

At-Grade Signing Plan Design Course Manual



June 2012



Office of
Traffic,
Safety, and
Operations

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Signing Plan Design (At-Grade) Manual

June 2012



Office of
Traffic,
Safety,
& Technology

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MnDOT Signing Plan Design (At-Grade) Manual

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1. INTRODUCTION

1.1 Background

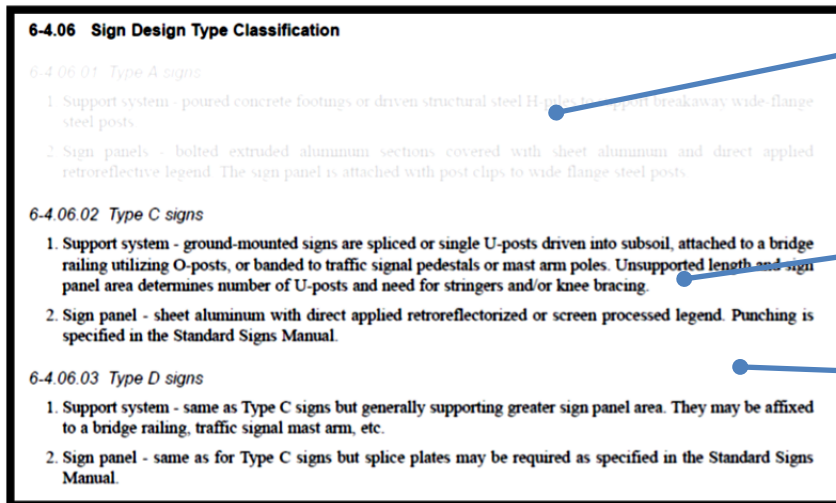
This Signing Plan Design (At-Grade) Manual has been developed to provide training to traffic personnel to acquire basic design skills in assembling signing plans for at-grade intersections on conventional highways and expressways. This one-day course is designed for persons who need to acquire signing plan design skills. Sample signing plan sets are provided as a reference.

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

Section 1 – Course Introduction

Section 2 – Traffic Engineering Manual (TEM) Chapter 6

This chapter is the “backbone” of the course and is annotated as follows:



Greyed out text will not be covered in the course; however, informational material related to the course may be contained in the text.

Normal (not greyed out) text will be covered in the course.

Text in a box indicates an annotation or addition.

Section 3 – Sample signing plan sets

Section 4 – Appendix

IMPORTANT: The material used to develop this course is current at the time of print. The TEM continues to change over time. The holder of this Manual should refer to the original reference materials to check for updates. Many of the updated materials can be found at the MnDOT Office of Traffic, Security & Operations website. The website is:

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

1.2 Disclaimer

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

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



1.3 Acknowledgements

The development of this Signing Plan Design (At-Grade) Manual has been a result of the efforts of the MnDOT Office of Traffic, Safety & Technology (OTST) and Albeck + Associates. The contributions by Heather Lott and Rick Sunstrom are gratefully acknowledged.

1.4 Contact Information

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

Exhibit 1-1 MnDOT Signing Technical Expert Contacts

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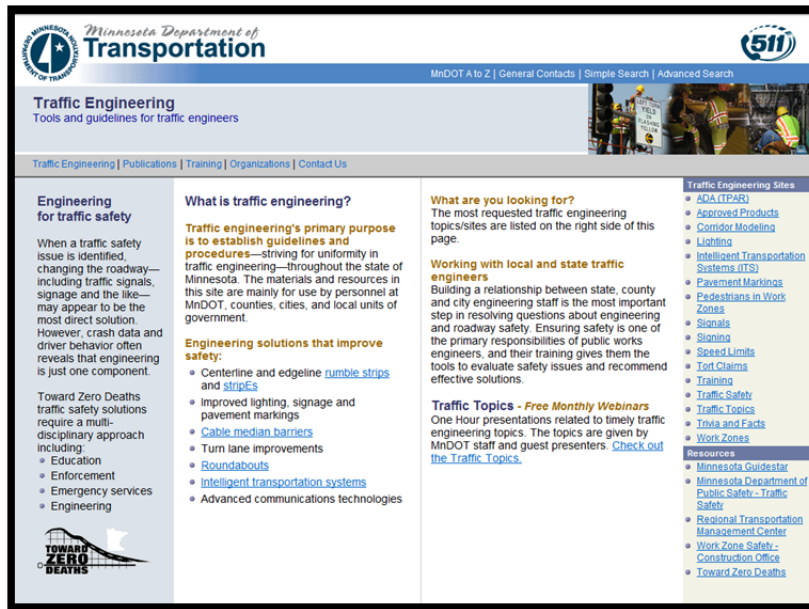
1.5 MnDOT OTST Website

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

www.dot.state.mn.us/trafficeng/contacts.html.

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

Exhibit 1-2 MnDOT OTST Website



1.6 Glossary of Terms

See pages 2-7 and 2-8 (TEM pages 6-7 and 6-8).



2. TEM CHAPTER 6 - GENERAL PRINCIPLES OF TRAFFIC SIGNING

The purpose of this section is to familiarize the attendee with the principles and application of traffic signs.

The information following this page is a direct printout of Chapter 6 of the Traffic Engineering Manual (TEM). At time of publishing this manual, this information is up to date. The most current version of the TEM can be found at:

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

It is important that the holder of this manual checks the above link for updates.

Chapter 6 TRAFFIC SIGNS

grayed out text is not covered in the At-Grade Course

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CHAPTER 6 - TRAFFIC SIGNS**6-1.00 INTRODUCTION****6-1.01 Purpose**

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

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

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

6-1.02 Scope

This chapter covers general procedures for selecting proper traffic signs and implementing the correct installation of these devices. General principles of traffic signing and practical application guidelines are strongly emphasized.

The layouts show applications (selection and placement) of recommended traffic signs for typical situations which occur frequently. All distances shown on the layouts are approximate. Not all situations can be addressed; therefore, the applications shown must be considered and applied as directed by engineering judgment.

Although it is usually desirable to provide all traffic signs as shown in the layouts, situations arise where this becomes impractical. Engineering judgment may dictate modifications to the typical layouts. When modifications are made, factors such as traffic volume, speed, sign distance, right of way, etc. must be considered.

The major source documents for this chapter are the MN MUTCD, the Standard Signs Manual, and the Mn/DOT Standard Specifications for Construction. Individuals responsible for designing and fabricating signs should have access to and be familiar with these reference materials. Technical support on the design of guide signs is available from the Mn/DOT Office of Traffic, Safety, and Technology (OTST).

6-1.03 Chapter Organization

This chapter is organized into six major sections. These sections cover (6-3) legal authority for placing traffic signs, (6-4) general principles of traffic signing, (6-5) application guidelines for regulatory signs, (6-6) application guidelines for warning signs, (6-7) application guidelines for guide signs, and (6-8) application guidelines for miscellaneous signs. Preferred signing practice for construction and maintenance work zone traffic control is found in Chapter 8.

6-2.00 GLOSSARY

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

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

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

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

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

Conventional Highway - A two-lane, two-way trunk highway.

Direct Applied - Adhesive-backed pressure sensitive retroreflective sheeting.

Expressway - A high speed, multi-lane highway which is generally an arterial road with the design speed 45 mph and greater. Two types of expressways exist, divided and undivided for both urban and rural sections. Most intersections are at grade, although grade separation and interchanges may be needed in some areas where high volume road or rail crossings exist, or terrain conditions favor grade separation.

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

Freeway - A divided highway with full control of access.

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

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

Legend - The message on the face of a sign panel. It includes all alpha-numeric text, arrows, route markers, and special symbols. Legends are made of retroreflective materials except where opaque black paints are prescribed for text on certain signs.

Local Road - Any road that is not a trunk highway.

Logo - A single or multicolored symbolic design unique to a product, a business, or a service facility used as a means of identification of a company's products, services, or business.

Metro District - The Mn/DOT Metropolitan District encompassing the eight-county Minneapolis-St. Paul Metropolitan Area.

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

Primary Guide Signs (freeways only) - These signs consist of advance junction signing, exit directional signs, exit gore signs, destination, and distance signs. Exit numbers are included on interstate freeways.

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

Sheeting, Encapsulated Lens Retroreflective - A material utilizing retroreflective spherical lens elements adhered to a synthetic resin and covered by a smooth plastic surface (commonly referred to as High Intensity). See Mn/DOT Standard Specification 3352.2A2b.2

Sheeting, Pressure Sensitive - Retroreflective or non-retroreflective sheeting which has an adhesive backing that permits application of the sheeting to the substrate by pressure, and requires no heat, solvent, or other preparation for adhesion to smooth, clean surfaces.

Sheeting, Prismatic Retroreflective (DG3) - A material utilizing full cube corner lenses formed in a transparent, synthetic resin, sealed and backed with a pressure sensitive adhesive and blue poly liner.

Sheeting, Wide Angle Prismatic Retroreflective for Visual Impact Performance (VIP) - A material utilizing prismatic lenses formed in a transparent, synthetic resin, sealed and backed with a pressure sensitive adhesive and blue poly liner. This sheeting material has optimum performance over a broad range of observation angles.

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

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

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

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

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

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

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

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

U-Post (Flanged Channel Sign Post) - A steel post of a channel or modified channel design, with flanges against which a sign panel will be placed. Holes are punched at a uniform spacing along the centerline of the back of the post.

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

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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.

6-4.06.05 Traffic Signal Mast Arm Signs

1. General

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

Figure 6.24 shows typical mast arm signing.

2. Internally lit street name signs

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

a. General criteria

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

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

b. Sign housing

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

There shall be a minimum of two rows of fluorescent lamps installed in each internally lit street name sign. One row of lamps will be wired for standby operation. In the event the main row of lamps fails, the second row of lamps can be activated either automatically or manually by a switching device. Ground access to manual switches should be provided.

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

c. Sign face

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

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

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

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

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 6.31, 6.32, and 6.33.

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.

*** On November 6, 2007, the TEO Executive Committee approved updated guidelines for spacing of signs on trunk highways in urban areas. Item 3, Spacing of Signs has been replaced with the following new guidelines:

Space signs in urban areas at the minimum desirable distances indicated below:

- * 100 feet in speed zones up to and including 35 mph
- * 150 feet in speed zones 40 mph or greater

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 ← Figures 6.3A and 6.3B show structural details

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.

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 OTST 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

OTST 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 OTST.
3. OTST 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.

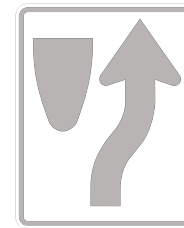
6-5.04 Bus Shoulder Sign (R4-X7)

Authorized buses are allowed to drive on designated shoulders on freeways and expressways in the Metro District. Typical signs and locations are shown in Figure 6.16.

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

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

The WATCH FOR BUSES ON SHOULDER (W14-X9) sign shall be placed on all freeway ramps, intersecting city, township, and county roads, and high volume entrances. These signs should not be installed for low volume entrances and private drives.



**6-5.05 BYPASS LANE Sign (R4-X8)
BYPASS & TURN LANE Sign (R4-X8a)**

See Chapter 7 for striping of bypass lanes.

See Figure 6.17 for the typical signing of bypass lanes.

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

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



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

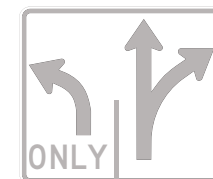
Mn/DOT policy is to use the NO PASSING ZONE (W14-3) pennant sign (48" x 60" x 60"). This does not preclude use of the DO NOT PASS sign where it is deemed necessary based on engineering judgment.



6-5.07 Intersection Lane Control Sign (R3-8)

The Intersection Lane Control sign (R3-30AD) may be used at a four-legged intersection with a through two-lane, two-way highway, a public street, and a private driveway if the following conditions are met:

1. The left turn lane from the through trunk highway to the public street is striped, and
2. The adjacent through lane of the trunk highway also functions as a right turn lane to a private entrance. The private entrance is required to have a STOP sign for controlling traffic entering the trunk highway. The private entrance serves a private residence, commercial business, or development.



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 6.18A and 6.18B 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 greater than 50,000 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)

30" x 30" Minimum, match right 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 6.19):

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).



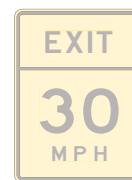
1. Maintenance of these advance warning signs on all local road approaches to trunk highway intersections is the responsibility of the road authority.
2. At new intersections, or at intersections where traffic control is revised by Mn/DOT, Mn/DOT will investigate the need for advance warning signs on 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.

See Appendix D for MN MUTCD Table 2C-4 for advance sign placement distances.

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.



6-6.05 BRIDGE ICES BEFORE ROAD Sign (W8-13)

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

Minnesota Statute 3.736, subd 3(d) provides immunity for “a(ny) loss caused by snow or ice on any highway or other public place, except when the condition is affirmatively caused by the negligent acts of a state employee.”

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

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

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



6-6.06 Channelized Intersections

Figures 6.20A and 6.20B indicate the signing required for channelized intersections.

6-6.07 Chevron Alignment Sign (W1-8)

The Chevron Alignment sign is a warning sign and, as with all warning signs, should be used sparingly, as excessive use will reduce its effectiveness. Generally, this sign should be used only on curves of six degrees or greater. Curves of less than six degrees are to be marked by standard delineation as covered in Chapter 7.



