICAL.
4. OVERHEAD SIGNS SHALL BE POSITIONED AT RIGHT ANGLES TO THE THRU ROADWAY UNLESS OTHERWISE NOTED.
5. TO AVOID SPECULAR GLARE, $\angle A$ SHALL BE APPROXIMATELY 93° FOR SIGNS LOCATED LESS THAN 30' FROM THE EDGE OF PAVEMENT AND APPROXIMATELY 92° FOR SIGNS LOCATED 30' OR MORE FROM EDGE OF PAVEMENT. THIS APPLIES TO SIGNS TYPE A, C, & D AND INCLUDES SIGNS IN THE GORE.
6. "Y" IS THE PERPENDICULAR DISTANCE FROM THE GROUND LINE TO THE FRICTION FUSE ON THE POST, THIS DISTANCE SHALL BE AT LEAST 7'.
7. WHERE "X" IS LESS THAN 30', "H" SHALL BE $7' \pm 6"$, WHERE "X" IS 30' OR GREATER, MINIMUM AND PREFERRED "H" IS 5'.
8. LATERAL CLEARANCES GIVEN APPLY TO RIGHT AND OR LEFT SIDE INSTALLATION.
9. WHEN A TYPE A SIGN IS INSTALLED DIRECTLY BEHIND TRAFFIC BARRIER, THE LEFT EDGE OF THE SIGN PANEL SHALL BE LOCATED A MINIMUM OF 4 FEET BEHIND THE FACE OF THE TRAFFIC BARRIER.

SIGN PLACEMENT

REvised 4-7-06



① ADDITIONAL SIGN REQUIRED WHEN RAMP IS 3 LANES OR WIDER

STANDARD SIGN PLACEMENT

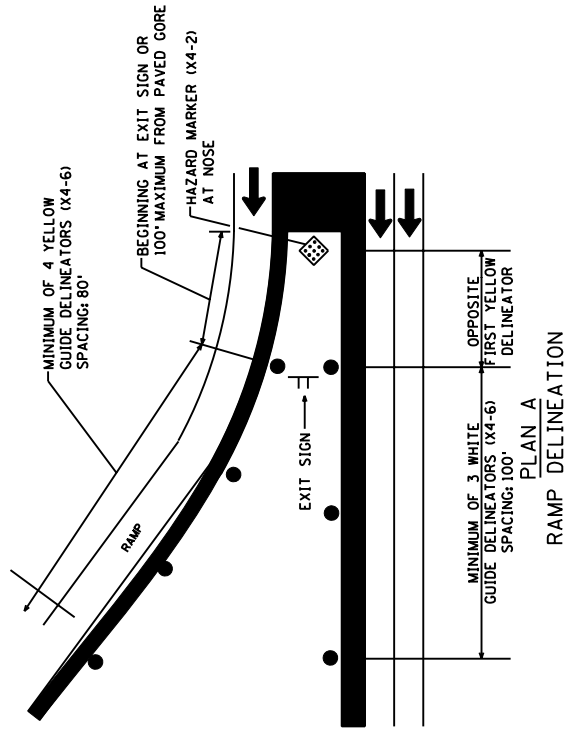
REGULATORY, WRONG WAY, AND EXCLUSION SIGNS ON FREEWAY DIAMOND INTERCHANGE RAMP

STATE PROJ. NO.

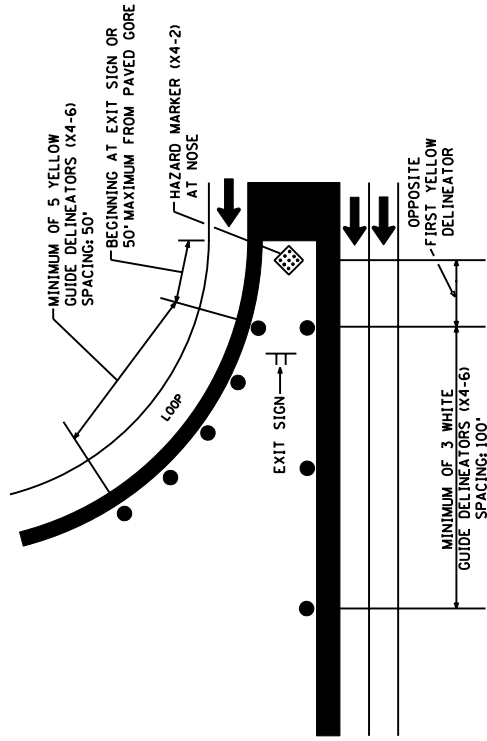
SHEET NO. 45 OF 73 SHEETS

PLOTTED/REVISED: \$\$\$DATE\$\$\$

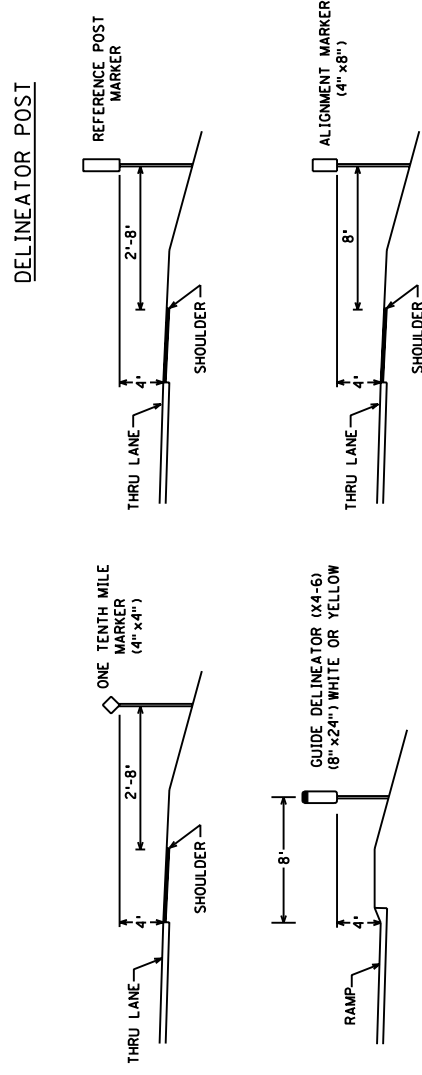
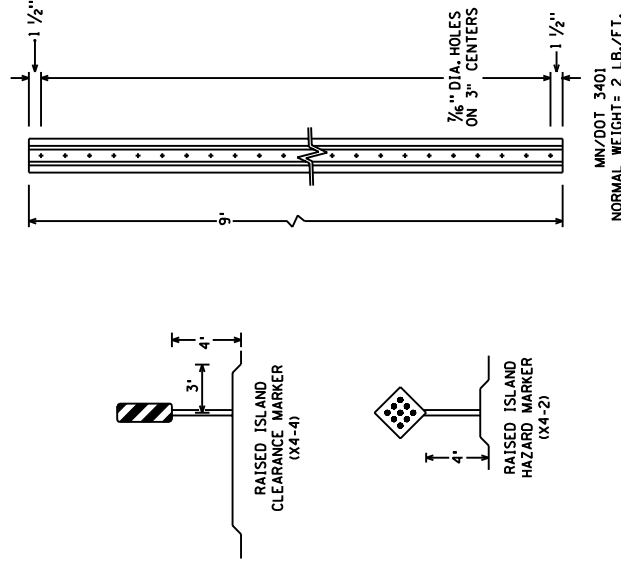
DISTRICT: \$\$\$DISTRICT\$\$\$
PLOT NAME: \$\$\$PLOTNAME\$\$\$
PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$



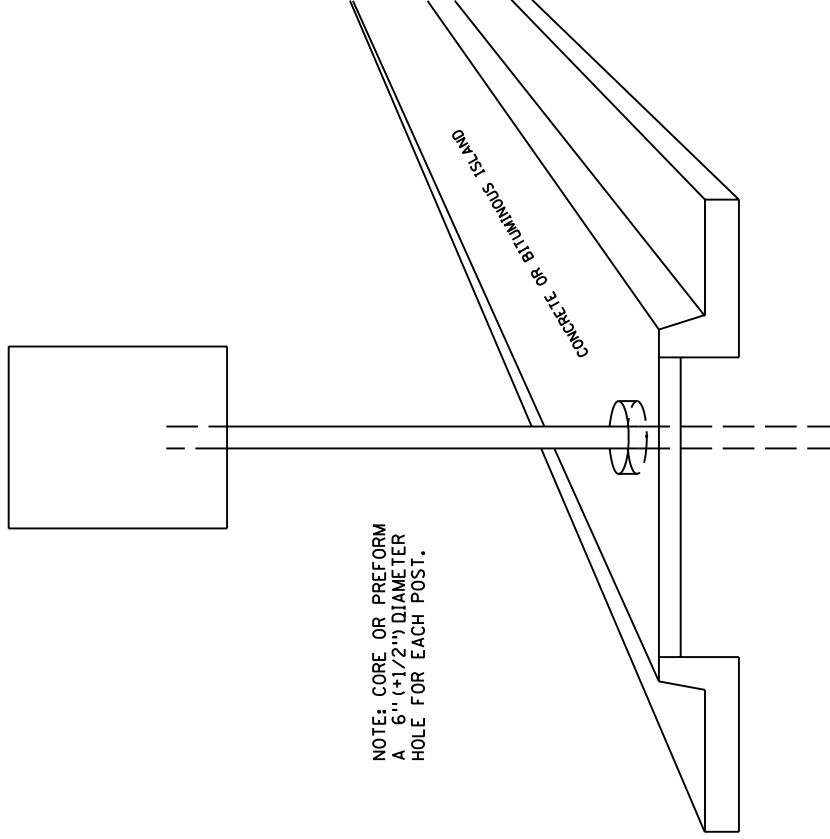
PLAN A
RAMP DELINEATION



PLAN B
LOOP DELINEATION



DELINEATORS AND MARKERS



FLANGED CHANNEL POST MOUNTED THROUGH SURFACED
MEDIAN OR SIDEWALK

1. ASSEMBLE SIGN POST TO STUB POST WITH BOLTS AND WITH ONE OF THE FLAT WASHERS ON EACH BOLT BETWEEN PLATES.

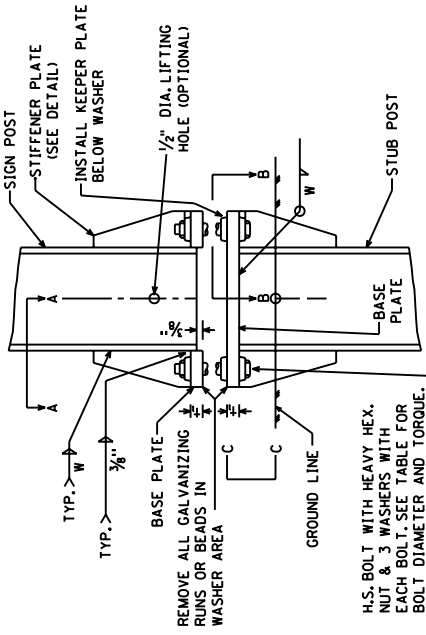
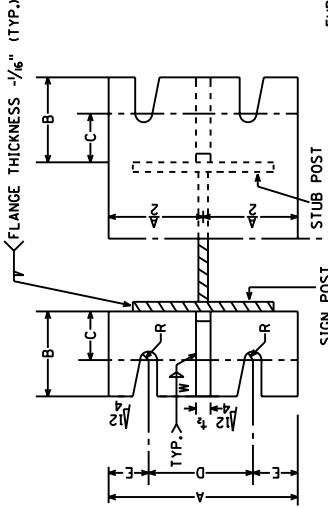
2. SHIM AS REQUIRED TO PLUMB POST.
3. TIGHTEN ALL BOLTS THE MAXIMUM POSSIBLE WITH 12" OR 15" WRENCH TO BED WASHERS AND SHIMS AND TO CLEAN BOLT THREADS, THEN LOOSEN EACH BOLT IN TURN AND RETIGHTEN IN A SYSTEMATIC ORDER TO THE PRESCRIBED TORQUE. (SEE TABLE)
4. BURR THREADS AT JUNCTION WITH NUT USING A CENTER PUNCH TO PREVENT NUT LOOSENING.



SECTION A-A | SECTION B-B

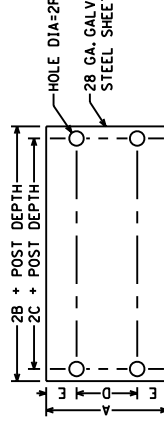
(SEE TABLE FOR DIMENSIONS)

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.

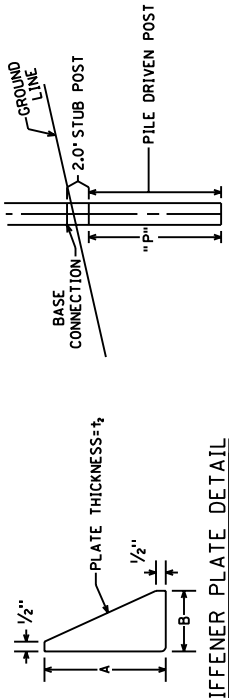


SIGN POST AND STUB POST

ELEVATION



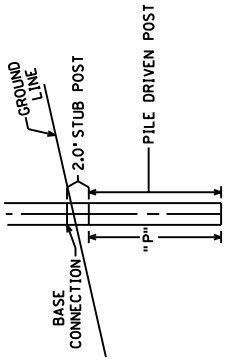
KEEPER PLATE



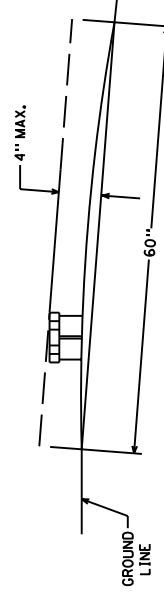
STIFFENER PLATE DETAILS

(SEE TABLE FOR DIMENSIONS)

H-PILE FOOTING



VIEW C-C



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.

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

DIMENSION		BASE CONNECTION DATA										FUSE AND HINGE PLATE DATA										FOOTING DATA			
POST SIZE	BOL T 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	BOL T DIA.	STUB LENGTH ①	H PILE POST "P" MIN.	POST LENGTH		
		W4X13	¾" DIA. x 3-½" TORQUE=600"	6"	2½"	1½"	3½"	1½"	1"	½"	13/32"	2"	1¼"	4"	2¼"	7/8"	1"	1/16"	¾"	¾"	¾"	¾"	2'	12"	12"
W5X16											2½"	1¼"	5"	2¾"	1 1/8"	1 1/8"	¾"	7/8"	¾"	¾"	2'	12"	12"		
W6X20	7/8" DIA. x 4-½" TORQUE=800"	8"	3"	1¾"	4"	2"	1¼"	½"	¼"	15/32"	2½"	1¼"	6"	3½"	1¼"	1 1/8"	1/16"	1 1/8"	¾"	¾"	¾"	2'	12"	12"	
W8X24											2½"	1½"	6½"	3½"	1½"	1 1/2"	15/16"	1¼"	1½"	1½"	¾"	2'	12"	12"	
W8X28	1" DIA. x 5" TORQUE=1000"	8"	3"	2"	4"	2"	1½"	¾"	¾"	17/32"	2½"	1½"	6½"	3½"	1½"	1 1/8"	1/16"	1 1/8"	1½"	1½"	1"	2'	12"	12"	
W8X31	1-1/8" DIA. x 5"										3"	1¾"	8"	5½"	1¼"	2"	1/16"	1½"	1½"	1½"	1"	2'	12"	12"	
W10X39	TORQUE=1200"	9"	3½"	2"	5"	2"	1½"	¾"	¾"	19/32"	3"	1¾"	8"	5½"	1¼"	1 7/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	2'	12"	12"	

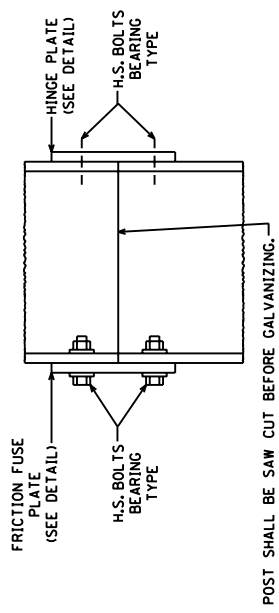
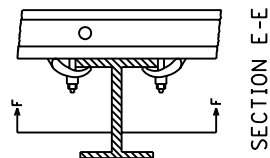
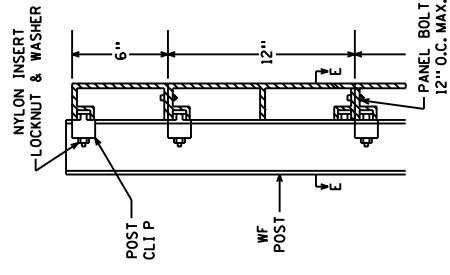
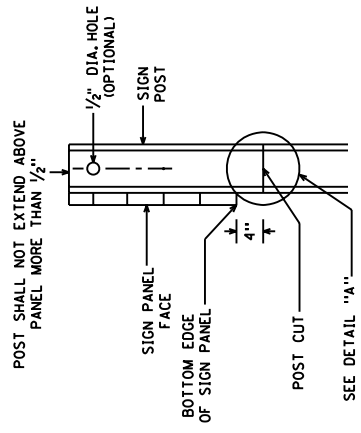
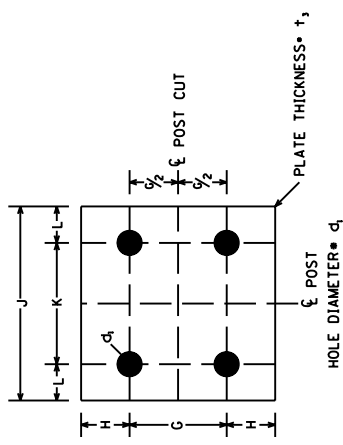
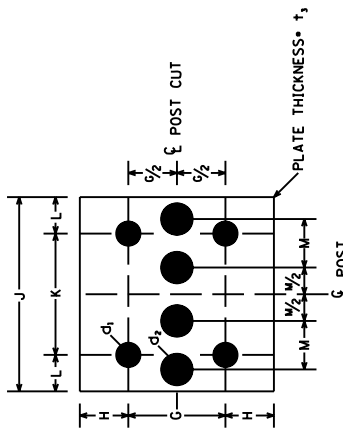
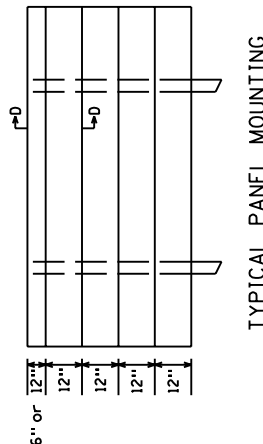
TYPE A SIGN STRUCTURAL DETAILS

H-PILE FOOTING
SHEET 1 OF 2

Revised 9-10-01

STATE PROJ. NO.

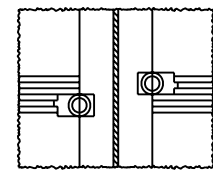
SHEET NO. 48 OF 73 SHEETS



SECTION D-D

SECTION E-E

DETAIL "A" FRICTION FUSE



NOTE: POST CLIPS SHALL BE INSTALLED ON BOTH SIDES OF EACH POST AT EACH PANEL JOINT AS INDICATED.

SECTION F-F

GENERAL NOTES:

1. STRUCTURAL STEEL SHALL CONFORM TO MN/DOT 3308. REINFORCING BARS SHALL CONFORM TO MN/DOT 3301. SPIRALS SHALL CONFORM TO MN/DOT 3305-NO SPLICES. HIGH STRENGTH BOLTS SHALL CONFORM TO A.S.T.M.-A325.
2. FORMS WILL BE REQUIRED FOR THE EXPOSED VERTICAL SURFACES OF THE FOOTINGS.
3. REFER TO "SIGN DATA" SHEET FOR SPECIFIC DATA ON EACH INDIVIDUAL SIGN INSTALLATION.
4. FRICTION FUSE PLATE SHALL BE INSTALLED ON SIDE OF POST FACING TRAFFIC.
5. 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 MN/DOT 2471.3C4 AND MN/DOT 2471.3G4.

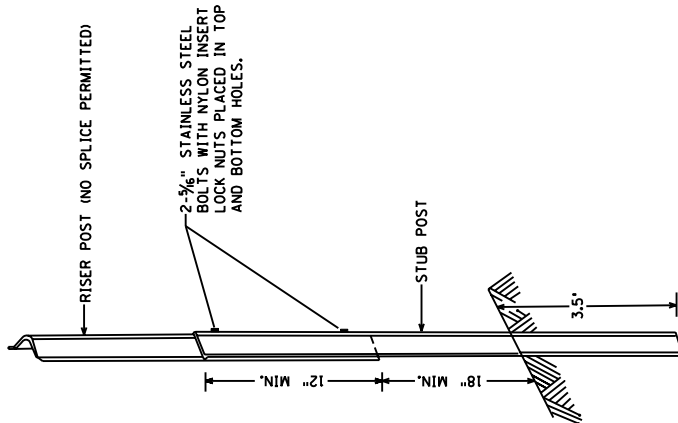
CONTRACTOR NOTE: ALL FRICTION FUSE BOLTS SHALL BE TORQUE WRENCH TIGHTENED IN THE FIELD IN THE PRESENCE OF THE ENGINEER OR HIS REPRESENTATIVE. NUTS SHALL HAVE BEEN RETAPPED AND BOLT THREADS SHALL HAVE BEEN CLEANED WITH A 1/64" OVERSIZED RETREADING DIE AFTER GALVANIZING. BEFORE TIGHTENING MAY BEGIN, THE 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*

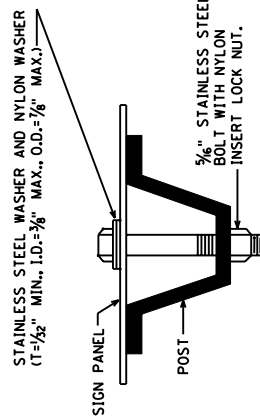
TYPE A SIGN STRUCTURAL DETAILS

SHEET 2 OF 2

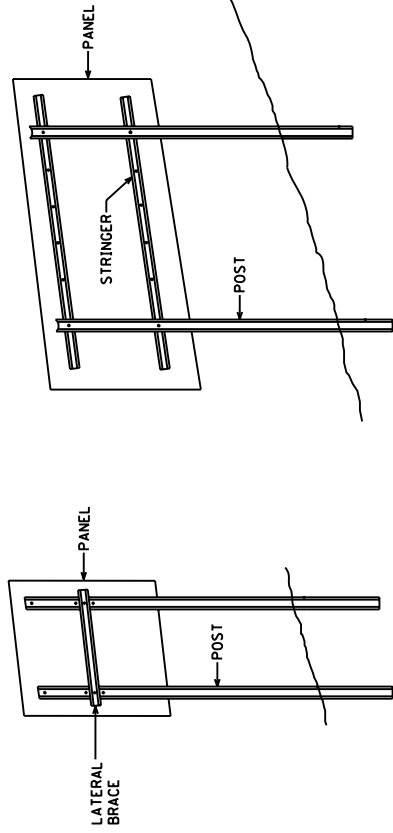
TYPE C & D POST



U POST SPlice

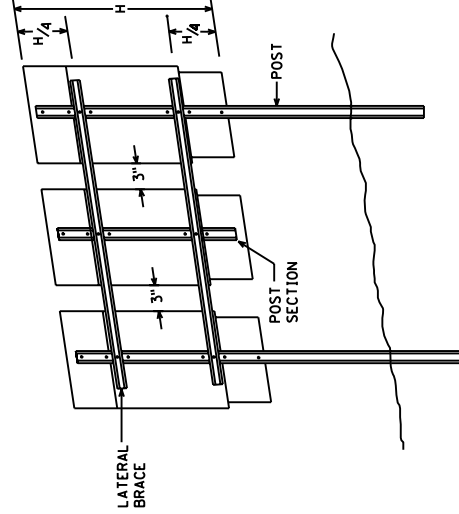


U POST MOUNTING TYPE C SIGNS



TYPICAL TYPE C INSTALLATION

TYPICAL TYPE D INSTALLATION



MODIFIED TYPE C INSTALLATION

NOTES:

1. USE 3" STUB POSTS, RISER POSTS, STRINGERS, KNEE BRACES, LATERAL BRACES AND KNEE BRACE STUB POSTS. ALL SHALL CONFORM TO MN/DOT 3401.
2. FOR TYPE D SIGN POSTS LENGTHS AND SPACINGS, SEE SIGN DATA SHEET.
3. 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 STANDARD SIGNS MANUAL).
4. MOUNTING (PUNCH CODE) FOR TYPE C SIGN PANELS SHALL BE AS INDICATED IN THE STANDARD SIGNS MANUAL UNLESS OTHERWISE SPECIFIED.
5. ALL RISER (VERTICAL) POSTS SHALL BE SPLICED. DRIVEN STUB POSTS SHALL BE AT LEAST 7' LONG.
6. USE STAINLESS STEEL 3/8" BOLTS, WASHERS AND NYLON INSERT LOCK NUTS AS SHOWN FOR ALL GROUND MOUNTED AND OVERHEAD MOUNTED SIGNS.
7. STAINLESS STEEL WASHER WITH SAME DIMENSIONS SHALL BE PROVIDED BETWEEN ALL NYLON WASHERS AND BOLT HEADS.
8. BRACING STUBS SHALL BE NO MORE THAN 4" ABOVE GROUND AND EMBEDDED AT LEAST 3 1/2'.
9. A-FRAME BRACKET SHALL BE STEEL CONFORMING TO MN/DOT 3306 AND GALVANIZED IN ACCORDANCE WITH MN/DOT 3394.
10. COLLARS SHALL BE USED TO SHIM OVERLAYS AND DEMOUNTABLE LEGEND AWAY FROM PANEL WHERE INTERFERENCE WITH BOLT HEADS IS ENCOUNTERED. MN/DOT 3352.2A5.
11. 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.
12. 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.
13. WHERE 3 OR MORE TYPE C SIGNS ARE INSTALLED SIDE BY SIDE, THEY SHALL BE REINFORCED LATERALLY BY AT LEAST 2 BRACES, BOLTED AT EACH POST AND POST SECTION AND LOCATED APPROXIMATELY AT THE QUARTER POINTS AS SHOWN IN MODIFIED TYPE C INSTALLATION.