Variables such as approach speed, grade, super elevation, visibility, and vertical alignment affect the spacing of the signs. Chart 6-6 shows spacing of signs on various curves. Generally, the sign size is governed by the road classification (refer to Appendix C of the MN MUTCD or the Standard Signs Summary). Although the standard size for trunk highways is 18" x 24", the 24" x 30" sign may be used based on engineering judgment.

6-6.08 Controlled Burning Signs

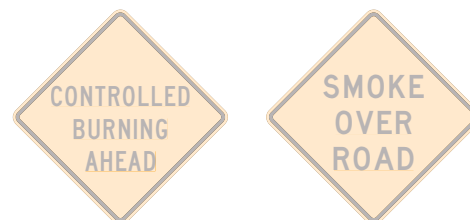
When controlled burning on trunk highway right-of-way occurs, a CONTROLLED BURNING AHEAD sign (W14-X12) should be installed prior to the burn area at a distance in conformance with the MN MUTCD, Table 2C.4.

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

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

These signs shall be made of 48" x 48" fluorescent orange retroreflective sheeting with a black legend and border. The signs should be installed on temporary stands.

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



6-6.09 Crossing Signs

Non-Vehicular and Vehicular Crossing signs should only be used at locations where the condition, crossing activity, or shared use of the roadway is unexpected or where a sight restriction or other geometric constraint exists.

Advance Non-Vehicular or Vehicular Crossing signs shall be placed in accordance with the MN MUTCD, Table 2C-4.

If a crossing is to be signed, whether or not there are crosswalk markings, advance NON-VEHICULAR or VEHICULAR CROSSING signs shall be installed.

6-6.09.01 Non-Vehicular Signs

Guidance for evaluating the installation of pedestrian crosswalks can be found in Chapter 7.

Specific information for the installation of the STOP FOR PEDESTRIAN IN CROSSWALK sign (R1-X1) is the MN MUTCD.

1. Pedestrian Crossing Signs

Specific information for the installation of disabled or senior citizen signing is in the MN MUTCD, Appendix B.

Typical examples where special treatment should be considered include isolated intersections where there are heavy pedestrian volumes, pedestrian crossings where approach visibility is poor, and at mid-block crossings.

Special treatment is not usually required at normal intersections within municipalities, or at rural intersections.

See Figure 6.21 for typical placement of a Pedestrian Crossing sign (W11-2) at an intersection. In urban areas, the distance for the advance crossing sign may be less where lateral clearance is limited or where inadequate sign spacing exists.

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

Guidelines for installation of In-Street Pedestrian Crossing signs on state highways are as follows:

- a. The sign shall be installed only by permit through Mn/DOT district offices.
- b. The sign shall only be used in 35 mph or lower speed zones.
- c. Only one sign structure shall be used per approach near marked crosswalks.
- d. The sign shall not be used at intersections controlled by traffic control signals or on approaches controlled by STOP signs.
- e. The sign should only be used at key locations, such as high volume pedestrian crosswalks, to avoid overuse.
- f. The sign shall only be used as an in-street sign, not on the outside shoulder or parking lane. When installed, the sign shall not impede or obstruct any traffic movement including through or turning movements.
- g. When the sign is used at, or in advance of, a school crossing to supplement ground mounted school warning signs, the sign shall include the SCHOOL plaque.
- h. The STOP FOR legend shall be used as Minnesota state law specifically requires that a driver must stop for a pedestrian in a crosswalk.
- i. The sign shall have a black legend and border on white and fluorescent yellow-green background and shall have the same dimensions shown on Standard Sign Number R1-6b.
- j. The sign shall have the same sign message on both sides or a retroreflective strip mounted on the backside the same color as the centerline or lane line. To avoid driver confusion, back-to-back signs should only be used on two-lane two-way roadways. See the MN MUTCD, Figure 2B-2.

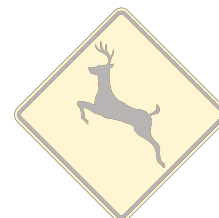
- k. The device shall meet the crashworthiness requirements of NCHRP Report 350.
 - l. The maximum mounting height shall be two feet to the bottom of the sign panel.
 - m. The sign may be used seasonally to prevent damage in winter due to plowing operations, and may be removed at night if pedestrian activity is minimal.
2. TRAIL CROSSING Sign (W11-X7)

A TRAIL CROSSING sign should only be installed for officially designated trails which cross the highway and are not continuously visible for a distance of 850 feet from the crossing. To determine if the visibility distance is adequate, use the sight restriction determination procedure under ~~6-6.05.02~~ Vehicle Crossing Signs.



3. Deer Crossing Sign (W11-3)

Mn/DOT policy is to not install Deer Crossing signs. In place signs shall be removed through attrition.



6-6.09.02

6-6.09.02 Vehicle Crossing Signs

1. Sight restriction determination

To determine whether or not a sight restriction exists for a crossing that can not be relocated, the following procedure may be used.

Temporarily place a traffic cone (28 inches tall) at the crossing. Using a vehicle or measuring device move to a point 850 feet in advance of the cone. If the cone is not continuously visible for the observer (at eye height of 3.5 feet above the pavement) then a sign shall be installed in accordance with MN MUTCD Table 2C-4.

If the crossing is located on a long, continuous downgrade, consult the Mn/DOT Road Design Manual, Table 2-5.09B. Based on engineering judgment, the distance obtained from Table 2-5.09B may be added to the standard 850 foot distance. The observation shall then be made from this distance to determine if a sign needs to be installed.

2. Snowmobile Crossing Sign (W11-6)

In addition to the criteria for installing Vehicle Crossing signs, engineering judgment may be used to install signs for crossings based on unique trail geometric conditions, such as deep ditches, steep inslopes, narrow shoulders, or at locations where MS 84.87, subd 1 b (6) permits snowmobiles to be operated on highway bridges (other than part of the main traveled lanes of interstate highways) when no other method of avoidance is possible.



If an established crossing meeting the guidelines for signing remains in the same location for several years, the district may consider installing warning signs with diagonal down arrows at the crossing.

Snowmobile Crossing signs should NOT be removed in the spring and reinstalled in the fall due to variations in the length of the snowmobiling season from year to year.

Do not sign all crossings since many Grant in Aid trail crossings move annually (some by as little as 100 feet).

If a snowmobile trail crossing is a multi-use trail and the criteria for sign installation are met, TRAIL CROSSING signs shall be used instead of Snowmobile Crossing signs.

6-6.09.03 Down Arrow Plaque (W16-7mp)

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



6-6.10 EVENT CONGESTION AHEAD Sign (W14-X11)

The EVENT CONGESTION AHEAD sign is a temporary sign that should be installed one hour before the event begins and removed each day after the event has ended. The 36" x 36" sign panel shall be used in urban, low speed areas. The 48" x 48" sign panel shall be used in rural, high speed areas. The sign shall have a black legend and border on an orange background.

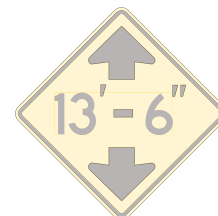


Fabrication and installation shall be done by local authorities.

In addition, NO PARKING signs may be considered. If local road authorities decide to use them, the NO PARKING signs may be non-retroreflective since they are temporary, less expensive than retroreflective aluminum signs, and accomplish the same purpose.

6-6.11 Low Clearance Sign (W12-2)

According to MS 169.81, subd. 1, no vehicle loaded or unloaded shall exceed 13 feet 6 inches in height except double-deck buses with written authority from the Commissioner of Transportation. The LOW CLEARANCE sign shall be installed to warn drivers that the clearance is less than the maximum clearance allowed plus one foot or 14 feet, 6 inches.



All structures with a clearance less than 14 feet 6 inches shall be signed. An additional 3-inch allowance for frost action should be reflected in the signing.

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

6-6.12 No Passing Zones

6-6.12.01 NO PASSING ZONE Sign (W14-3)

NO PASSING ZONE signs used on conventional highways shall be 48" x 60" x 60".

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



6-6.12.02 Terminal Marker Posts

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

A 3-1/2" x 2" sticker stating "Mn/DOT NO PASSING ZONE TERMINAL MARKER" shall be installed near the top of each visibility enhancer so that the sticker is visible from the roadway. The stickers are available from the state sign shop in Oakdale.

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

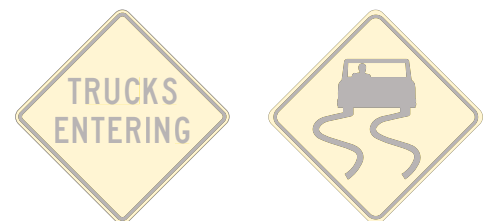
When a site is open to commercial trucks, the TRUCKS ENTERING sign (W11-X3) and the Slippery When Wet sign (W8-5) should be used on each approach to the access.

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 6.23 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 6.25.

The following typical layouts show the signing for freeway/expressway interchanges:

1. Diamond interchange on crossroad (Figures 6.26 and 6.27).
2. Folded diamond interchange on crossroad (Figure 6.28).
3. Cloverleaf interchange on crossroad (Figure 6.29).

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.

3. Distance signing

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

MN MUTCD Sections 2D.36 and 2D.37 establish guidelines to follow in selecting city names or other traffic generators, and in locating distance signs on conventional highways. Only one distance sign is permitted on each conventional highway leaving an intersection, municipality, or interchange.

MN MUTCD Section 2E.36 provides guidelines for distance signs on freeways.

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

- a. The first city along the route.
- b. The first county seat, route number of an intersecting conventional highway, or a significant geographical site or generator.
- c. The next major destination or control city.

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

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

The city name may be added to a sign, at Mn/DOT's expense, at the time the existing sign is due for replacement.

6-7.04 Typical Junction Signing Layouts

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

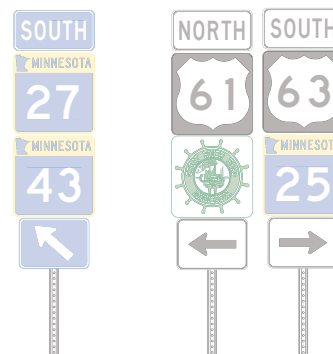
1. T-intersection (two-lane, two-way) (See Figure 6.31).
2. T-intersection (two-lane, two-way with four-lane divided) (See Figure 6.25).
3. Typical four-leg intersection (See Figure 6.32).
4. Typical intersection with county road (See Figure 6.33).
5. Typical rural single lane roundabout intersection (See Figure 6.34).

6-7.05 Independent Route Marker Assemblies

Independent route markers used on junction and directional sign assemblies shall follow the MN MUTCD Section 2D.27 and shall be 24" x 24", except for 3-digits on M1-1 signs which shall be 30" x 24" for both urban and rural applications on conventional highways.

MN MUTCD Section 2E provides guidance for expressways and freeways. Independent route markers shall be 36" x 36" except for 3-digits on M1-1 signs which shall be 45" x 36".

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



It sometimes becomes necessary to include two different color route markers on the same structure. When this happens the auxiliaries may not always match the color combinations of both route markers. To avoid this, route markers should be installed on separate structures whenever possible. When this is not possible the following guideline should be used to determine the color of the route marker auxiliaries:

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

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

6-7.05.01 County Pentagon Route Markers

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

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



Mn/DOT shall fabricate pentagon route markers using the same retroreflective materials used for all route markers on the conventional highway system and meeting the colors as stated in the MN MUTCD, Section 2D.11.

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

This section is based on Chapter 2D, Guide Signs Conventional Roads (see Sections 2D.2 and 2D.38) of the MN MUTCD.

Road name or street signs shall be white legend on green background and fully retroreflectorized in accordance with current Mn/DOT requirements.



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

6-7.06.01 General Criteria

Signing for named roads will be provided, at the request of the road authority, on the basis of all of the following conditions:

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

6-7.06.02 Urban Areas

Urban street name signs, such as the small slat versions mounted at intersection corners, are to be furnished and installed by the appropriate city.

Advance arterial and major street name signs (including mast arm mounted signs) on conventional highways in urban areas will be provided by Mn/DOT, as needed, to fulfill basic guide signing responsibilities.

If street name signs are to be installed in an urban area (business, commercial, or residential district) where parking or pedestrian movement is likely to occur or where there are other obstructions to view, the clearance to the bottom of the sign panel shall be at least 7 feet in accordance with MN MUTCD Section 2A.18.

Lateral offset should be at least two feet from the face of curb in accordance with MN MUTCD Section 2A.19.

6-7.06.03 Rural Areas

When the trunk highway intersects a public road, appropriate identification of that public road will be provided on conventional roads and expressways with at grade intersections by Mn/DOT (see Figures 6.33 and 6.35), based on all of the following conditions:

1. When so requested by the local governing body, Mn/DOT will furnish and install route marker assemblies on the trunk highway, provided that the intersecting local road is numbered and marked with route markers. Route marker assemblies shall be in accordance with the MN MUTCD. Identification by number only should be encouraged whenever possible.
2. When a numbered public road is also known by an officially designated name, both types of identification may be used on a sign.
3. For road name signs, all initial signing costs, including overhead factors and installation by Mn/DOT, shall be paid by the road authority requesting the signing, at the current rate per square foot of sign, as established by Mn/DOT. Mn/DOT will maintain road name signs at its own expense.