TYPE C & D SIGN

STRUCTURAL DETAILS

Sheet 1 of 3

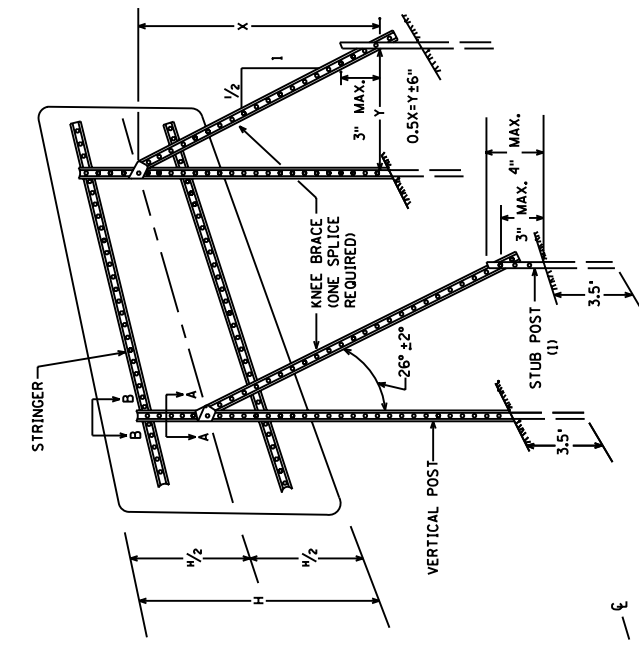
REV. 6-26-07

STATE PROJ. NO.

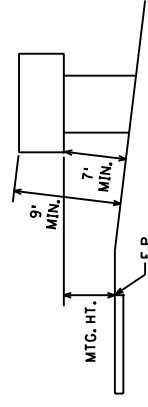
SHEET NO. 50 OF 73 SHEETS

PLOTTED/REVISED: 8/8/04 DATE: 8/8/04

DISTRICT: 5501
PLOT NAME: 5501PLOTNAME
PATH & FILENAME: 5501PLOTNAME



TYPICAL "A-FRAME" INSTALLATION
TYPE "D" SIGNS



TYPICAL MOUNTING

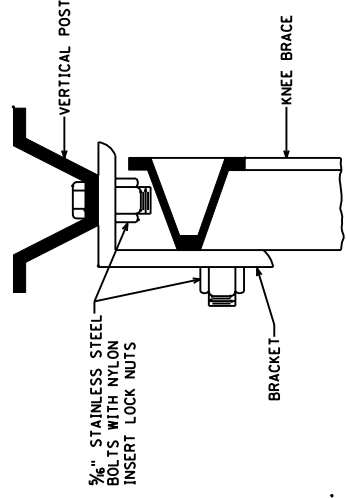
(1) OFFSET STUB POST 1' TOWARD ROADWAY
RELATIVE TO VERTICAL POST. ATTACH STUB
POST AND KNEE BRACE BACK TO BACK.

TYPE C & D SIGN

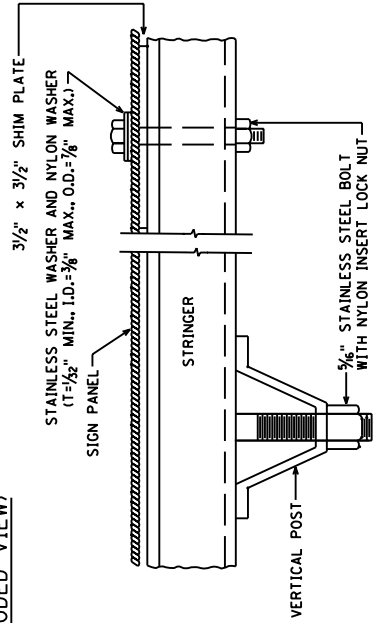
STRUCTURAL DETAILS

Sheet 2 of 3

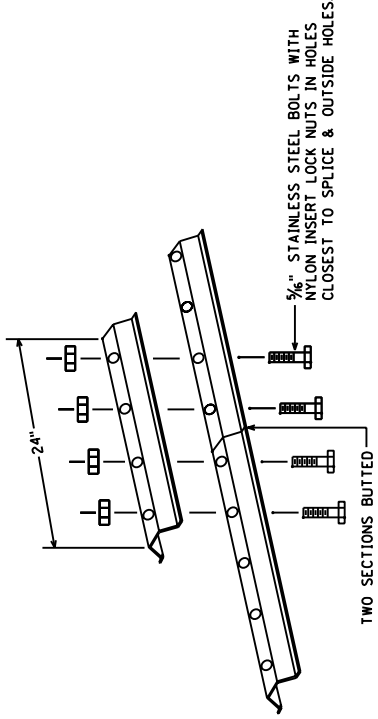
SHEET NO. 51 OF 73 SHEETS



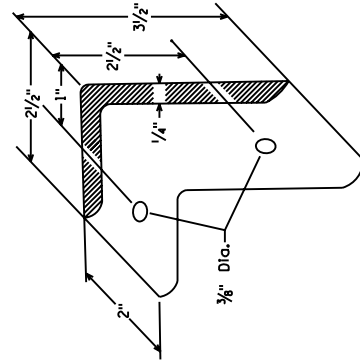
SECTION A-A



SECTION B-B

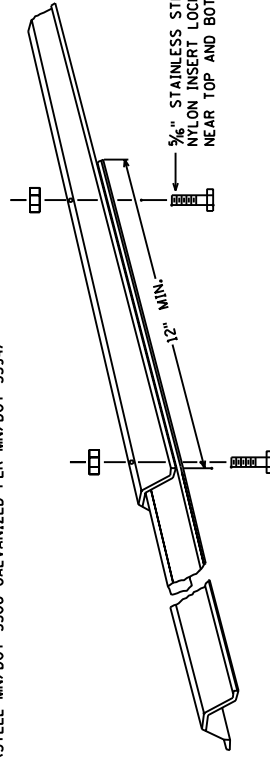


LATERAL BRACE OR STRINGER
SPlice DETAIL (EXPLODED VIEW)



A-FRAME BRACKET

(STEEL MN/DOT 3306 GALVANIZED PER MN/DOT 3394)

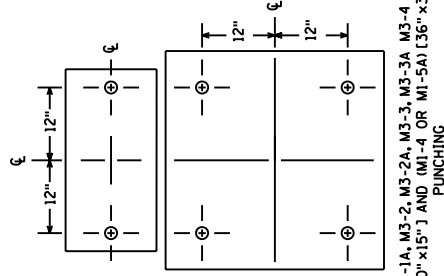
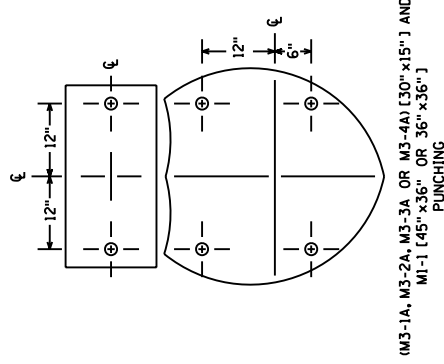
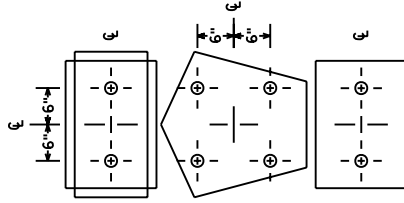
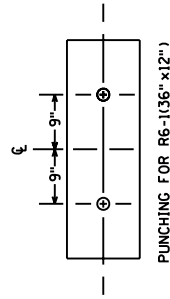
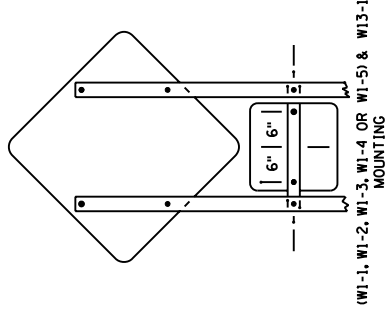
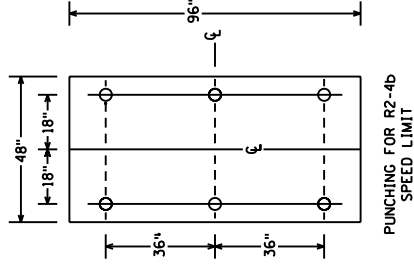
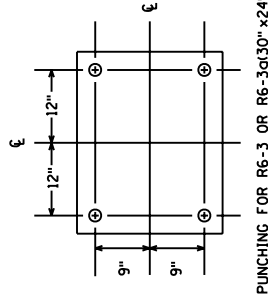
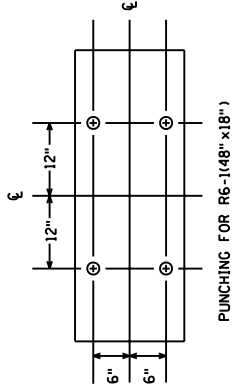
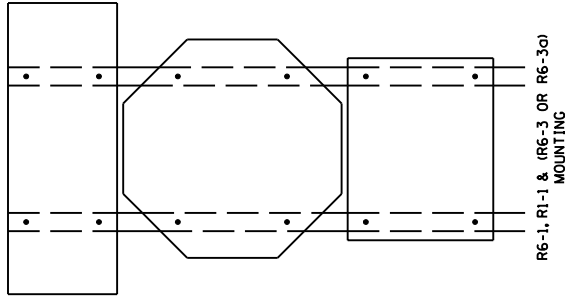


KNEE BRACE SPlice

REV. 1-7-08

PLotted/REVISED: sss@DATe08ss

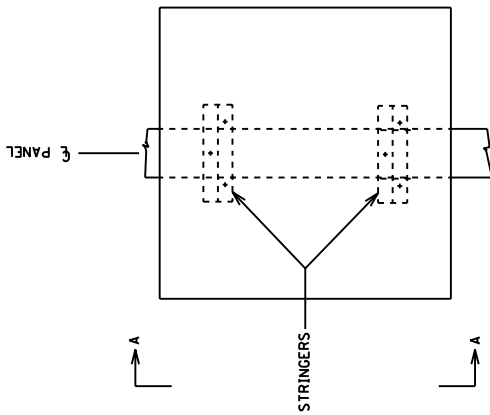
DISTRICT: sss@DISTRICT08
PLOT NAME: sss@PLOT08NAME08
PATH & FILENAME: sss@PATH08FILENAME08



TYPE C & D SIGN

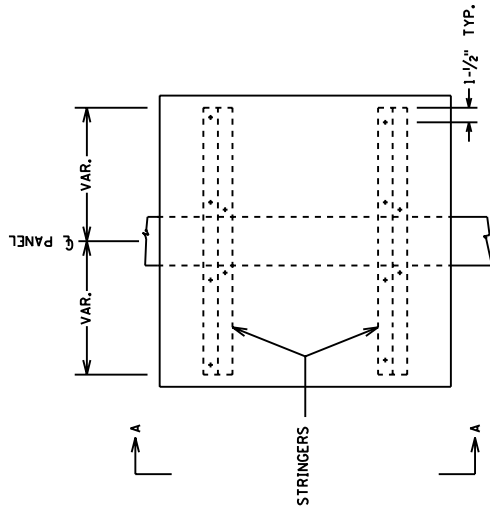
STRUCTURAL DETAILS

Sheet 3 of 3



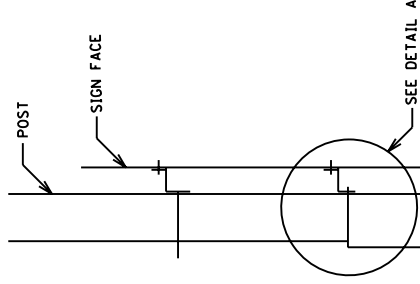
TYPE "C" SIGNS WITH SINGLE POST PUNCHING

ELEVATION

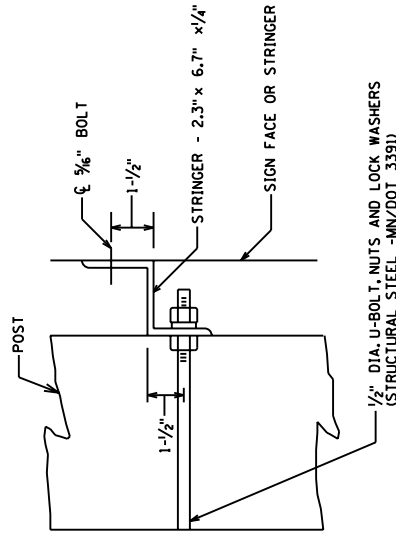


TYPE "C" SIGNS WITH 2-POST PUNCHING

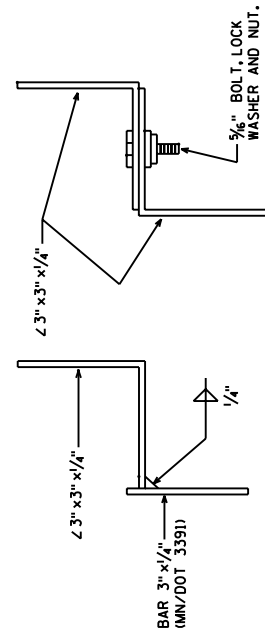
ELEVATION



VIEW A-A



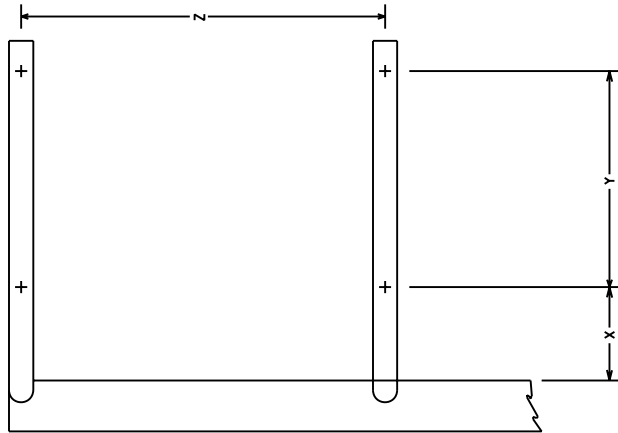
DETAIL A



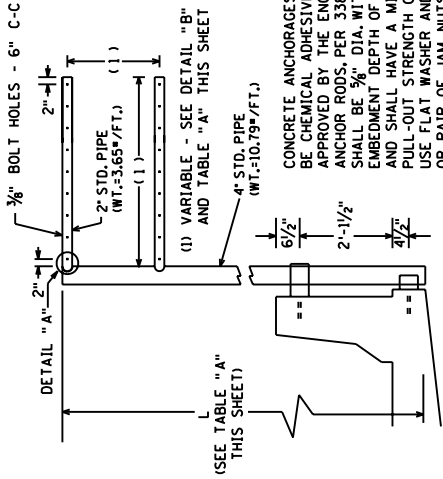
DETAIL A STRINGER ALTERNATES

- 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 MN/DOT 3306 AND GALVANIZED IN ACCORDANCE WITH MN/DOT 3394. FASTENERS SHALL BE IN ACCORDANCE WITH MN/DOT 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.