6-7.06.04 Street Name Signs Above Stop Signs

Small street name signs may be installed above Mn/DOT maintained STOP signs at the discretion of the district traffic office:



Criteria for installation shall be based on all of the following conditions:

1. No street name signs are allowed if there are any other signs, such as a ONE WAY sign, in place on the STOP sign structure.
2. The street name sign assembly shall be mounted six inches above the STOP sign.
3. Street name signs shall be double faced and fabricated with retroreflective sheeting on extruded or flat aluminum blades.
4. The signs shall be fully retroreflectorized and have white legend and border on green background.
5. The sign panel size should be 9 inches by a variable length (maximum 36 inches) with 6-inch upper case and 4-1/2 inch lower case letters Series B, C, D, or E.
6. The street name sign assemblies shall be constructed so that the name plate cannot be turned.
7. Not more than three slats (six-way installation) shall be permitted above any one STOP sign.

6-7.07 Boundary Signs

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

6-7.07.01 City Name Sign (I2-3)

City Name signs should be installed only for communities identified on the official Minnesota Highway Map and/or official county highway maps. Signs should normally be installed at the actual corporate boundary, subject to the following guidelines:



1. Urban areas

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

2. Rural areas

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

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

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

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

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

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

6-7.07.02 Community Identification Sign

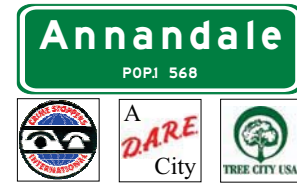
Criteria for these signs, which are allowed outside the trunk highway right-of-way, are specified in MS 173.08 subd. 1 (10).

This signing program is administered by the district offices under the direction of the Office of Technical Support.



6-7.07.03 Community Recognition Signing Program

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



Community Recognition Sign panels shall not be installed on Interstate freeways statewide, or on freeways and expressways in the Metro District.

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

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

The sign panel designs shall be approved by the district traffic engineer.

1. Examples of permitted sign panels:

- a. Non-profit service organizations.
- b. Special programs, either permanent or temporary; e.g. DARE, Tree City, Storm Ready City, Fit City, and Sister City.
- c. City logo.
- d. City recognition slogans; e.g. State Baseball Champions.
- e. Drinking Water Protection Area sign panel.

2. Costs

- a. Community Recognition Sign panels shall be fabricated, installed, and maintained by the community under the Mn/DOT permit process.
- b. If more than two Community Recognition Sign panels are to be installed by the community on an existing sign structure, the community shall pay an up-front charge of \$200 to Mn/DOT for reimbursement of costs incurred by state forces to:
 - 1) Raise the existing CITY NAME sign panel or the STAR CITY sign panel as required to meet the nine foot clearance from the ground.
 - 2) Modify the U-channel sign structure to include knee braces if necessary in order to meet breakaway and wind loading requirements.
 - 3) Furnish and install a horizontal stringer for the mounting of Community Recognition Signs.

3. Sign Format

The sign panel background, or the predominant color, may be any color except red or orange.

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

The sign panels may be made of either retroreflective or non-retroreflective sheeting. If made of retroreflective sheeting, they shall be no more retroreflective than High Intensity Sheeting. Fluorescent materials shall not be used on sign panels.

The sign base material shall be sheet aluminum or other material approved by Mn/DOT. See Minnesota Standard Specifications for Construction, 3352.2A1b.

Any combination of sign panels may be allowed up to a total of 72" in length by 24" in height having a total square footage not to exceed 12 square feet. These panels shall be installed horizontally either below the CITY NAME sign panel or below an existing STAR CITY sign panel if it is mounted on its own structure.

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 OTST 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).



2. The costs of fabrication, installation, and maintenance of signs shall be paid by Mn/DOT.
3. Signing directing motorists from one trunk highway onto another may be allowed if the facility is within ten miles of the intersection of the two trunk highways. Signs directing motorists from one freeway to another freeway shall not be allowed.
4. In place EMERGENCY HOSPITAL signs shall be removed through attrition and replaced with HOSPITAL signs. Mainline signing and ramp signing at an interchange shall be replaced at the same time.
5. HOSPITAL signs should be installed in accordance with the following:
 - a. Interchange signs (E10-1, E10-3, E10-4 and E10-8)
 - 1) At rural interchanges where General Motorist Service signs (E10-1) are in place, the word HOSPITAL (E10-1 Supplement) may be included on the General Motorist Service sign if the word CAMPING is not displayed.
 - 2) At urban or rural interchanges where General Motorist Services are not signed, the E10-3 sign shall be installed at the interchange nearest the hospital. The appropriate signing, E10-4 or E10-8, shall be installed on the ramp(s).
 - 3) If the hospital is located less than two miles from an interchange, the E10-8 sign shall be installed on the ramp(s). If the hospital is located two miles or more from an interchange, the E10-4 sign shall be installed on the ramp(s).
 - 4) Trailblazing signs on trunk highways shall display the number of miles in one mile increments (E10-8 or E10-4 if mileage is required).
 - 5) Trailblazing signs (D9-2a) on local roads shall display the number of blocks from the trunk highway to the facility.
 - b. At-grade intersection signs (D9-2a and D9-2b)
 - 1) The D9-2b sign shall be ground-mounted in advance of, or on a traffic signal mast arm at, the intersection with the road leading to the hospital.
 - 2) Trailblazing signing (D9-2a) on trunk highways and/or local roads shall display either the number of blocks or miles (in one mile increments) to the facility. Trailblazing signs on local roads directing motorists to the facility shall display the appropriate distance and arrow.

6-7.09.05 Resort and Camping Signing Program

RESORT signs (D9-X3) and CAMPING signs (D9-X4) direct the motorist to campgrounds or resorts in rural areas where the Advertising Regulation Law has restricted the installation of private advertising signs off the highway right-of-way. (See Figures 6.33) These signs may only be installed where resort information signs (or County Slat Sign program) are in place on local roads in accordance with MS 160.283-160.285.



In addition to the general criteria for all signing programs, the following criteria apply to the Resort and Camping Signing Program.

1. Signs may be installed in rural areas on conventional highways and at at-grade intersections on expressways.
2. Signs shall only be allowed from the nearest trunk highway intersection. Signs directing motorists from one trunk highway to another trunk highway shall not be allowed.

3. The cost of fabrication, installation, and maintenance of the signs shall be paid by 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.

6-7.09.12 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.

To obtain signing under the Specific Service Signing Program, the application form shall be completed and submitted to the district traffic engineer. For a copy of the Application for Installation of Specific Service Signs see Forms 6.1A through 6.1E.

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.

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

1. Priority of installation

- a. A business shall not be allowed to “bump” another business from a specific service sign.
- b. If two or more eligible businesses apply at the same time, year-round businesses shall have priority over seasonal businesses.
- c. Left - or right-oriented businesses have priority over straight-ahead oriented businesses. If a business is eligible for a left or right directional sign panel on one approach, then it is eligible for a straight-ahead directional sign panel on the other approach. Although straight ahead signing is to be discouraged, it may be permitted at certain intersections.

2. Sign placement

- a. No specific service sign or assembly shall be placed at a location that will interfere with other necessary signing as determined by the Commissioner of Transportation. If space is unavailable, requests shall be denied.
- b. A specific service sign on a ramp shall not be allowed if the business is readily visible from the ramp terminal or effective directional signing is visible.
- c. A specific service sign should be installed on the right side of the roadway.
- d. A sign assembly shall be limited to four panels. Assemblies on mainline approaches to interchanges are limited to three panels and one action message panel, e.g. NEXT RIGHT.
- e. Specific service signs shall be installed at least 300 feet from any in place signs on a conventional road. In place signs are not to be removed to accommodate specific service signs. The maximum number of specific service sign assemblies per intersection approach shall be the number of structures that can be placed within a half mile of the intersection.
- f. Specific service signs shall be installed at least 400 feet from any in place signs on an expressway. The maximum number of specific service sign assemblies per interchange approach shall be the number that can be placed either within one half mile of the exit ramp gore or past the previous interchange entrance ramp, whichever distance is the shortest.

3. Order of installation

The following sequence of signs shall be used at intersections on conventional highways to integrate specific service signs with other traffic signs in a uniform manner. The signs are listed in the order that a motorist would encounter them as they approach an intersection. The spacing of the signs shall be as shown in Figure 6.33.

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

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.

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

1. The Adopt-A-Highway sign panel is the primary sign panel on the sign structure.
2. At the correct Engineering station for the Reference Location sign, install a 2-1/2 pound or 3 pound per foot U-post structure to provide an offset of 12 feet from the edge of the shoulder to the left edge of the Adopt-A-Highway sign panel. Install the sign structure in accordance with Figures 6.3A, 6.3B, and 6.3C and Charts 6.2 or 6.3, and 6.4.
3. Attach the Adopt-A-Highway sign panel to the sign structure as shown in Figure 6.3A and meet the following minimum clearances (or see Figure 6.2):
 - a. A minimum clearance of six feet from the surface of the nearest traffic lane to the bottom of the sign panel.
 - b. A minimum clearance of seven feet measured perpendicular from the ground line to the bottom of the sign panel.
4. Attach the reference post marker to the left vertical post, directly below the Adopt-A-Highway sign panel with mounting hardware shown in Figure 6.3B.

See Forms 6.3A and 6.3B for a copy of the Adopt-A-Highway agreement form.

6-8.02 Adopt-A-Rest Area Sign Program

Rest areas/wayside rests (Class II and Class III Rest Areas) may be adopted by groups for the purpose of litter pickup, similar to adopting a portion of highway. These rest areas typically are located off the interstate highway system. Rest areas which are maintained by the Green View organization may not be adopted under the Adopt-A-Rest Area guidelines.

One ADOPT-A-REST AREA sign (I-X1), 42" x 24" may be installed along the exit ramp or road into the rest area or in the rest area at a site determined by the Site Development staff.

All other pertinent guidelines of the Adopt-A-Highway program shall apply to the Adopt-A-Rest Area program.

See Forms 6.4A and 6.4B for a copy of the Adopt-A-Rest Area agreement form.

6-8.03 Community Destination Sign Program

1. Introduction

The community must develop a master plan for Community Destination signing which contains a map of the community, including the city street/local road system and a concept design of a typical community destination sign, which may include the city logo or name and up to a total of three destinations/attractions.

2. Community Map

The map of the community shall include:

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

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

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).

6-8.08.02 Teletypewriter (TTY) Facility Signing in Rest Areas

This symbol sign provides travelers that have hearing impairments or speech difficulties advance notice of TTY equipped public pay telephones located in several Mn/DOT Class I rest areas.



Guidelines for fabrication and installation of TTY sign panels are as follows:

1. The sign panel shall display the white TTY symbol on a blue background
2. The TTY symbol sign panel may be installed on an existing advance rest area sign structure for each of the rest areas equipped with TTY equipment. If there is more than one rest area sign, OTST and district traffic office staff will determine which advance sign structure will display the TTY symbol sign panel.
3. If the advance rest area sign panel is on a ground mounted sign structure, the TTY symbol sign panel shall be attached in accordance with the following size guidelines:
 - a. U-channel sign structures - the TTY symbol sign panel shall be 24" x 24". The sign panel shall be mounted directly below the rest area sign panel on the right U-channel post with standard sign panel mounting hardware.
 - b. I-beam sign structure - the TTY symbol sign panel shall be 30" x 30". The mounting will be determined by OTST and district traffic office staff.
4. If the advance rest area sign panel is mounted overhead, the TTY symbol sign panel shall be 30" x 30" and shall be mounted overhead. The mounting location will be determined by OTST and district traffic office staff. If there is more than one overhead mounted advance rest area sign panel, OTST and district traffic office staff will determine which advance sign structure will display the TTY symbol sign panel.
5. All costs for the TTY symbol sign panels (fabrication, installation, and removal) will be borne by Mn/DOT, since Mn/DOT is providing this equipment and let the statewide contract for the installation and maintenance of the TTY equipment in all Class I rest areas.

6-8.08.03 WAYSIDE REST Sign (D5-X1)

Wayside rests (State owned and maintained facilities only) are rest stop facilities with limited services located on conventional highways in rural areas. (See Figure 6.38) If the wayside rest is closed for the season, a CLOSED plaque may be installed as shown in Figure 6.38.



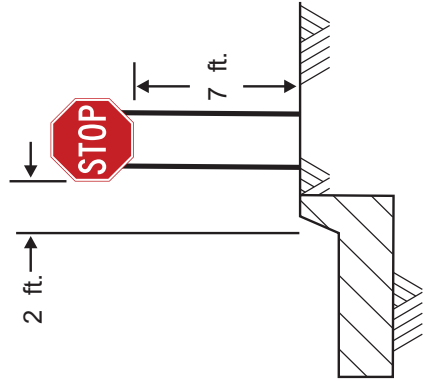
1. A WAYSIDE REST advance sign shall be installed approximately 1/2 mile in advance of the point of turn. When appropriate supplemental signs are used they shall be placed below the D5-X1 or the D5-X2 sign. If the wayside rest has only picnic tables, no supplemental signs shall be used.
2. A WAYSIDE REST with arrow sign (D5-X2) shall be installed approximately 200 feet in advance of the point of turn.