TYPE C SIGNS MOUNTED ON O-POSTS,
OH SIGN POSTS OR SIGNAL STANDARDS

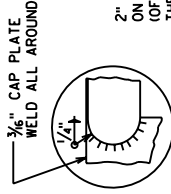


DETAIL "B"



ELEVATION

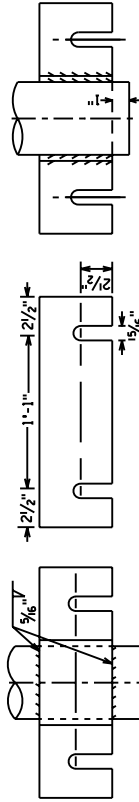
END VIEW



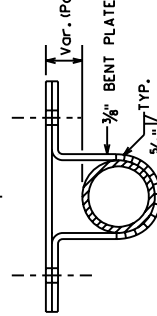
DETAIL "A"

(1) VARIABLE - SEE DETAIL "B" AND TABLE "A" THIS SHEET

CONCRETE ANCHORAGES SHALL BE CHEMICAL ADHESIVE TYPE AS APPROVED BY THE ENGINEER. ANCHOR RODS, PER 3385 TYPE A, SHALL BE 3/8" DIA. WITH A MIN. EMBEDMENT DEPTH OF 5". PULL-OUT SHALL HAVE A MIN. ULTIMATE PULL-OUT STRENGTH OF 12,000#. USE FLAT WASHER AND LOCK NUT OR PAIR OF JAM NUTS.



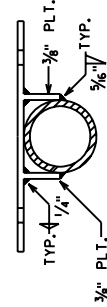
FILL PLATE



UPPER CONNECTION

SIGN NO.	X (IN.)	Y (IN.)	Z (IN.)	L (FT.)
C-25	8	36	48	12.0
D-15	8	42	48	12.5

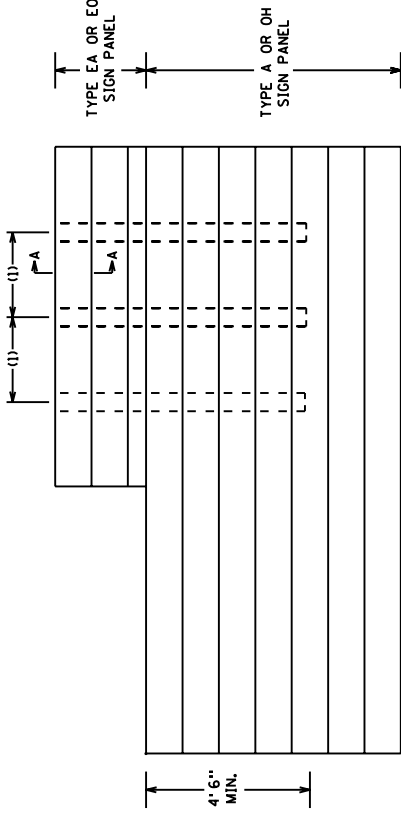
TABLE "A"



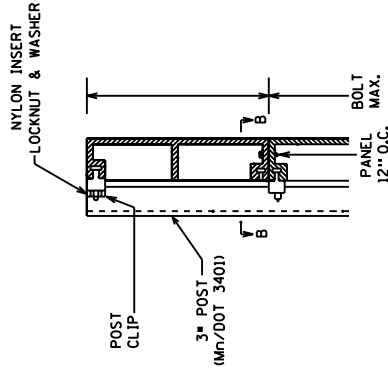
LOWER CONNECTION

- 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.

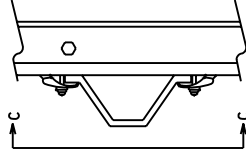
TYPE C & D SIGNS
MOUNTED ON BRIDGE RAIL



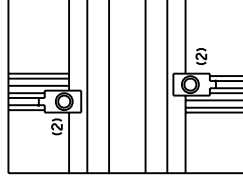
TYPICAL PANEL MOUNTING



SECTION A-A



SECTION B-B



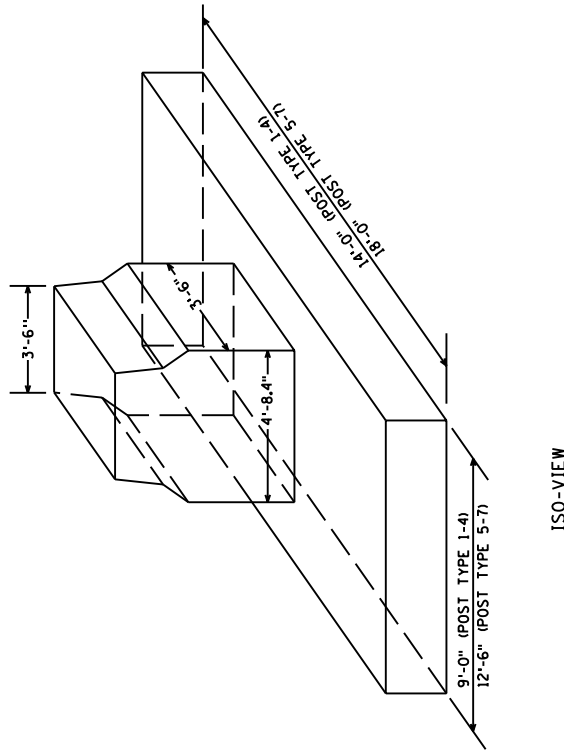
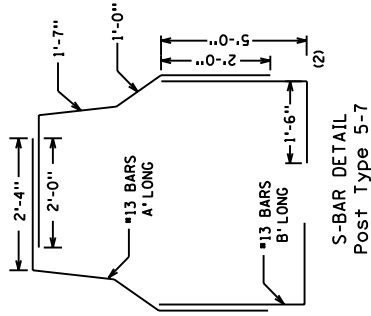
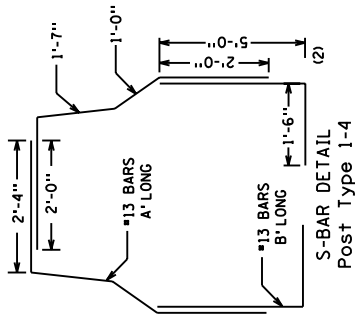
VIEW C-C

SPECIFIC NOTES:
 (1) SEE SIGN DATA SHEET FOR NUMBER AND SPACING OF POSTS. SPACING AND LOCATION CAN BE ADJUSTED WHERE NECESSARY.
 (2) POST CLIPS SHALL BE INSTALLED 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

QUANTITIES (3)					
ADDITIONAL REINFORCEMENT	NO. OF BARS	LENGTH (FT.)	WEIGHT (LBS.)	BAR SPACING	CONCRETE (CU.YD.)
#13 BARS A' LONG	8	6.92	37	3 SPACES @12"=3'-0"	
#13 BARS B' LONG	8	6.50	35	3 SPACES @12"=3'-0"	
TOTAL					



ELEVATION VIEW

GENERAL NOTE:
1. For details and reinforcements not shown see standard sign sheet ST-5.

- SPECIFIC NOTES:
(1) 1/2" bituminous felt joint if adjacent pavement is concrete.
(2) #13 S-bars placed symmetrical about the centerline of the post, bend in the field to fit.
(3) All quantities depend upon field verification of footing elevations.

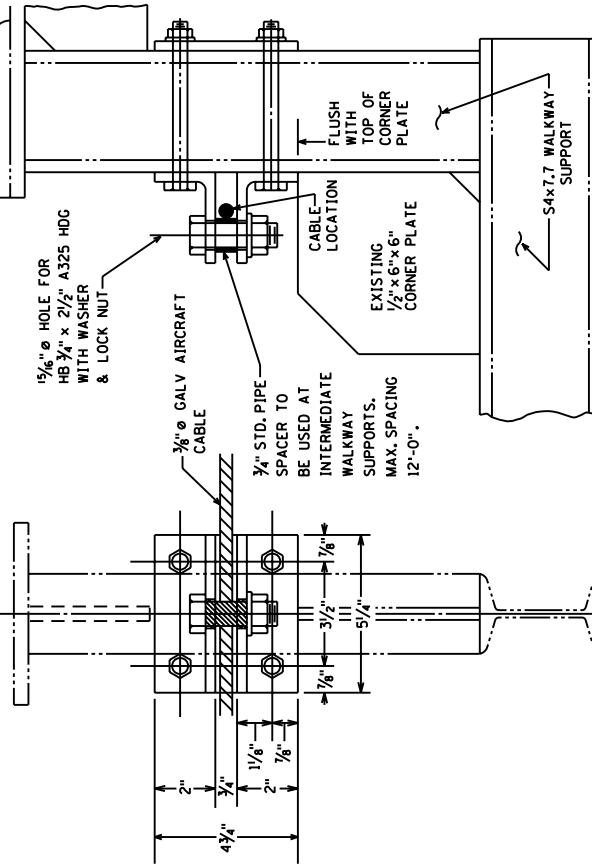
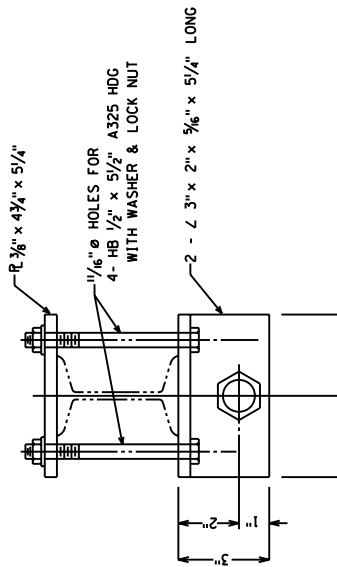
MEDIAN BARRIER FOOTING

(SPREAD)

REVISED 4-25-02

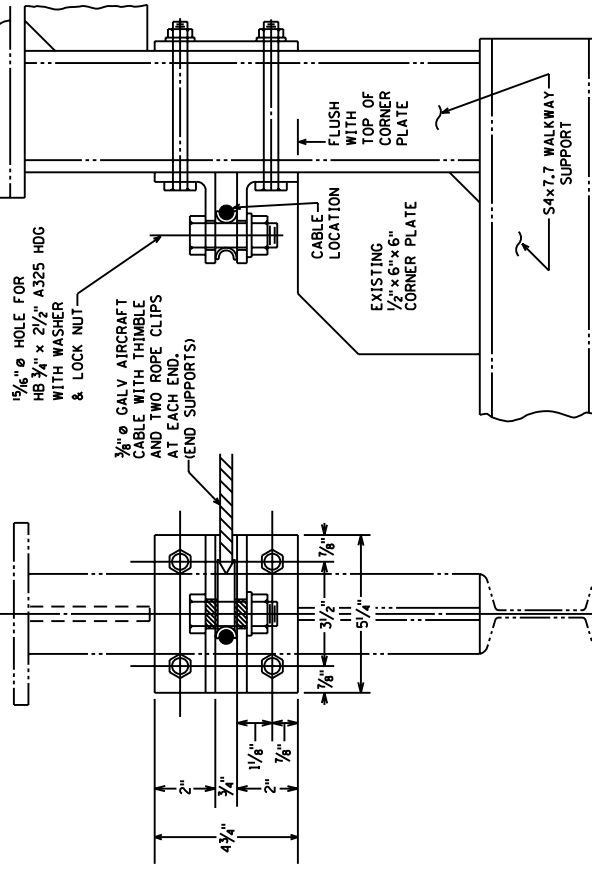
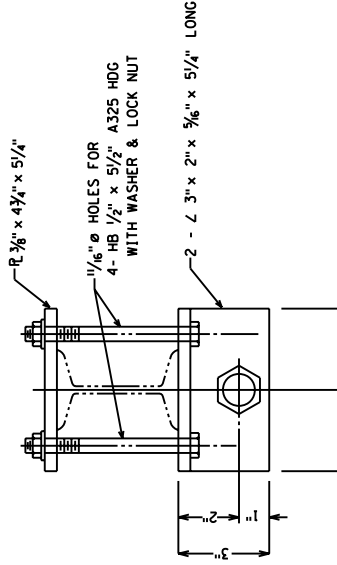
STATE PROJ. NO.

SHEET NO. 57 OF 73 SHEETS



MIDDLE CONNECTION

- NOTES:
1. ALL STRUCTURAL STEEL PER Mn/DOT 3306. GALVANIZED PER MnDOT 3394.
 2. ALL FASTENERS PER A325. GALVANIZED PER Mn/DOT 3392.
 3. HB-HEX BOLT.
 4. HDG-HOT DIP GALVANIZED.



END CONNECTION

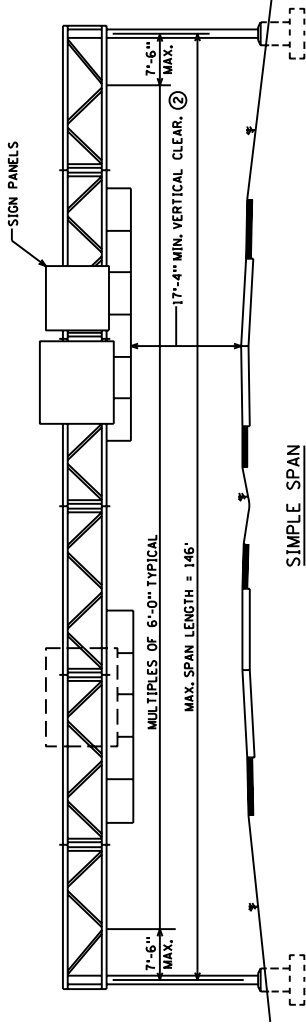
SAFETY CABLE FOR OH SIGNS DESIGN B

STATE PROJ. NO.

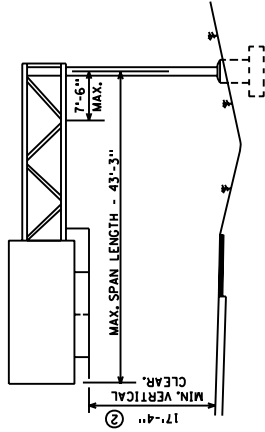
SHEET NO. 58 OF 73 SHEETS

PLOTTED/REVISED: ssssdwT6ssss

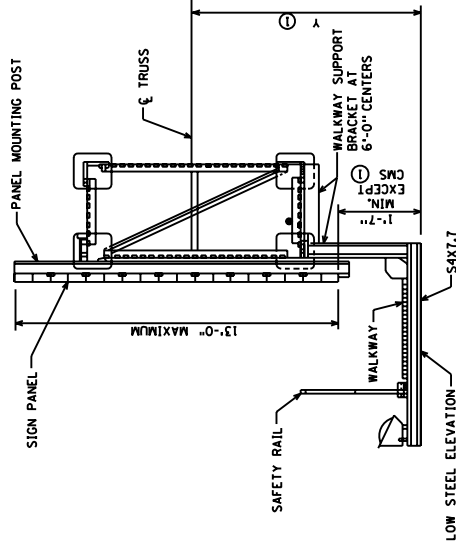
DISTRICT #: sssdistrctss
PLOT NAME: sssdplotss
PATH & FILENAME: sssdpathfiless



SIMPLE SPAN



CANTILEVER



SECTION

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 TO
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"

- SPECIFIC NOTES:
- DIMENSION Y IS CONSTANT AND BASED ON THE DEEPEST SIGN PANEL ABOVE THAT WALKWAY. WHEN STANDARD SIGN PANEL(S) AND CMS ARE MOUNTED ON THE SAME SPAN, DIMENSION Y SHALL BE COVERED BY THE CMS.
 - MINIMUM CLEARANCE WILL BE MEASURED FROM THE HIGHEST ELEVATION OF PAVEMENT, SHOULDERS, AND MOUNTABLE CURBS, OR IF INSURMOUNTABLE CURBS ARE USED, THE HIGHEST CLEAR 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 1995.

LOADING:

WIND LOAD 90 M.P.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)--- Mn/DOT 3306
POST STEEL----- VARIES
HIGH STRENGTH BOLTS----- Mn/DOT 3391.28
ANCHOR RODS----- Mn/DOT 3385
CASTINGS----- Mn/DOT 3322
REINFORCEMENT BARS----- Mn/DOT 3301
WALKWAY GRATING----- FEDERAL SPECIFICATIONS RR-G-661b, TYPE 1 STEEL
CONCRETE----- Mn/DOT 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 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS. BEARING SURFACES MUST BE SMOOTH.

FABRICATION:

FABRICATION OF STRUCTURAL METALS SHALL BE IN ACCORDANCE WITH Mn/DOT 2471, Mn/DOT 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 Mn/DOT 1531 AND Mn/DOT 2471.

STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

GENERAL ELEVATIONS
AND NOTES

DRAWING ST-1

STATE PROJ. NO. SHEET NO. 59 OF 73 SHEETS

REVISED 2/08/00

SIMPLE SPAN

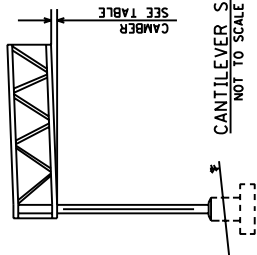
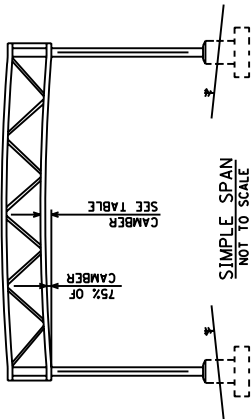
SPAN	SIMPLE SPAN TRUSS CAMBER											
	40	50	60	70	80	90	100	110	120	130	140	150
CAMBER	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 5/8	2
DL DEFLECTION	0	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2
RESIDUAL CAMBER	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 5/8	2

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'	40'	45'	
CAMBER	1/8	1/4	3/8	1/2	5/8	1 1/4
DL DEFLECTION	0	0	1/8	3/8	1/2	1
RESIDUAL CAMBER	1/8	1/4	3/8	1/2	5/8	1

NOTE:
CAMBER AND DEFLECTIONS SHOWN ARE SHOWN AT
END OF CANTILEVER.
WHEN ERECTING CANTILEVER TRUSSES, THE POSTS
SHALL BE SET 1/4" 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	TABLE 1 - POST IDENTIFICATION BASEPLATE DESIGN	PERMISSIBLE PIPE SECTIONS			
		MIN. YIELD=35 KSI	WALL THICKNESS (INCH)	OUTSIDE DIAMETER (INCH)	MIN. YIELD=42 KSI
1	A	N.A.	18	0.250	18
2	A	N.A.	0.375	18	0.312
3	A	18	0.500	18	0.375
4	A	18	0.562	18	0.500
5	B	18	0.938	18	0.750
6	B	20	0.594	20	0.500
7	B	N.A.	N.A.	20	0.812
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 BUTT SPLICE CONFORMING TO AWS D1.1 DETAIL B-42 IN THE UPPER 1/3 OF ITS LENGTH. BACK UP RINGS FOR THESE WELDED SPLICES SHALL BE COMMERCIAL PRODUCTS. BUTT WELDS REQUIRE RADIOGRAPHIC INSPECTION (MAY/DOIT 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"	109
12'-0"	113
12'-6"	117
13'-0"	121

WALKWAY SUPPORT QUANTITIES	
USE MAXIMUM PANEL WEIGHT ON SPAN TO CALCULATE QUANTITIES. WHEN CONVENTIONAL SIGN PANELS AND OTHERS ARE MOUNTED ON THE SAME SPAN, QUANTITIES SHALL BE GOVERNED BY THE CMS.	

PANEL WEIGHT	TRUSS TYPE (WEIGHT/SUPPORT)		
	A	B	C
6'-6"	99	105	113
7'-0"	101	108	115
7'-6"	103	109	119
8'-0"	105	111	121
8'-6"	107	113	123
9'-0"	109	115	125
9'-6"	111	117	127
10'-0"	113	119	129
10'-6"	115	121	131
11'-0"	117	123	133
11'-6"	119	125	135
12'-0"	121	127	137
12'-6"	123	129	139
13'-0"	125	131	141

POST QUANTITIES

QUANTITIES INCLUDE ANCHORAGE ASSEMBLY AND TRUSS CONNECTION PLATES. PAY LENGTH OF POSTS IS FROM THE BOTTOM OF THE BASE PLATE (ELEV. A) TO THE TOP OF THE TRUSS. POST QUANTITIES ARE BASED ON GRADE 42 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	2470*47 LBS/FT	1870*47 LBS/FT	1890*47 LBS/FT	1890*47 LBS/FT	1915*47 LBS/FT
2	1880*59 LBS/FT	2470*59 LBS/FT	1870*59 LBS/FT	1890*59 LBS/FT	1890*59 LBS/FT	1915*59 LBS/FT
3	1880*71 LBS/FT	2470*71 LBS/FT	1870*71 LBS/FT	1890*71 LBS/FT	1890*71 LBS/FT	1915*71 LBS/FT
4	1880*94 LBS/FT	2470*94 LBS/FT	1870*94 LBS/FT	1890*94 LBS/FT	1890*94 LBS/FT	1915*94 LBS/FT
5	1910*138 LBS/FT	2500*138 LBS/FT	2460*138 LBS/FT	1910*138 LBS/FT	2460*138 LBS/FT	2500*138 LBS/FT
6	N/A	2500*104 LBS/FT	N/A	2500*104 LBS/FT	2500*104 LBS/FT	2500*104 LBS/FT
7	N/A	2500*167 LBS/FT	N/A	2500*167 LBS/FT	2500*167 LBS/FT	2500*167 LBS/FT

STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

CAMBER, POST IDENTIFICATION
AND ESTIMATED QUANTITIES

DRAWING ST-2

REVISED 12/23/99

STATE PROJ. NO.

SHEET NO. 60 OF 73 SHEETS

GENERAL NOTES:

- THE CONTRACTOR SHALL BURR THE
THREADS OF THE ANCHOR BOLTS IN
ACCORDANCE WITH MN/DOT 2402.3H
AFTER TORQUING NUTS.

DRAWING ST-3

REVISÉ 10/5/98



DRILLED SHAFT

[illegible]

NOTE (5): MUST BE FORMED A MINIMUM OF 6" BELOW THE GROUND SURFACE. THE EXCAVATED AREA FOR FORMING SHALL BE BACKFILLED AND TAMPED WITH EQUIVALENT TO SURROUNDING MATERIAL.



POST	SPREAD FOOTINGS											
	ANCHOR RODS						J REIN. BARS					
NO.	A	B	C	D	E	F	NO. REIN DIA.	LENGTH	NO. REIN	SIZE	LENGTH	
1-4	14'-0"	9'-0"	3'-6"	3'-6"	8 1/2"	2'-0"	8	2 1/4" 3'-10 1/2"	14	#4	8'-6"	
5-7	18'-0"	12'-6"	3'-6"	3'-6"	9"	2'-0"	12	2 1/2" 4'-0"	19	#4	12'-0"	

REVISÉ 10/5/98

TRUSS SECTIONS SHALL BE MADE IN MULTIPLES OF 6'-0" EXCEPT THAT THE BRACING PANEL NEAREST EACH POST MAY MAKE UP THE REMAINING LENGTH. SECTION LENGTH WELDED CHORD SPICES ARE NOT BELIEVED EXIST 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 WELDED TOGETHER. WELDED CHORD SPICES SHALL BE 100% Y. CHORD SPICE WELD SHALL BE COMPLETE PENETRATION WITH 100% UT AND MT TESTING PER 2471.30.

UNLESS OTHERWISE SHOWN ALL WELDS SHALL BE 1/4" WELLS ALL AROUND.

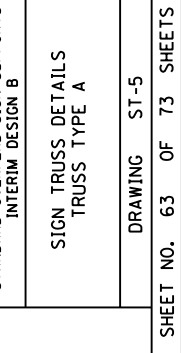
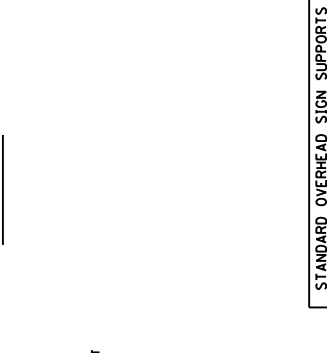
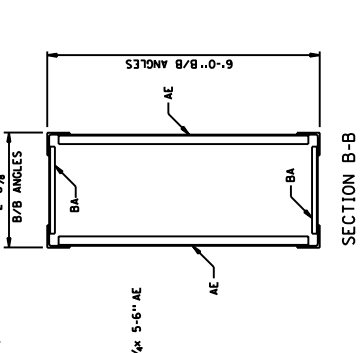
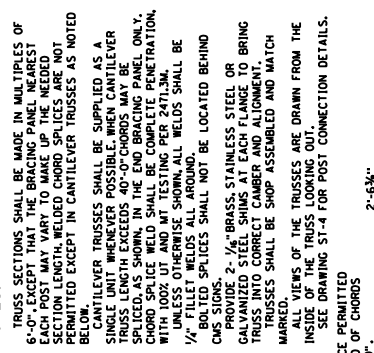
CHORD SPICES SHALL NOT BE LOCATED BEHIND CMS STUDS.