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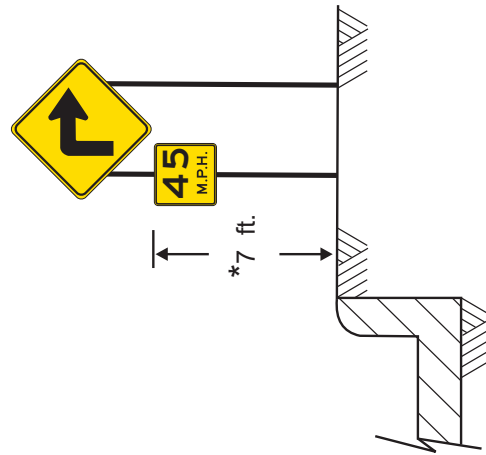
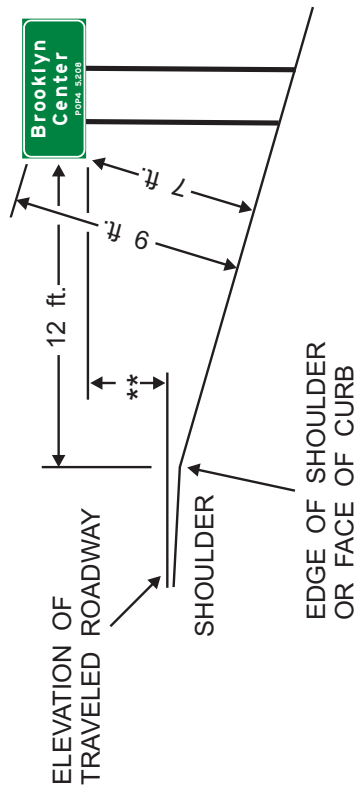
URBAN

TYPICAL SPEEDS
BELOW 45 MPH



RURAL

TYPICAL SPEEDS
45 MPH AND ABOVE



NOTE: All dimensions are minimums.

* A secondary sign (e.g. advisory speed) mounted on a single post of a multi-post structure does not affect the mounting height of the primary sign.

** 5 feet Conventional road, 7 feet Expressway or freeway.

Text Ref.: 6-4.07.02

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SIGN PLACEMENT

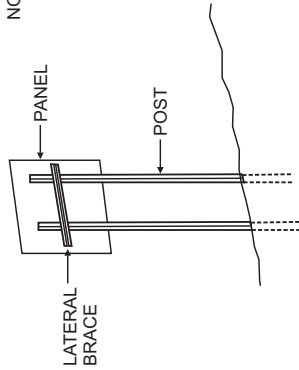
FIGURE
6.2

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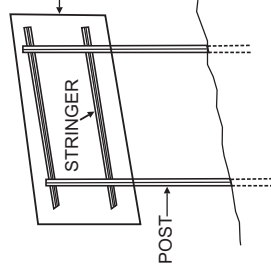
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- NOTES:
1. USE 3LB/FT. STUB POSTS, RISER POSTS, STRINGERS, KNEE BRACES, LATERAL BRACES AND KNEE BRACE STUB POSTS. ALL SHALL CONFORM TO MN/DOT 3401.
 2. FOR TYPE D SIGN POSTS, LENGTH, AND SPACINGS, SEE SIGNS DATA SHEET.
 3. TYPE D SIGN PANELS SHALL BE BOLTED TO STRINGERS AT 24" MAXIMUM INTERVALS IN ACCORDANCE WITH TYPE D STRINGER AND PANEL JOINT DETAIL. (SEE MN/DOT STANDARD SIGNS MANUAL).
 4. MOUNTING (PUNCH CODE) FOR TYPE C SIGN PANELS SHALL BE AS INDICATED IN THE MN/DOT STANDARD SIGNS MANUAL UNLESS OTHERWISE SPECIFIED.
 5. ALL RISER (VERTICAL) U POSTS SHALL BE SPLICED. DRIVEN STUB POSTS SHALL BE AT LEAST 7' LONG.
 6. USE STAINLESS STEEL 5/16" BOLTS, WASHERS, AND NYLON INSERT LOCK NUTS AS SHOWN FOR ALL GROUND MOUNTED AND OVERHEAD 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 IMBEDDED 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.

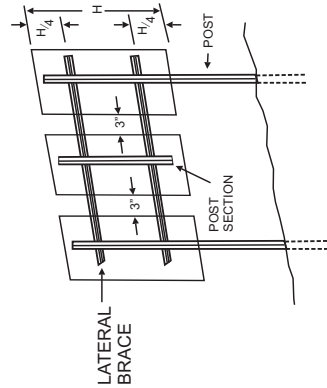
NOTES:



TYPICAL TYPE C INSTALLATION

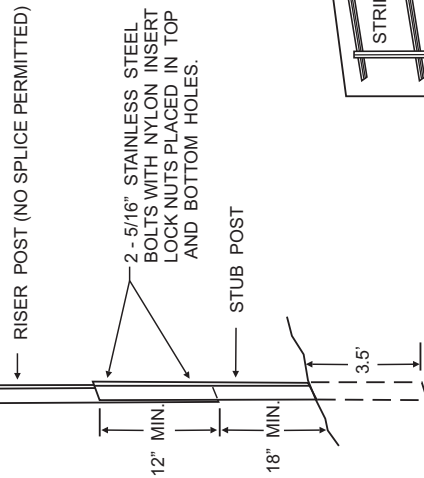


TYPICAL TYPE D INSTALLATION

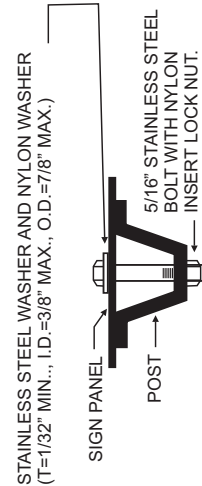


MODIFIED TYPE C INSTALLATION

TYPE C & D POST



U POST SPLICE



U POST MOUNTING TYPE C SIGNS

Text Ref.: 6-4.08.01

Rev: 8-5-08

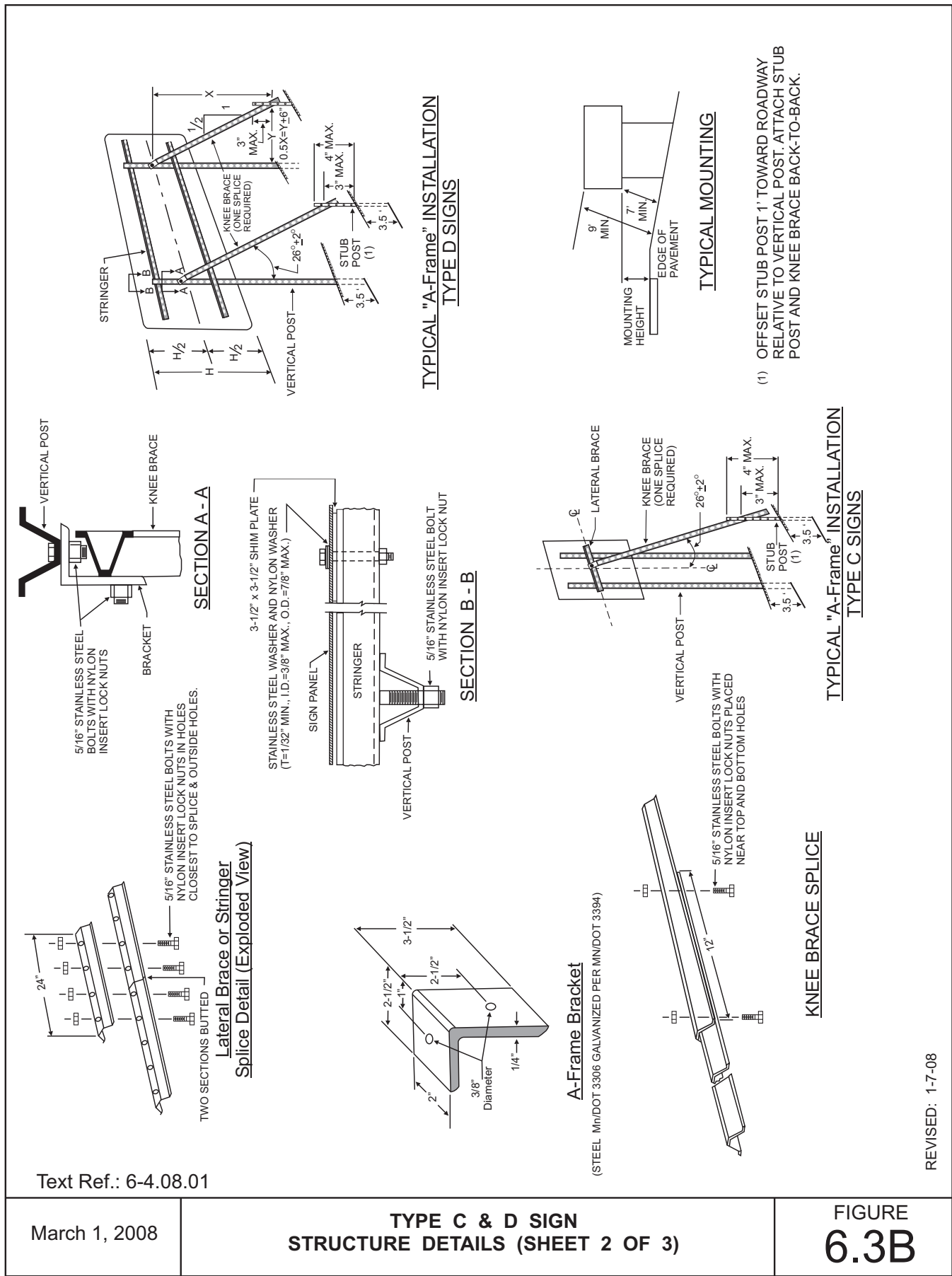
March 1, 2008

TYPE C & D SIGN STRUCTURE DETAILS (SHEET 1 OF 3)

FIGURE 6.3A

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REVISED: 1-7-08

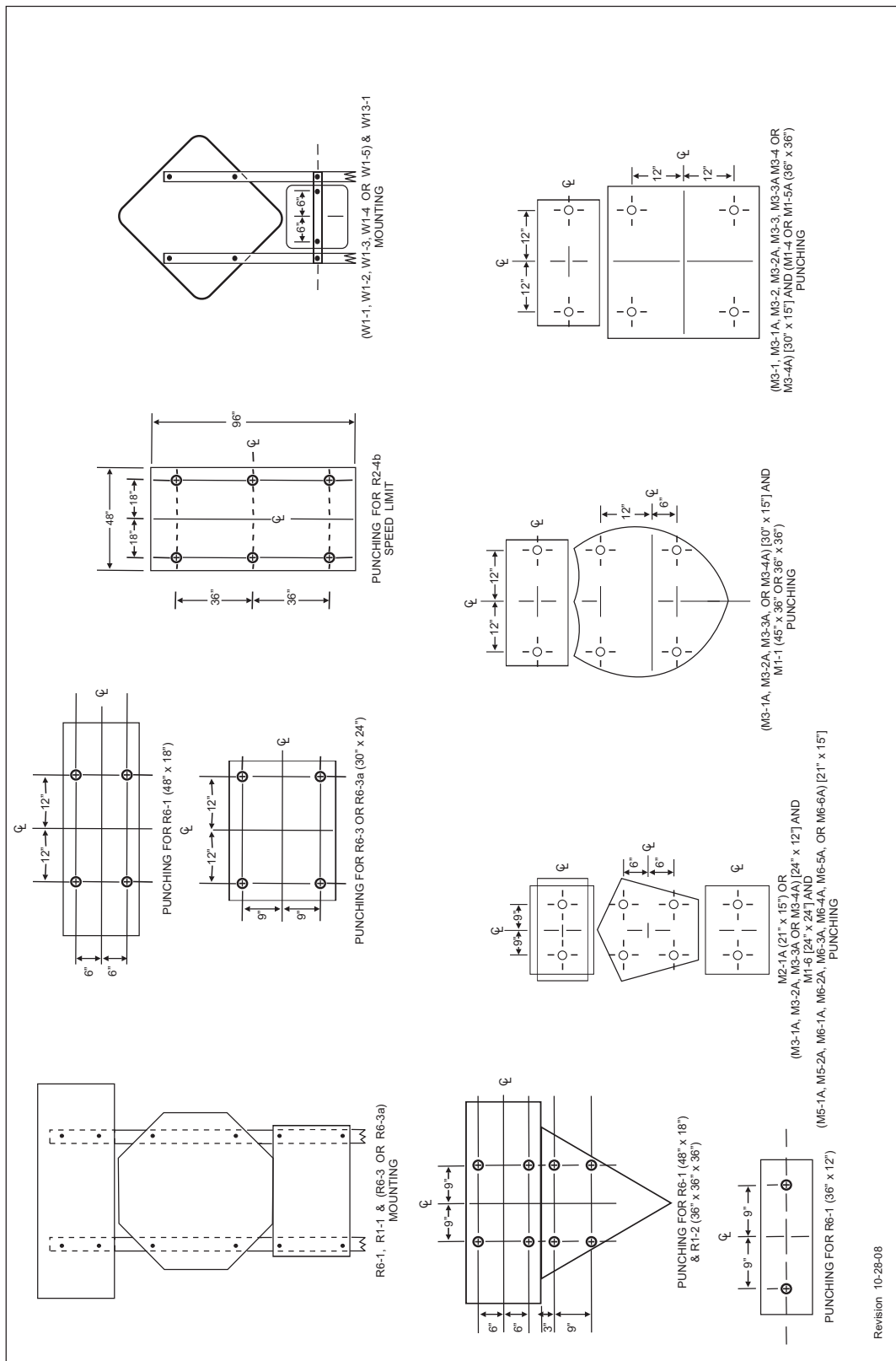
March 1, 2008

TYPE C & D SIGN STRUCTURE DETAILS (SHEET 2 OF 3)