PROVIDE 2 - 1/4" BRASS, STAINLESS STEEL OR GALVANIZED STEEL SHIMS AT EACH FLANGE TO BRING TRUSS TOGETHER. TRUSS BRACING AND WELDS SHALL BE SHIP ASSEMBLED AND MATCH MARKED.

ALL VIEWS OF THE TRUSSES ARE DRAWN FROM THE INSIDE OF THE TRUSS LOOKING OUT.

SEE DRAWING 31-74 FOR POST CONNECTION DETAILS.

2'-6 1/2" OF CHORDS



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.

PROJ. NO.

STATE PROJ. NO.

REVISÉ 2/8/00

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.

BOTTOM VIEW
SIMPLE SPAN

SIMPLE SPAN

BOTTOM VIEW
CANTILEVER END

BOTTOM VIEW

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B

SIGN TRUSS DETAILS
TRUSS TYPE A

DRAWING ST-5

SHEET NO. 63 OF 73 SHEETS

REVISÉ 2/8/00

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.

BOTTOM VIEW
SIMPLE SPAN

SIMPLE SPAN

BOTTOM VIEW
CANTILEVER END

BOTTOM VIEW

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B

SIGN TRUSS DETAILS
TRUSS TYPE A

DRAWING ST-5

SHEET NO. 63 OF 73 SHEETS

TRUSS SECTIONS SHALL BE MADE IN MULTIPLE OF 6'-0" EXCEPT THAT THE BRACING PANELS NEAR EACH POST MAY VARY TO MAKE UP THE WEDED SECTION LENGTH. WELDED CHORD SPICES 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 WELDED AS SHOWN. SHALL BE BRACING PANELS ONLY. WITH 100% UT AND UT TESTING PER 247.13M. UNLESS OTHERWISE SHOWN, ALL WELDS SHALL BE 1/4" FILLET WELDS ALL AROUND.

WELDED SPICES SHALL NOT BE LOCATED BEHIND CHORDS.

PROVIDE 2 - 1/2" BRASS, STAINLESS STEEL OR GALVANIZED STEEL SHIMS AT EACH LAP TO BRING TRUSSES INTO CORRECT CAMBER AND ALIGNMENT.

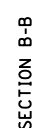
TRUSSES SHALL BE SHOP ASSEMBLED AND MATCH MARKED.

ALL VIEWS OF THE TRUSSES ARE DRAWN FROM THE INSIDE OF THE TRUSS LOOKING OUT.

SEE DRAWING ST-4 FOR POST CONNECTION DETAILS.

WELDED CHORDS

2'-10" B/B ANGLES

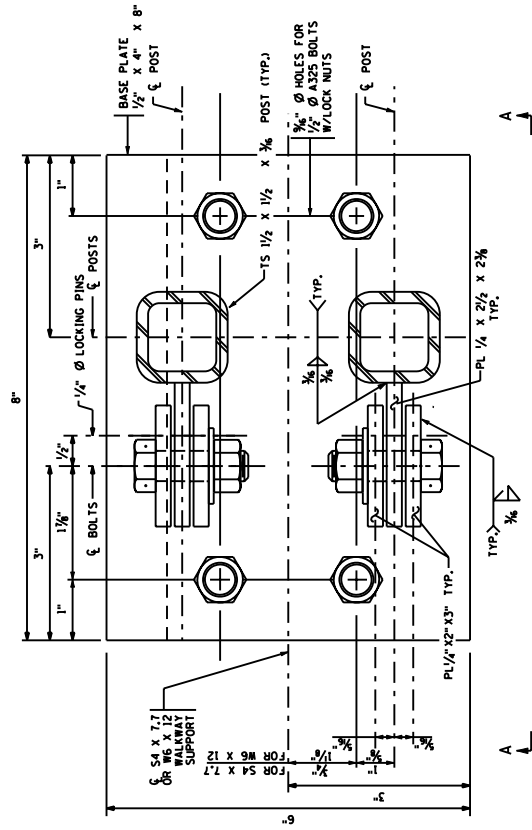


DETAILS SHOWN ARE FOR THE FREE ENDS
OF THE CANTILEVER SPANS. ALL OTHER
DETAILS FOR CANTILEVER TRUSSES SHALL
BE AS SHOWN FOR THE SIMPLE SPANS.

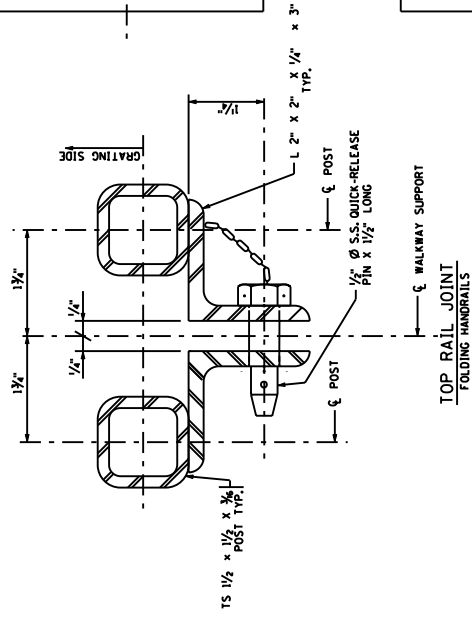
NOTE: THE BOTTOM VIEW IS DETAILED TO PROVIDE FOR WALKWAY ATTACHMENT. WHERE THE WALKWAY IS OMITTED, PROVIDE STRUT BA AS INDICATED IN THE TOP VIEW.

REvised 2/8/00

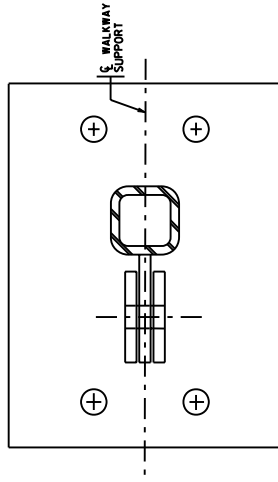
DISTRICT : \$ODISTRICT\$
 IPLOT NAME: \$OPILOTNAME\$
 PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$



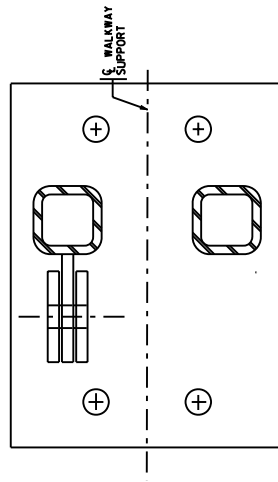
DETAIL 1
**BASE PLATE & HINGE ASSEMBLY
FOR FOLDING HANDRAIL**



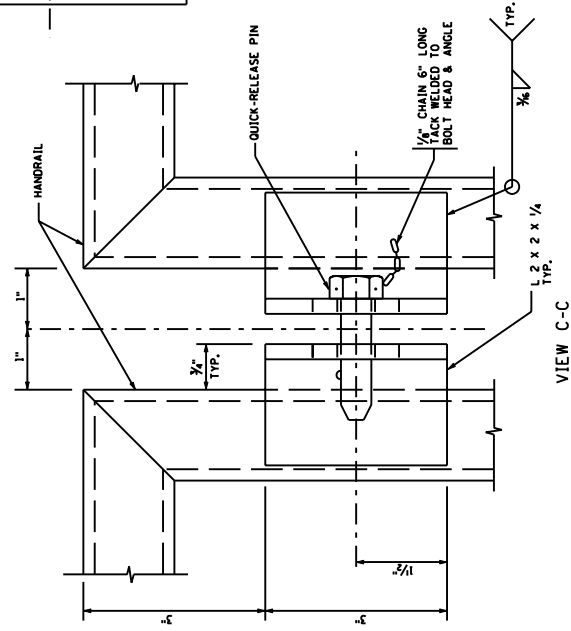
TOP RAIL JOINT
FOLDING HANDRAILS



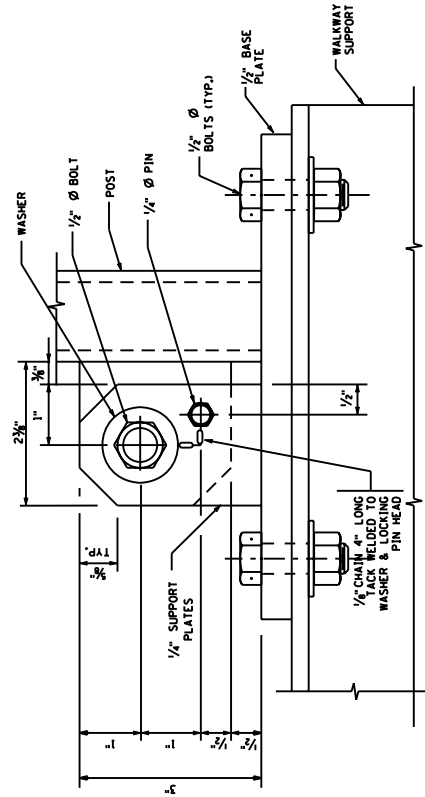
BASEPLATE AND HINGE FOR
FOLDING RAIL END POST



BASEPLATE AND HINGE FOR
FIXED TO FOLDING TRANSITION



VIEW C-C

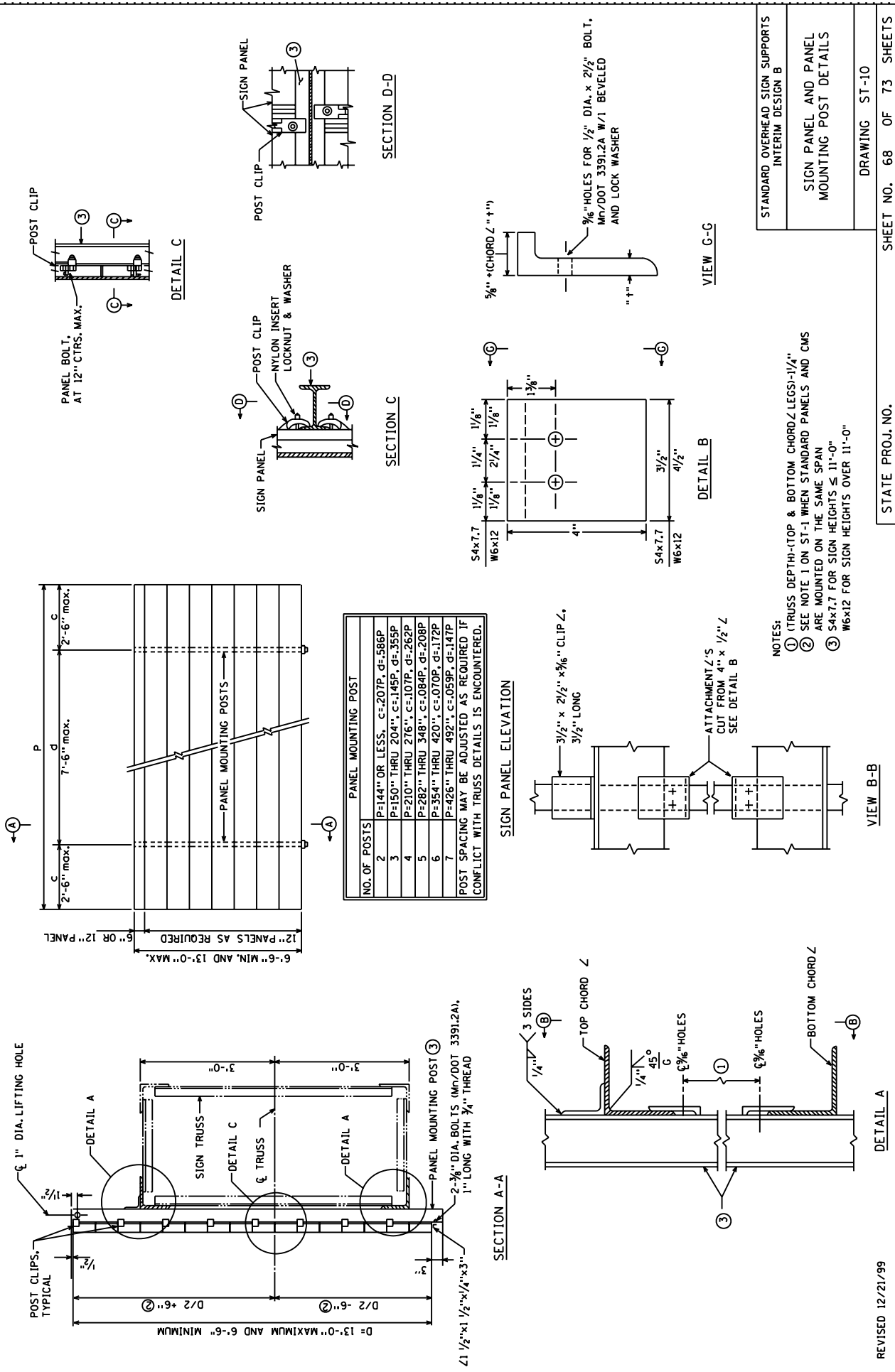


VIEW A-A

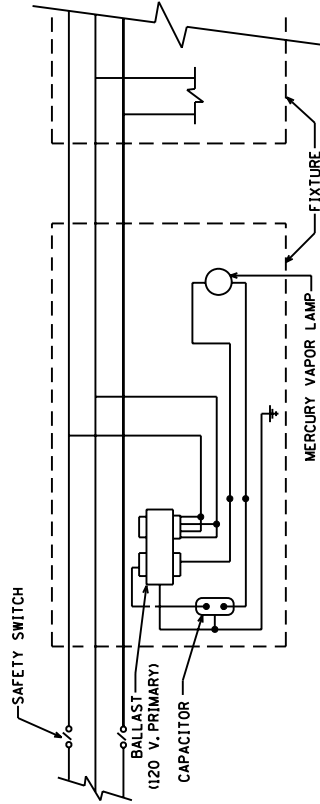
VIEW A

BASE PL. & HINGE FOR FOLDING HANDRAIL

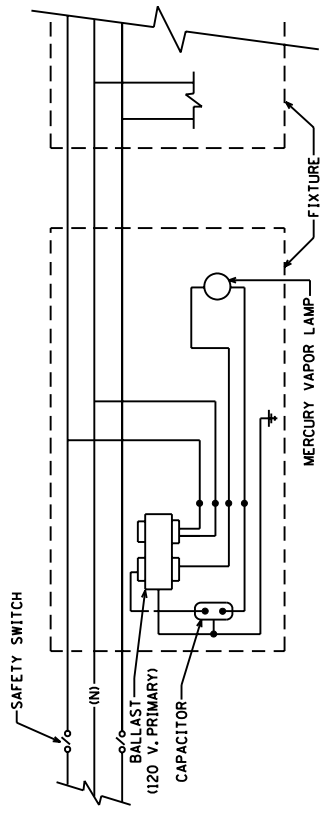
STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B
FOLDING HANDRAIL
DRAWING ST-9
SHEET NO. 67 OF 73 SHEETS



REVISÉ 12/21/99

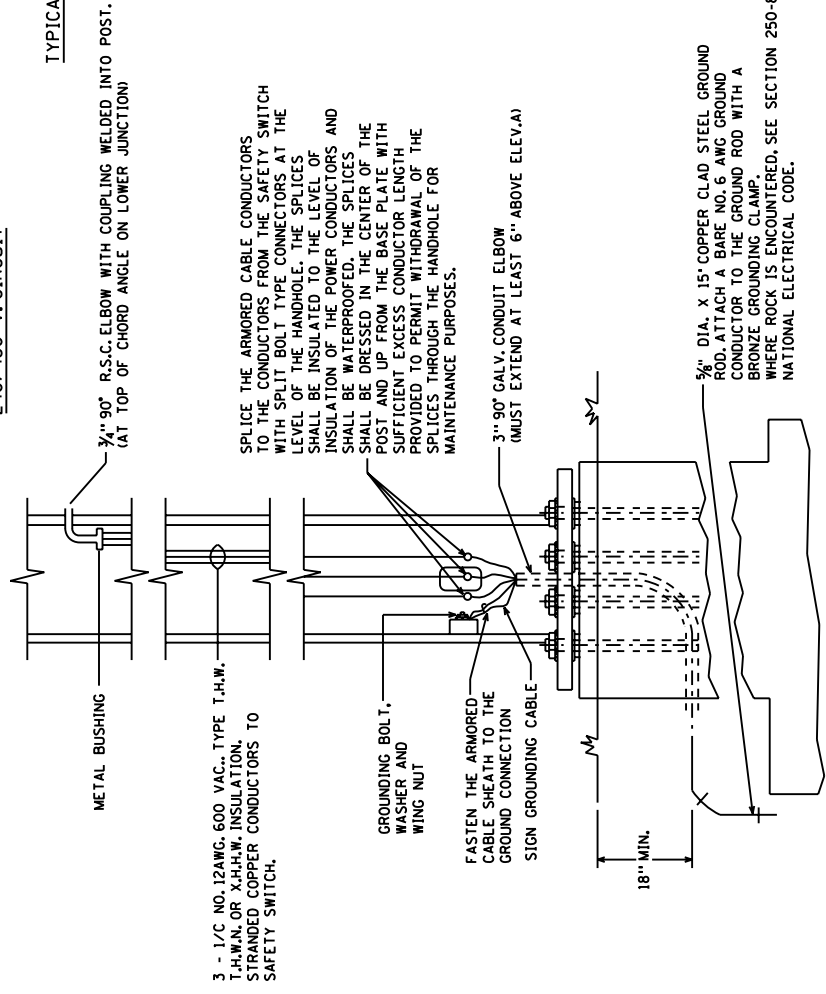


120/240 V. CIRCUIT



240/480 V. CIRCUIT

TYPICAL CIRCUIT DIAGRAMS



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/C 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. 70 OF 73 SHEETS

STATE PROJ. NO.

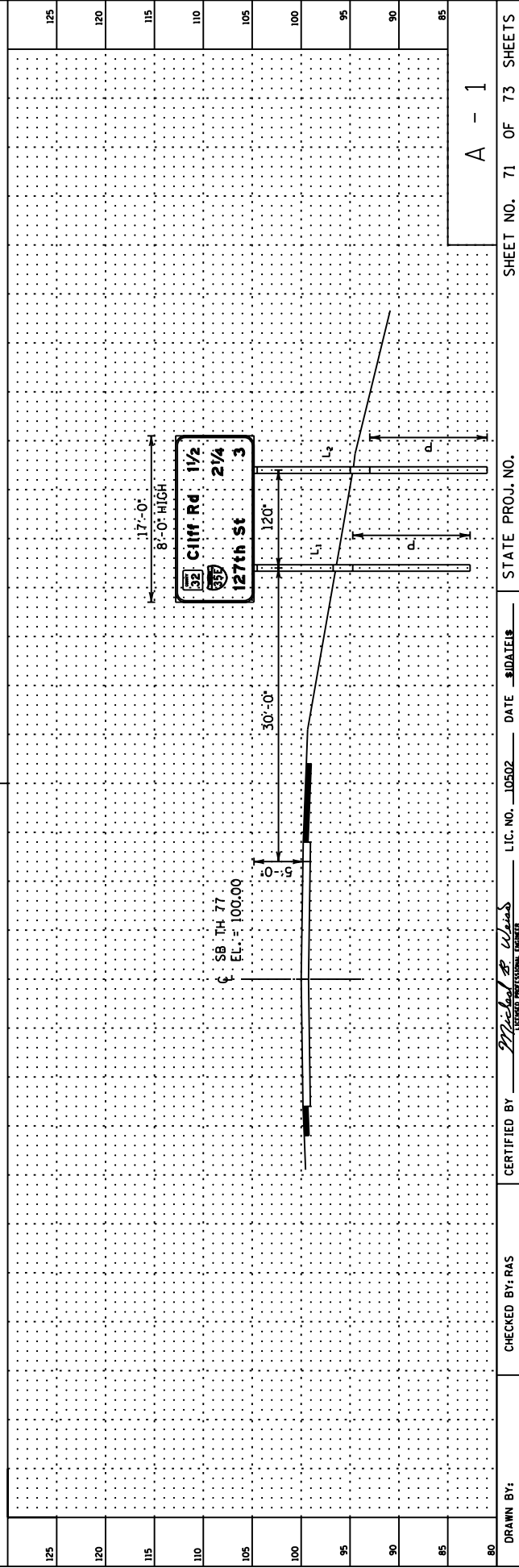
PLOTTED/REVISED: \$\$\$DATE\$\$\$

DISTRICT #: \$\$\$DISTRICT\$\$\$
PLOT NAME: \$\$\$PLOTNAME\$\$\$
PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$

SIGN A-1

SB T.H. 77
STA. 369+00

POST TYPE W6X20
POST LENGTH L₁ 16.0 FT.
POST LENGTH L₂ 18.0 FT.
PILE FOOTING P 12.0 FT.



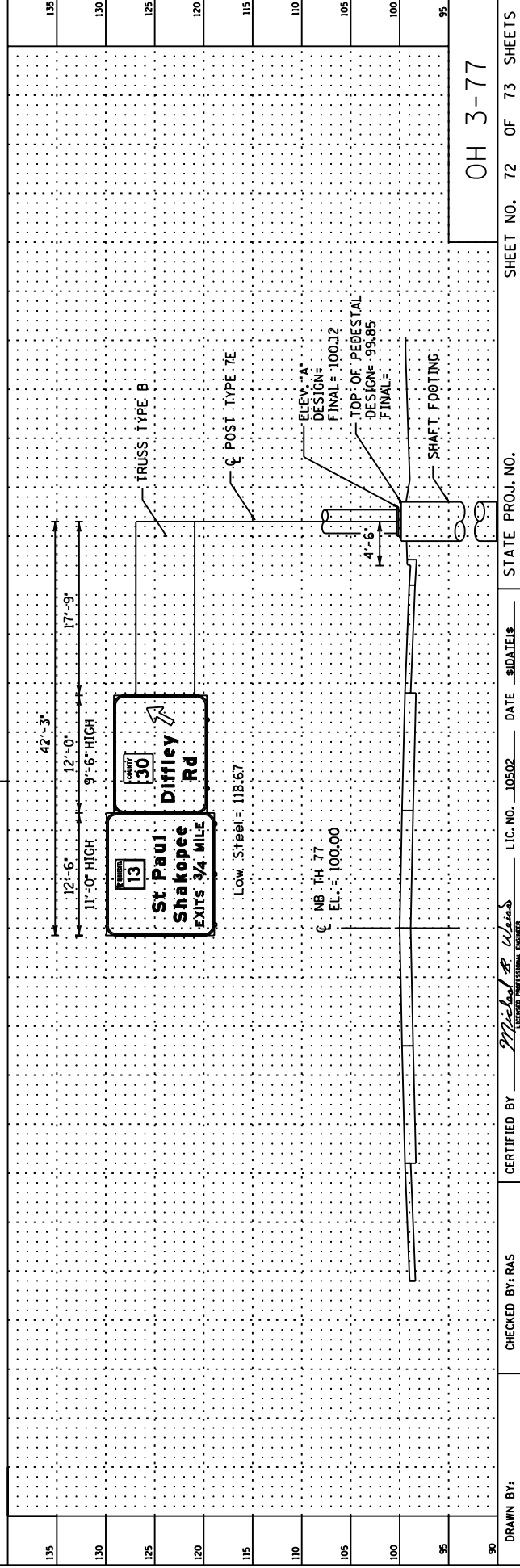
PLOTTED/REVISED: \$\$\$DATE\$\$\$

DISTRICT #: \$\$\$DISTRICT\$\$\$
PLOT NAME: \$\$\$PLOTNAME\$\$\$
PATH & FILENAME: \$\$\$PATHFILENAME\$\$\$

OH 3-77
N.B. T.H. 77
STA. 215+25
QUANTITIES

	DESIGN	FINAL
POST STEEL	6976 LBS	
TRUSS STEEL	7098 LBS	
WALKWAY SUPPORT STEEL	LBS	
WALKWAY GRATING STEEL	LBS	
PANEL MOUNTING POST STEEL	501 LBS	
CONCRETE (SHAFT) FOOTING	14.1 CU YDS	
SIGN PANELS TYPE OH	251.50 SQ FT	

- NOTES: 1. LOW STEEL IS BOTTOM OF PANEL MOUNTING POSTS ON THE TALLEST PANEL.
2. STRUCTURE IS DESIGNED FOR FUTURE WALKWAY.