FIGURE 6.3B

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Text Ref.: 6-4.08.01

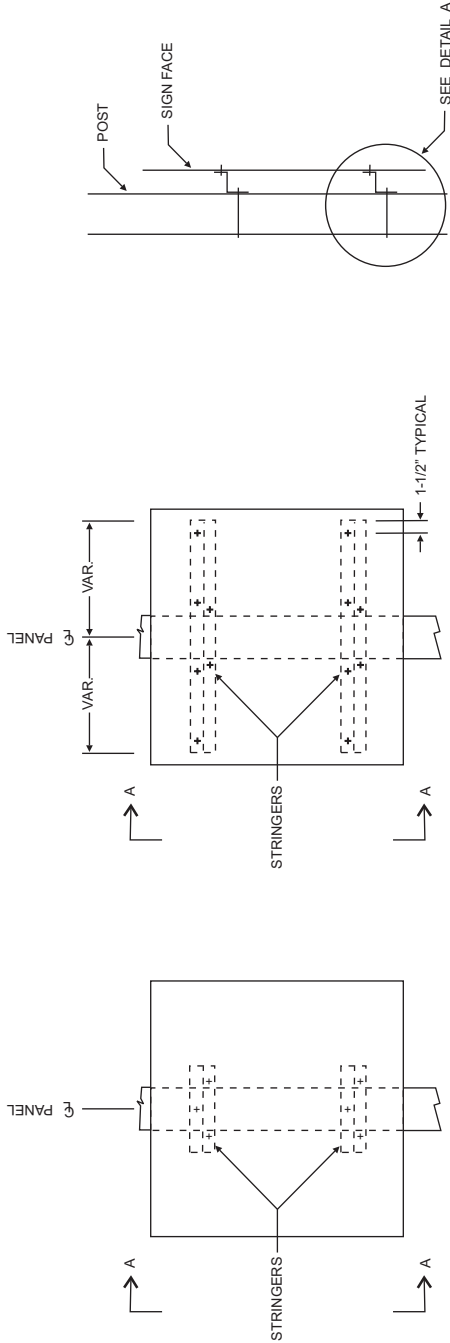
October 28, 2008

TYPE C & D SIGN STRUCTURE DETAILS (SHEET 3 OF 3)

FIGURE 6.3C

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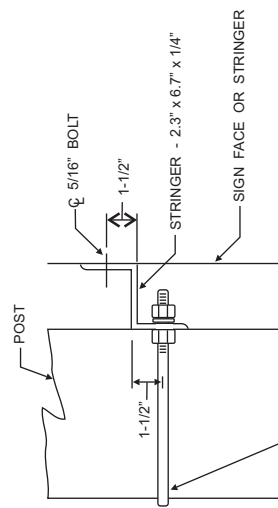
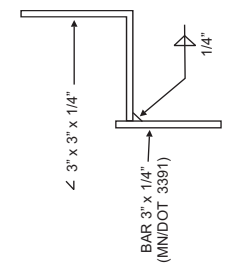
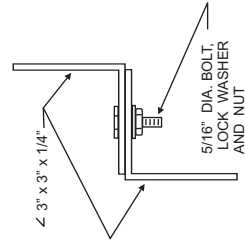


VIEW A-A

ELEVATION

ELEVATION

- NOTES:
1. FOR DETAILS AND NOTES NOT SHOWN, SEE TYPE C & D SIGN DETAILS. FOR BACK TO BACK MOUNTINGS, ROTATE STRINGERS FOR ONE PANEL 180° FROM WHAT IS SHOWN SUCH THAT PANELS CAN BE MOUNTED AT THE SAME ELEVATION.
 2. DETAIL A STRINGER MAY BE ONE OF THE THREE DESIGNS DETAILED OR AN APPROVED EQUAL. STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH MINDOT 3306 AND GALVANIZED IN ACCORDANCE WITH MINDOT 3394. FASTENERS SHALL BE IN ACCORDANCE WITH MINDOT 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.



DETAIL A STRINGER ALTERNATIVES

DETAIL A

Text Ref.: 6-4.08.01

Revised 3-13-00

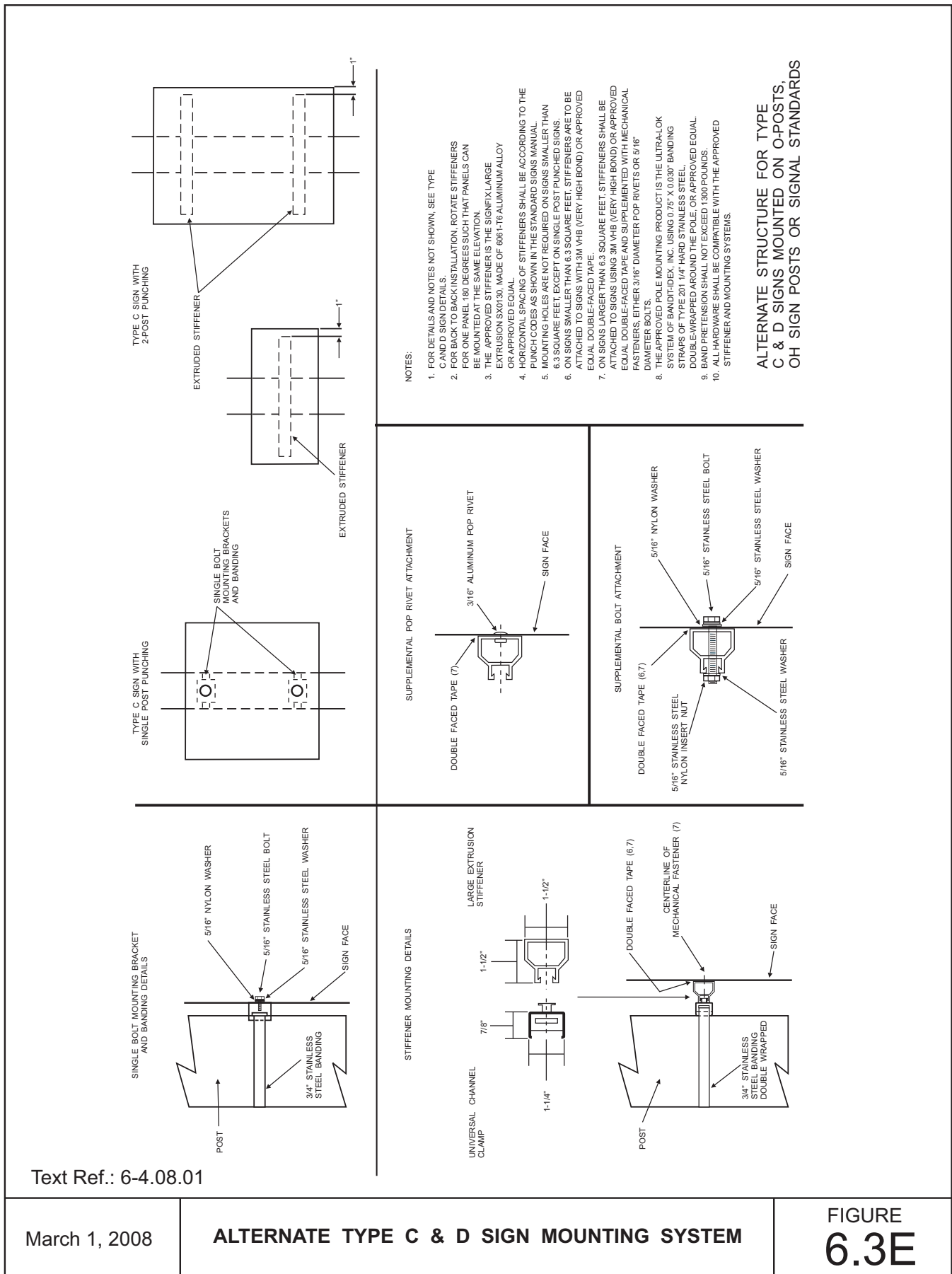
March 1, 2008

TYPE C SIGNS MOUNTED ON O-POSTS, OH SIGN POSTS OR SIGNAL STANDARDS

FIGURE 6.3D

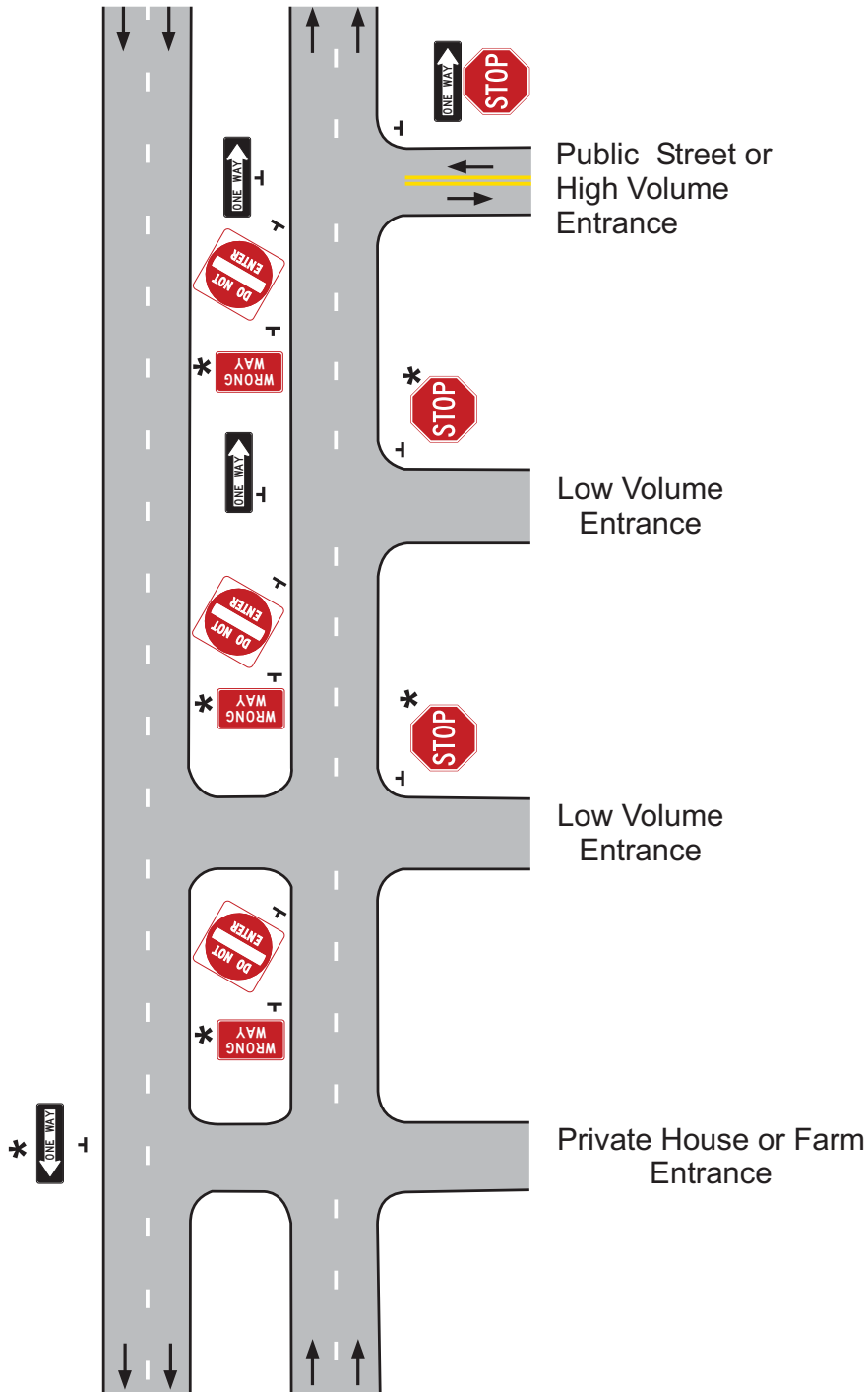
March 1, 2008

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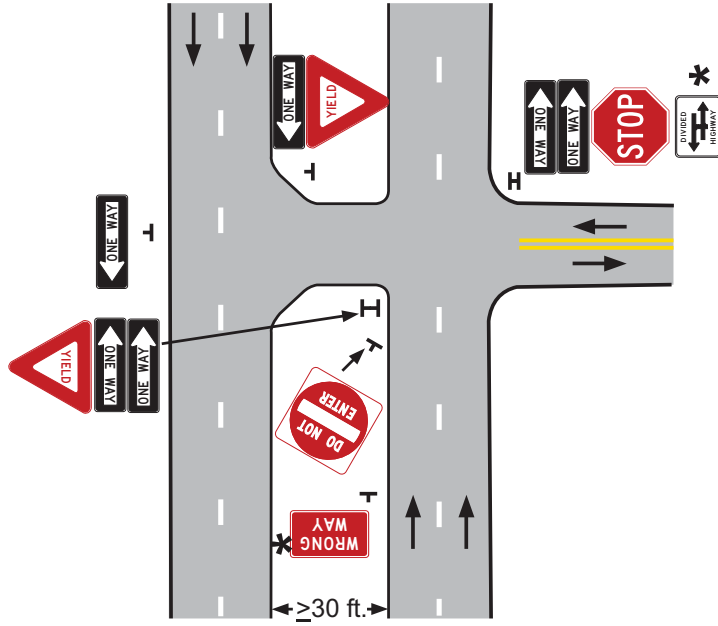
Legend
 * Optional

Text Ref.: 6-5.02

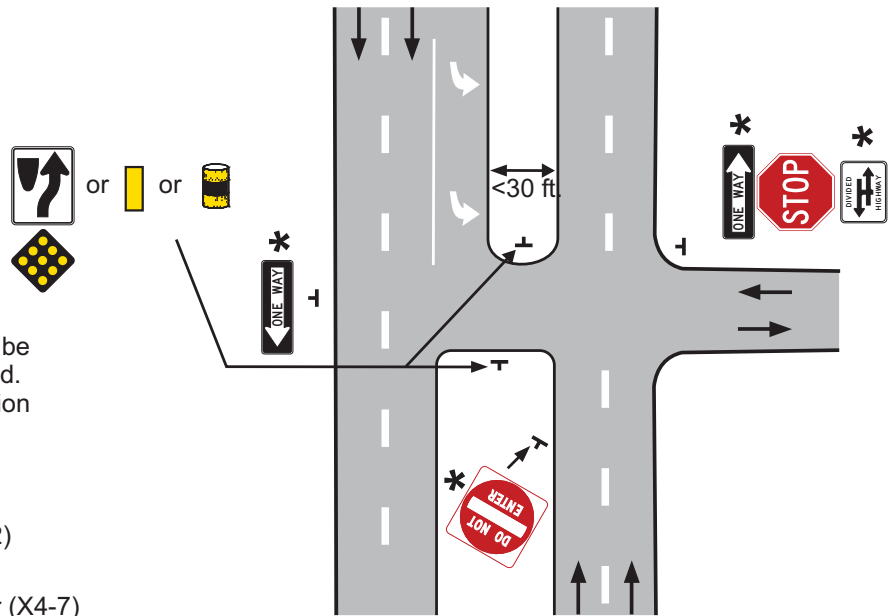
March 1, 2008	REGULATORY SIGNS ON DIVIDED HIGHWAYS AT ENTRANCES	FIGURE 6.4
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TRAFFIC ENGINEERING MANUAL



MEDIAN 30 FT. OR GREATER



Notes:

- 1. If "ONE WAY" signs are to be used, both shall be installed.
- 2. See Chapter 7 for application of markings.

Legend

- Hazard Marker (X4-2)
- Alignment Delineator (X4-7)
- Cylinder Style Delineator (X4-13)
- * Optional

MEDIAN LESS THAN 30 FT.

Text Ref.: 6-5.02

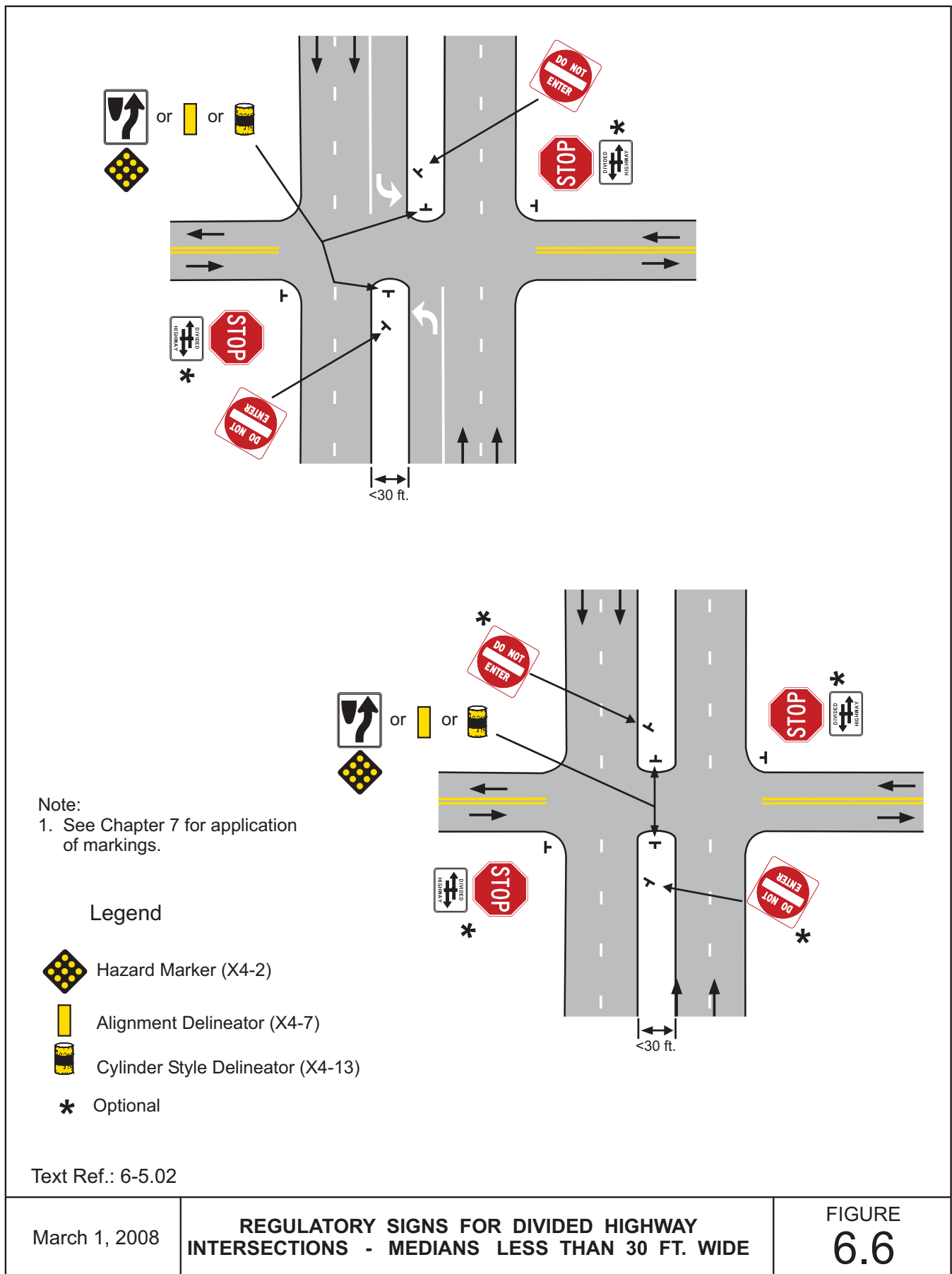
March 1, 2008

REGULATORY SIGNS FOR DIVIDED HIGHWAY - T INTERSECTIONS

FIGURE 6.5

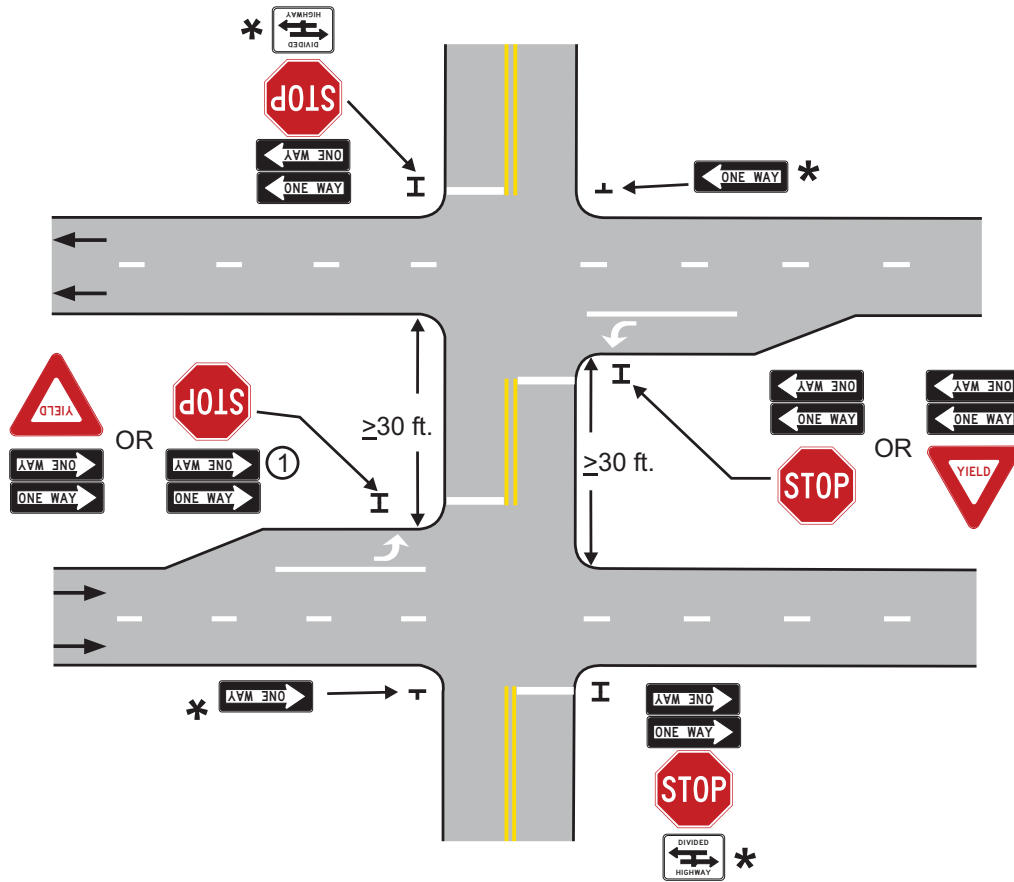
March 1, 2008

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

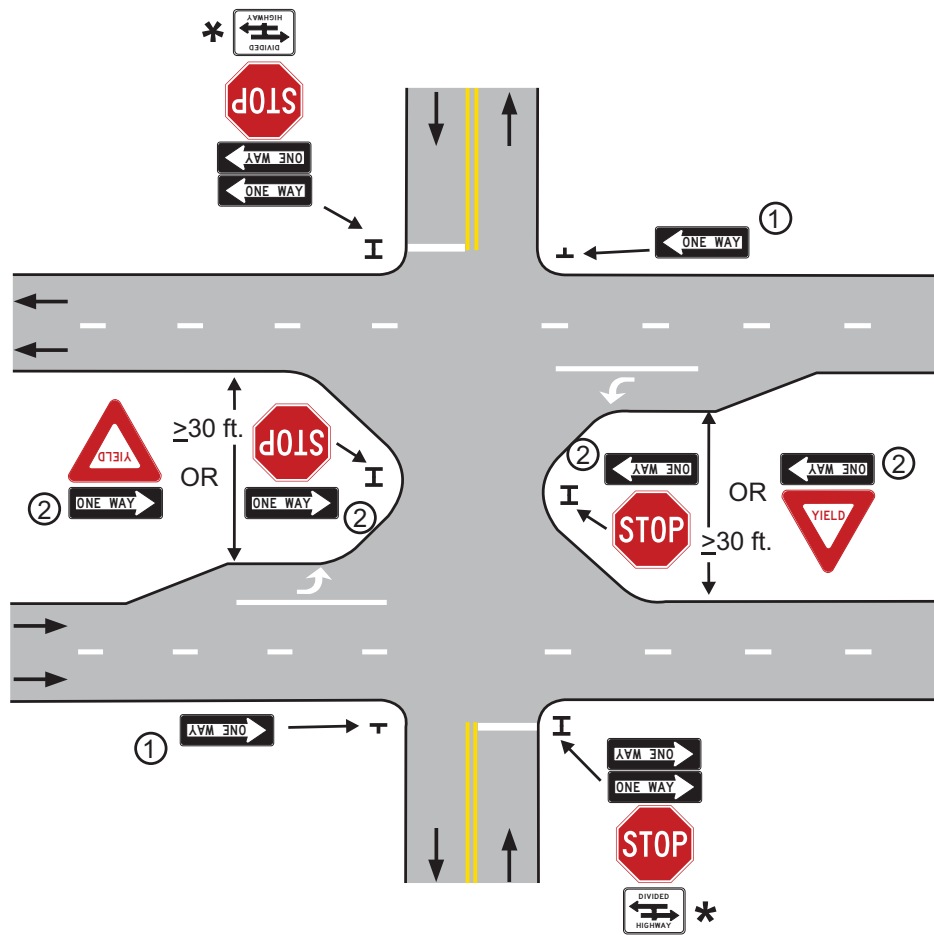
* Optional

Text Ref.: 6-5.02

March 1, 2008	REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTION - MEDIAN WIDTH 30 FT. OR GREATER	FIGURE 6.7A
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NOTES:

- ① These ONE WAY signs are mounted in the far right quadrant rather than above the STOP or YIELD sign in the median to avoid confusion.
- ② Mount the ONE WAY signs above the STOP or YIELD sign.
- 3. See Figure 6.8 for DO NOT ENTER and WRONG Way signs.