Appendix A - 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

Appendix B - Sign Symbols Overview

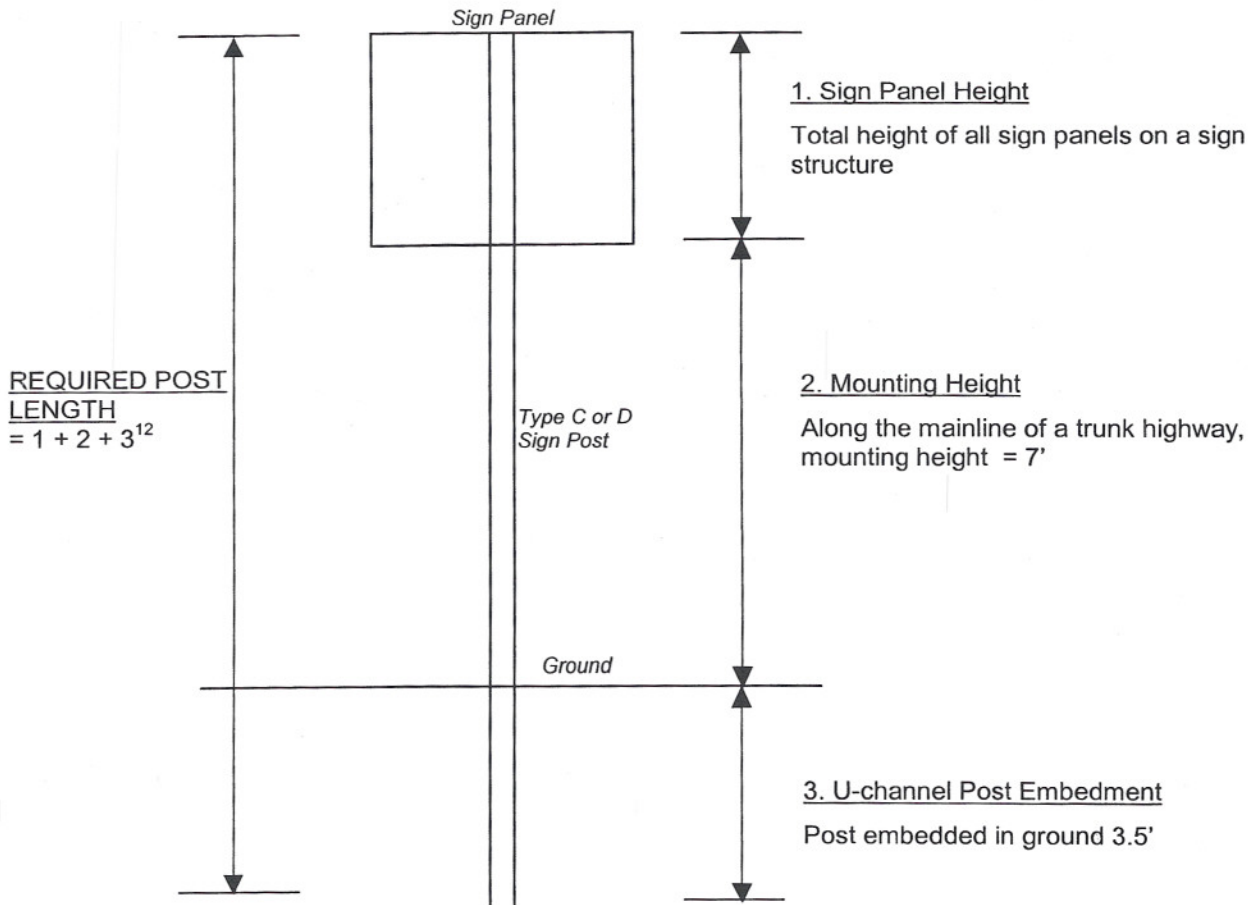
Name	Symbol	Line Width Decimal of an Inch (B)	Line Length in Inches (B)	Size Timely Template T-41 in Inches (B)
Pedestrian Indication F. & I.		.021		1/8
Pedestrian Indication Inp.		.021		1/8
Pedestrian Push Button on a Signal Support		.021		1/8
Pedestrian Push Button Station		.021		
Anchor		.021		
Flashing 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

Appendix C – Type A Post Sizing Chart, Type C & D Sign Post Length Determination, & Type OH Post Sizing Charts

Type C and Type D Sign Post Length Determination



Note:

1. If a sign is located on flat ground,
 $1 + 2 + 3 =$ required post length
(round total length up to nearest foot)
2. If a sign is located on an inslope in a rural area, ADD 2 feet for the slope (round total length up to nearest foot).

NOTE: FOR CMS (LED) POST SELECTION SEE POST/TRUSS SELECTION TABLES (TABLE

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	2	2	2	
		24	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	4	4	
		26	1	1	1	1	1	1	2	2	2	3	3	3	3	3	3	4	4	4	4	
		28	1	1	1	1	2	2	2	3	3	3	4	4	4	4	4	4	4	4	4	
		30	1	1	1	2	2	2	3	3	3	4	4	4	4	4	4	6	6	6	6	
2	504	16						1	1	1	2	2	2	2	2	3	3	3	4	4	4	
		24						3	3	3	4	4	4	4	6	6	6	6	6	6	6	6
		26						3	4	4	4	4	6	6	6	6	5	5	5	5	5	5
		28						4	4	4	4	6	6	6	5	5	5	5	5	5	5	5
		30						4	4	4	6	6	6	5	5	5	5	5	7	7	7	7

TYPE A TRUSS ← TYPE B TRUSS → TYPE C TRUSS

④ CMS'S ATTACHED ON OPPOSITE SIDES OF THE TRUSS.

[illegible]

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)														
0		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
350	16							4	4	5	5	5	5	7	7	7
	24							5	5	5	5	5	7	7	7	7
	26							5	5	5	5	5	7	7	7	7
	28							5	5	5	5	5	7	7	7	7
	30							5	5	5	5	5	7	7	7	7
330	16							4	4	5	5	5	5	7	7	7
	24							5	5	5	5	5	7	7	7	7
	26							5	5	5	5	5	7	7	7	7
	28							5	5	5	5	5	7	7	7	7
	30							5	5	5	5	5	7	7	7	7
310	16						3	4	4	5	5	6	5	5	7	7
	24						4	5	5	5	5	5	7	7	7	7
	26						5	5	5	5	5	5	7	7	7	7
	28						5	5	5	5	5	5	7	7	7	7
	30						5	5	5	5	5	5	7	7	7	7
290	16					3	3	4	4	4	5	5	5	5	7	7
	24					4	4	5	5	5	5	5	5	7	7	7
	26					4	4	5	5	5	5	5	5	7	7	7
	28					5	5	5	5	5	5	5	5	7	7	7
	30					5	5	5	5	5	5	5	5	7	7	7
270	16				2	2	3	3	4	4	5	5	5	5	7	7
	24				3	3	4	4	4	5	5	5	5	5	7	7
	26				4	4	4	4	5	5	5	5	5	5	7	7
	28				4	4	4	4	5	5	5	5	5	5	7	7
	30				4	4	5	5	5	5	5	5	5	5	7	7
250	16			1	2	2	3	3	4	4	4	5	5	5	5	7
	24			3	3	3	4	4	4	5	5	5	5	5	5	7
	26			3	3	3	4	4	4	5	5	5	5	5	5	7
	28			3	3	3	4	4	4	5	5	5	5	5	5	7
	30			4	4	4	5	5	5	5	5	5	5	5	5	7
230	16		1	1	2	2	2	3	3	4	4	4	5	5	5	7
	24		2	2	3	3	3	4	4	4	5	5	5	5	5	7
	26		2	2	3	3	3	4	4	4	5	5	5	5	5	7
	28		3	3	3	3	4	4	4	5	5	5	5	5	5	7
	30		3	3	4	4	4	4	5	5	5	5	5	5	5	7
210	16		1	1	1	2	2	3	3	4	4	4	5	5	5	7
	24		2	2	2	3	3	4	4	4	5	5	5	5	5	7
	26		2	2	3	3	3	4	4	4	5	5	5	5	5	7
	28		2	2	3	3	3	4	4	4	5	5	5	5	5	7
	30		3	3	3	3	4	4	4	5	5	5	5	5	5	7
190	16	1	1	1	1	2	2	2	3	3	4	4	4	5	5	7
	24	1	1	2	2	2	3	3	4	4	4	5	5	5	5	7
	26	1	2	2	2	3	3	4	4	4	5	5	5	5	5	7
	28	2	2	2	3	3	3	4	4	4	5	5	5	5	5	7
	30	2	2	3	3	3	4	4	4	5	5	5	5	5	5	7
170	16	1	1	1	1	1	2	2	3	3	3	4	4	4	5	7
	24	1	1	1	2	2	3	3	3	4	4	4	5	5	5	7
	26	1	1	2	2	2	3	3	4	4	4	5	5	5	5	7
	28	1	2	2	2	3	3	3	4	4	4	5	5	5	5	7
	30	2	2	2	3	3	3	4	4	4	5	5	5	5	5	7
150	16	1	1	1	1	1	1	2	2	3	3	3	4	4	4	5
	24	1	1	1	1	2	2	3	3	3	4	4	4	5	5	7
	26	1	1	1	2	2	2	3	3	4	4	4	5	5	5	7
	28	1	1	2	2	2	3	3	3	4	4	4	5	5	5	7
	30	1	2	2	2	3	3	3	4	4	4	4	5	5	5	7
130	16	1	1	1	1	1	1	1	2	2	3	3	4	4	4	5
	24	1	1	1	1	1	2	2	3	3	3	4	4	4	5	7
	26	1	1	1	1	2	2	2	3	3	4	4	4	4	5	7
	28	1	1	1	2	2	2	3	3	3	4	4	4	4	5	7
	30	1	1	1	2	2	3	3	3	4	4	4	4	5	5	7
110	16	1	1	1	1	1	1	1	2	2	2	3	3	4	4	5
	24	1	1	1	1	1	2	2	2	3	3	3	4	4	4	5
	26	1	1	1	1	1	2	2	2	3	3	4	4	4	4	5
	28	1	1	1	1	2	2	2	3	3	3	4	4	4	4	5
	30	1	1	1	1	2	2	2	3	3	4	4	4	4	4	5
90	16	1	1	1	1	1	1	1	1	2	2	2	3	3	4	4
	24	1	1	1	1	1	1	2	2	2	3	3	3	4	4	4
	26	1	1	1	1	1	1	2	2	2	3	3	4	4	4	4
	28	1	1	1	1	1	2	2	2	3	3	3	4	4	4	4
	30	1	1	1	1	1	2	2	2	3	3	4	4	4	4	4
70	16	1	1	1	1	1	1	1	1	1	2	2	3	3	3	4
	24	1	1	1	1	1	1	1	1	2	2	3	3	3	4	4
	26	1	1	1	1	1	1	1	2	2	2	3	3	4	4	4
	28	1	1	1	1	1	1	1	2	2	3	3	3	4	4	4
	30	1	1	1	1	1	1	2	2	2	3	3	4	4	4	4
50	16	1	1	1	1	1	1	1	1	1	1	2	2	3	3	3
	24	1	1	1	1	1	1	1	1	1	2	2	3	3	3	4
	26	1	1	1	1	1	1	1	1	1	2	2	3	3	3	4
	28	1	1	1	1	1	1	1	1	2	2	2	3	3	4	4
	30	1	1	1	1	1	1	1	2	2	2	3	3	4	4	4

* USE ONLY 20" X .812" WALL (42 KSI) OPTION.

TYPE B TRUSS → TYPE A TRUSS

POST SELECTION PROCEDURE

1. 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.

2. 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.

CANTILEVERED SIGN STRUCTURE - BRIDGE TYPE BC
SIMPLE SPAN SIGN STRUCTURE - BRIDGE TYPE S

3. 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.

4. 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).

5. 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.

6. 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.

7. 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.

8. 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: 27 FT.
SPAN LENGTH: 75 FT.
TYPE: SIMPLE SPAN
SIGN TYPE: CONVENTIONAL

POST IDENTIFICATION NUMBER: 3

STANDARD OVERHEAD SIGN SUPPORTS INTERIM DESIGN B

POST SELECTION TABLES

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	B	B	B	B	B	
330							A	A	A	A	B	B	B	B	B	
310						A	A	A	A	A	B	B	B	B	B	
290					A	A	A	A	A	A	A	B	B	B	B	
270				A	A	A	A	A	A	A	A	A	B	B	B	
250			A	A	A	A	A	A	A	A	A	A	B	B	B	
230		A	A	A	A	A	A	A	A	A	A	A	A	B	B	
210		A	A	A	A	A	A	A	A	A	A	A	A	A	B	
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 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	C	C	C	C	C	C	C	C	NA	NA	NA	NA	NA		
900										B	B	C	C	C	C	C	C	C	C	NA	NA	NA	NA	NA		
800								A	B	B	B	C	C	C	C	C	C	C	C	NA	NA	NA	NA	NA		
700							A	A	A	B	B	B	C	C	C	C	C	C	C	C	NA	NA	NA	NA		
600					A	A	A	A	A	B	B	B	B	C	C	C	C	C	C	C	C	NA	NA	NA		
500				A	A	A	A	A	A	A	B	B	B	B	C	C	C	C	C	C	C	C	C	NA		
400		A	A	A	A	A	A	A	A	A	A	B	B	B	B	C	C	C	C	C	C	C	C	C		
300	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	C	C	C	C	C	C		
200	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	C	C	C		
100	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	C		
"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	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C
* 2						B	B	B	C	C	C	C	C	C	C	C	C	C	C
"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
1	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	C	C
* 2									A	A	A	A	A	B	B	B	B	C	C
"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 UNITS	CMS AREA (SQ. FT.)	POST HT. (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	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	2	2	2	2	2	2	3	3	3	3	4	4
		26	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	4	4	4	4	4	4
		28	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	6
		30	1	1	1	2	2	2	2	3	3	3	3	3	4	4	4	4	4	6	6	6	6
2	522	16							1	1	1	1	1	2	2	2	2	2	3	3			
		24							2	3	3	3	4	4	4	4	4	6	6				
		26							3	3	3	4	4	4	4	6	6	6	6				
		28							3	4	4	4	4	6	6	6	6	6	6				
		30							4	4	4	4	5	6	6	6	6	5	5	5			5

TYPE A TRUSS ← TYPE B TRUSS → TYPE C TRUSS

2 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

POST SELECTION CHART TYPE "A" SIGNS

Based on a 24.6 p.s.f. wind load

A_s - SIGN AREA PER POST (Sq. Ft.)

320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20

W10X39

W8X31

(8WF31)

W8X28

(8WF28)

W8X24

(8WF24)

W6X20

(6WF20)

W5X16

(5WF16)

W4X13

(4WF13)

"H" - Distance from Ground to Center of Sign (Ft.)

USE LONGEST POST

Rev. 10-1-76
Rev. 11-3-76

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

TYPE "E " SIGN POST SPACING

PANEL WIDTH (IN.)	POST SPACING		
	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	—	42	—
132	—	48	—
138	—	48	—
144	—	54	—
150	—	—	42
156	—	—	42
162	—	—	42
168	—	—	42
174	—	—	48
180	—	—	48