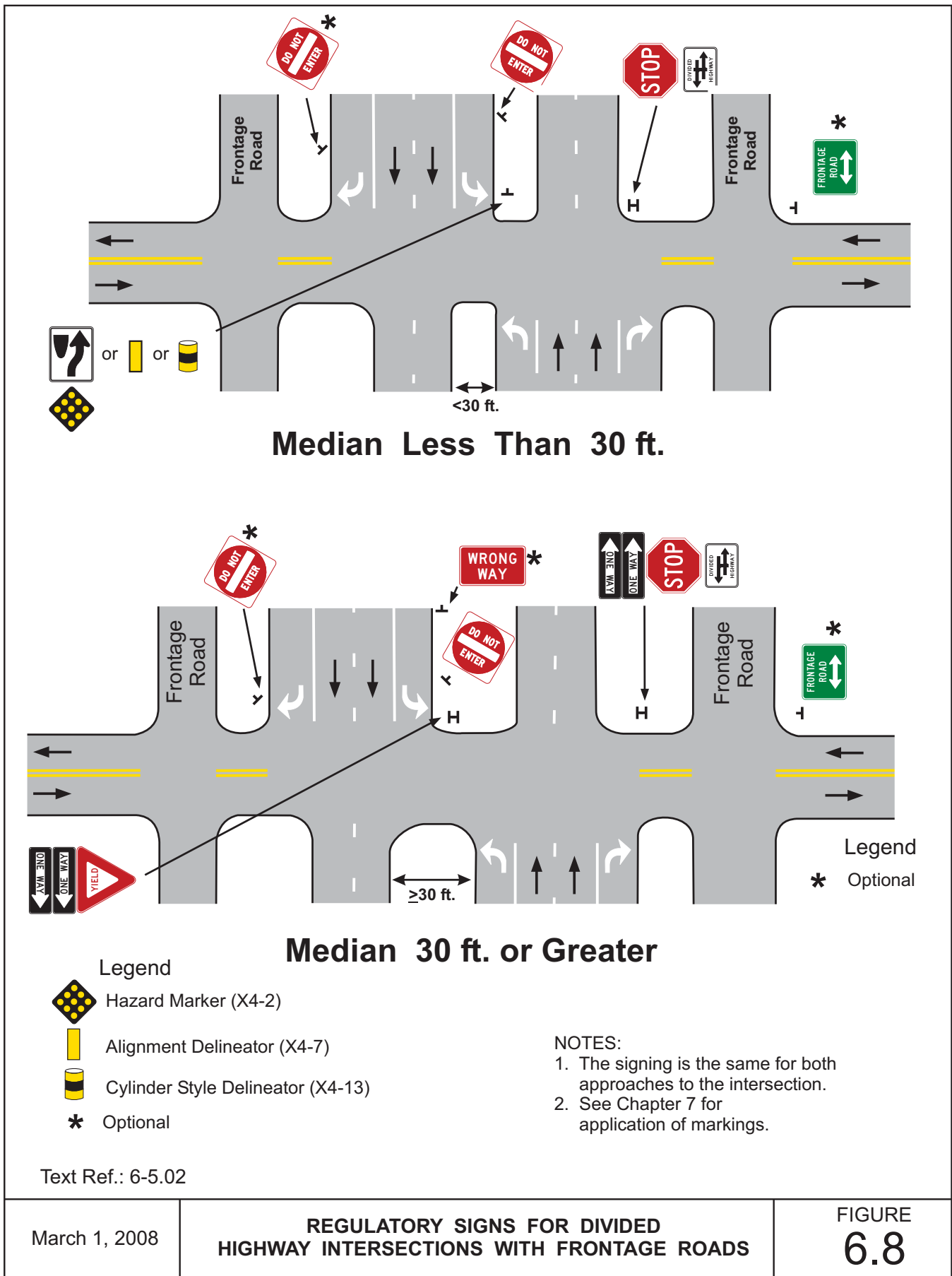
* Optional

Text Ref.: 6-5.02

March 1, 2008	REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTION - MEDIAN WIDTH 30 FT. OR GREATER	FIGURE 6.7B
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March 1, 2008

TRAFFIC ENGINEERING MANUAL



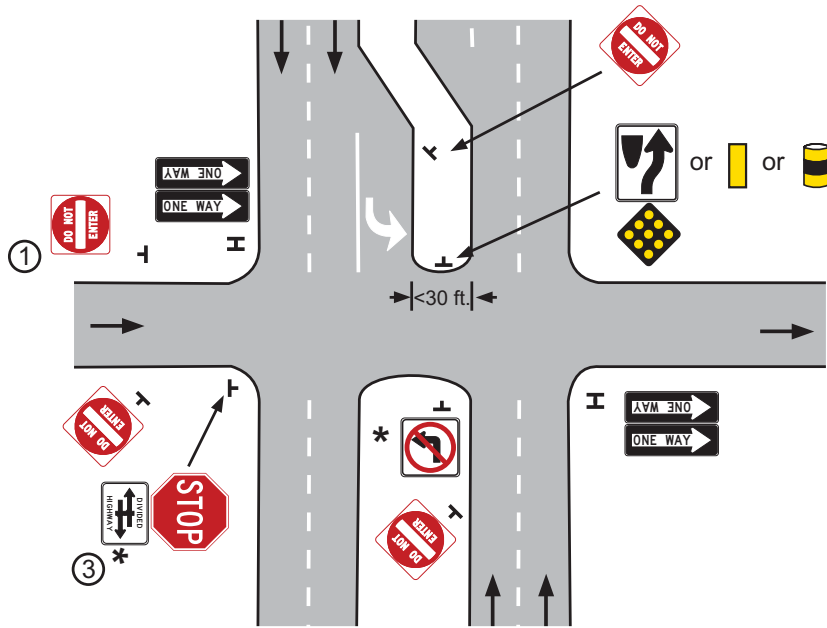
March 1, 2008

REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTIONS WITH FRONTAGE ROADS

FIGURE 6.8

March 1, 2008

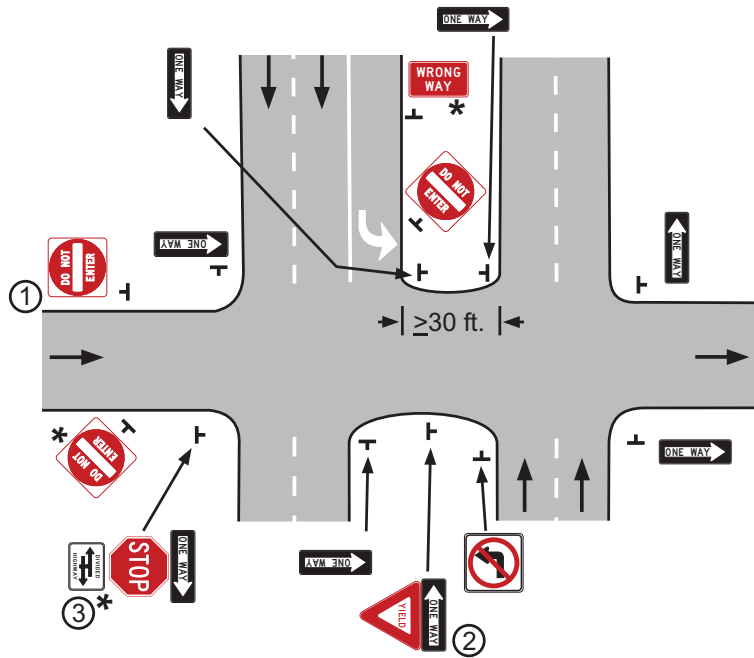
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Median Less Than 30 ft.

NOTES:

- ① See Figures 6.11 and 6.12 for regulatory signs on ramps.
- ② See Figure 6.7B for optional location of ONE WAY signs above YIELD signs.
- ③ The DIVIDED HIGHWAY sign should not be used when the roadway is divided only at the junction.



Median 30 ft. or Greater

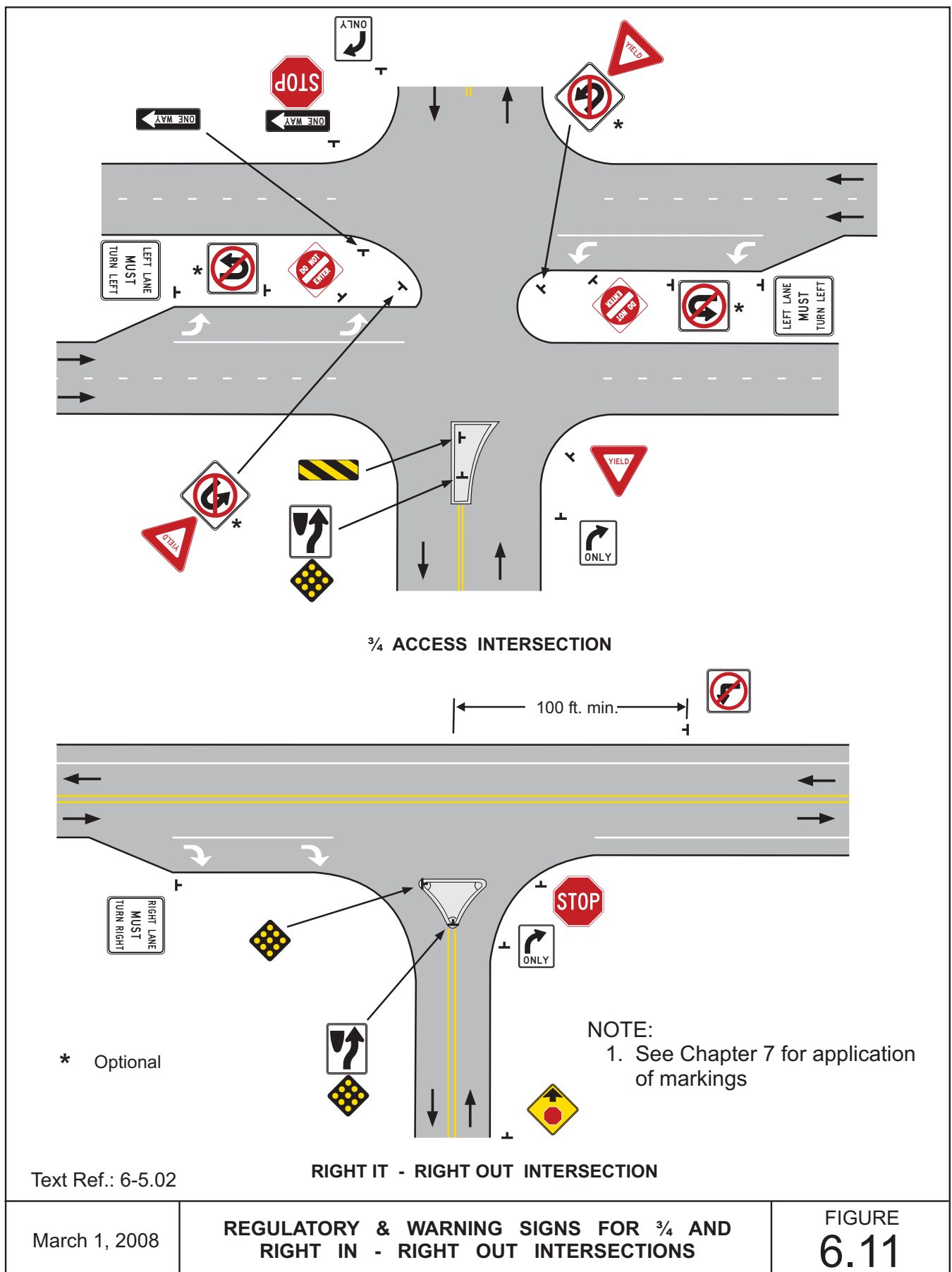
- Legend
- Hazard Marker (X4-2)
 - Alignment Delineator (X4-7)
 - Cylinder Style Delineator (X4-13)
 - * Optional

Text Ref.: 6-5.02

<p>March 1, 2008</p>	<p>REGULATORY SIGNS FOR DIVIDED HIGHWAY INTERSECTIONS WITH A ONE-WAY STREET/RAMP</p>	<p>FIGURE 6.9</p>
----------------------	---------------------------------------------------------------------------------------------	--------------------------

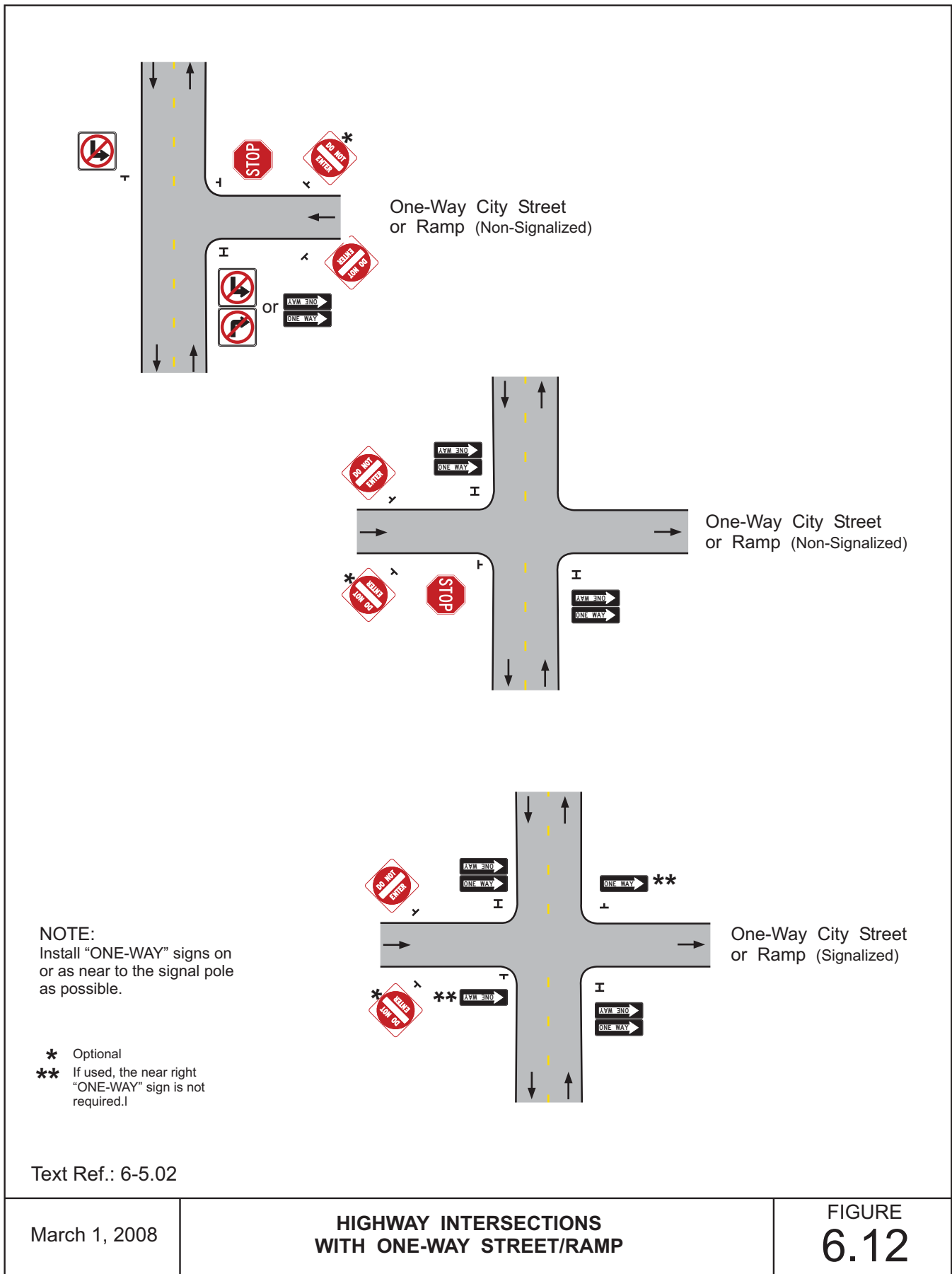
March 1, 2008

TRAFFIC ENGINEERING MANUAL



March 1, 2008

TRAFFIC ENGINEERING MANUAL



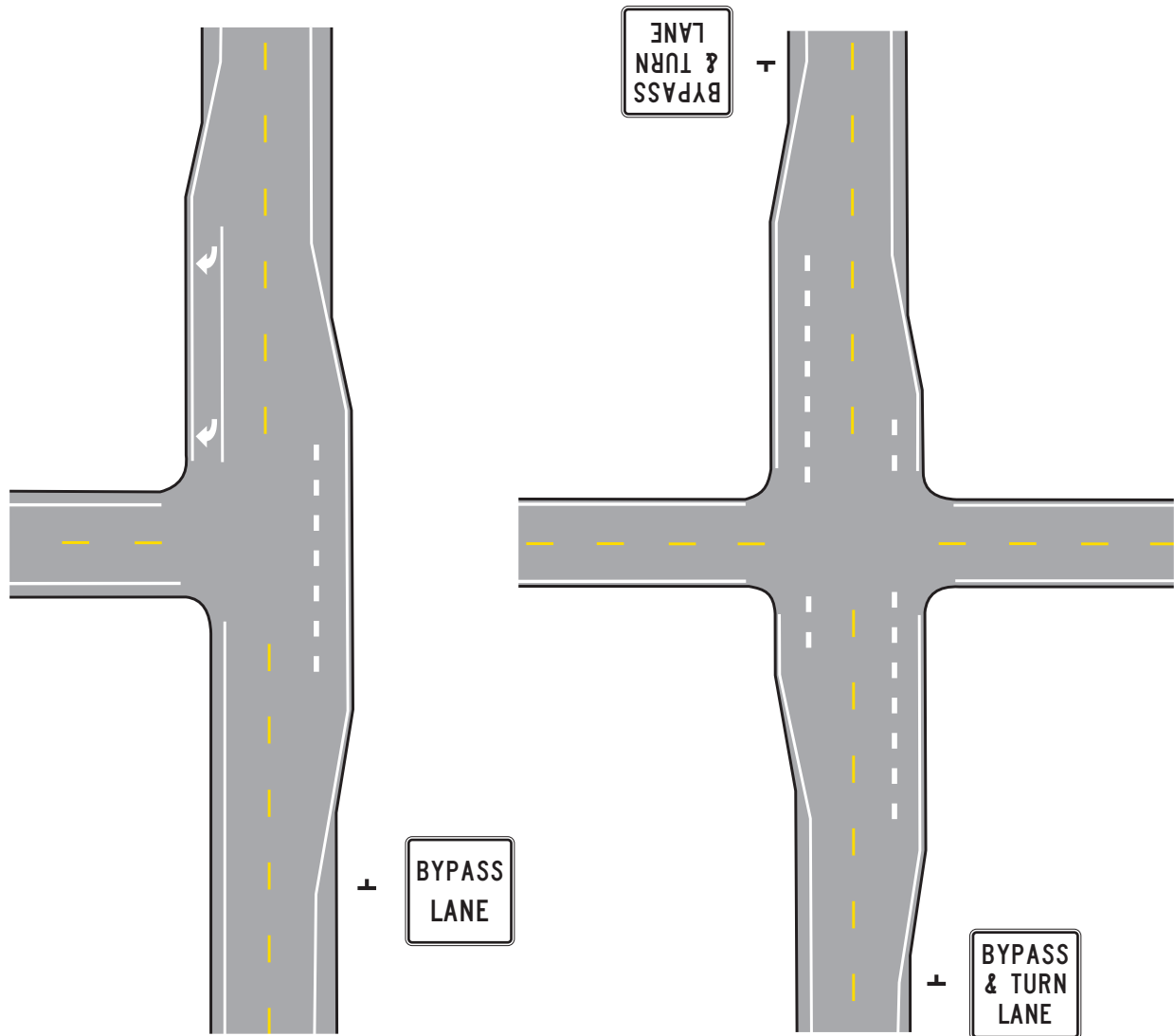
March 1, 2008

HIGHWAY INTERSECTIONS WITH ONE-WAY STREET/RAMP

FIGURE 6.12

March 1, 2008

TRAFFIC ENGINEERING MANUAL



Note:
See Chapter 7 for application of markings.

Text Ref.: 6-5.05

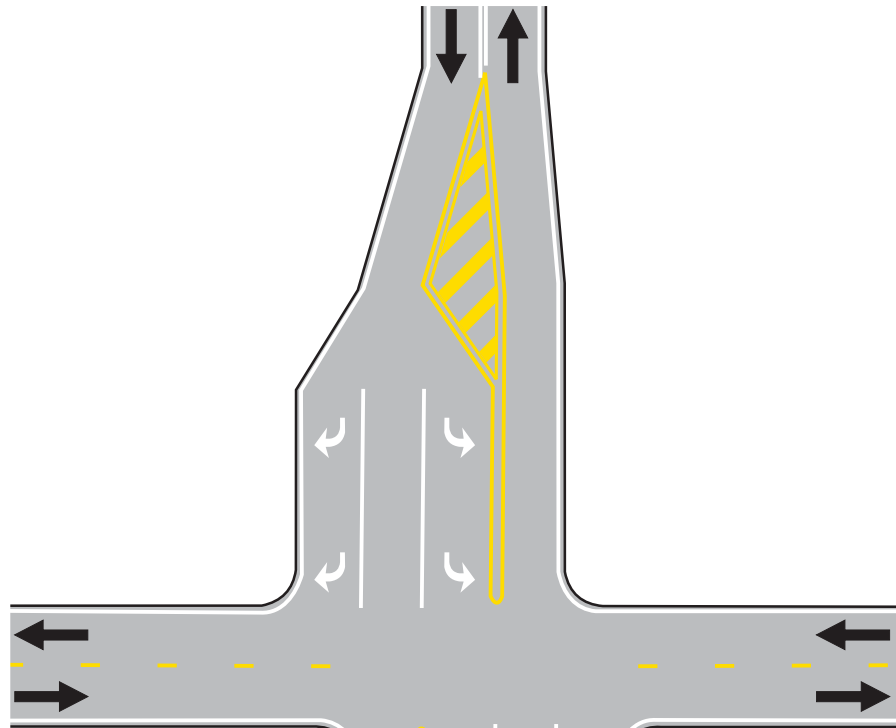
March 1, 2008

BYPASS LANES

FIGURE
6.17

March 1, 2008

TRAFFIC ENGINEERING MANUAL



NOTE:

- 1. The signing is the same for both approaches to the intersection.
- 2. See Chapter 7 for application of markings.

* - Optional



500 ft min.

Text Ref.: 6-6.06

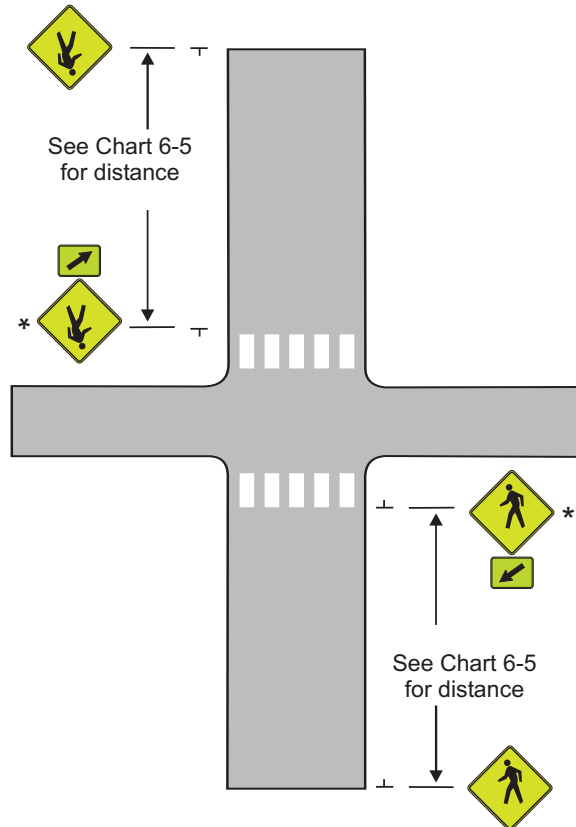
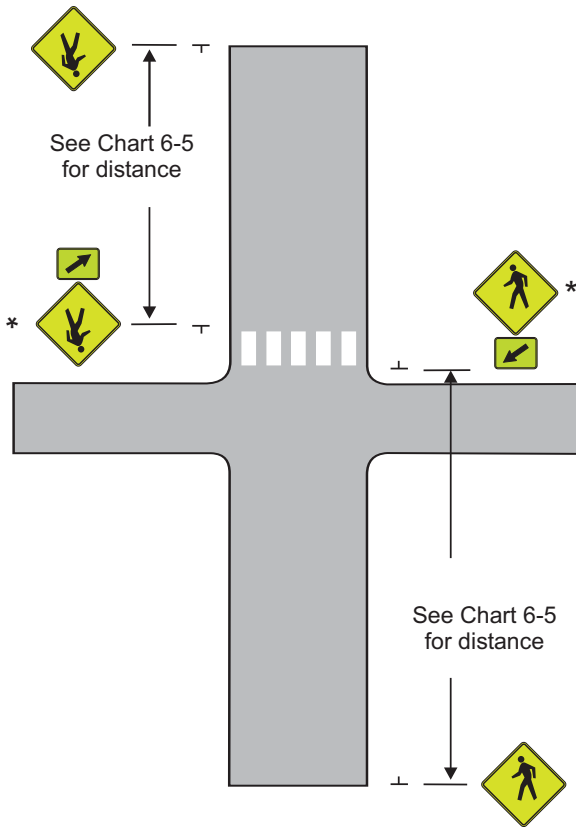
March 1, 2008

CHANNELIZED INTERSECTION SIGNING
PAINTED MEDIAN

FIGURE
6.20B

March 1, 2008

TRAFFIC ENGINEERING MANUAL



NOTES:

1. Intended for use where a definite need exists:
 - Heavy pedestrian volumes
 - Mid-block crossings, etc.
2. See Chapter 7 for application of markings.

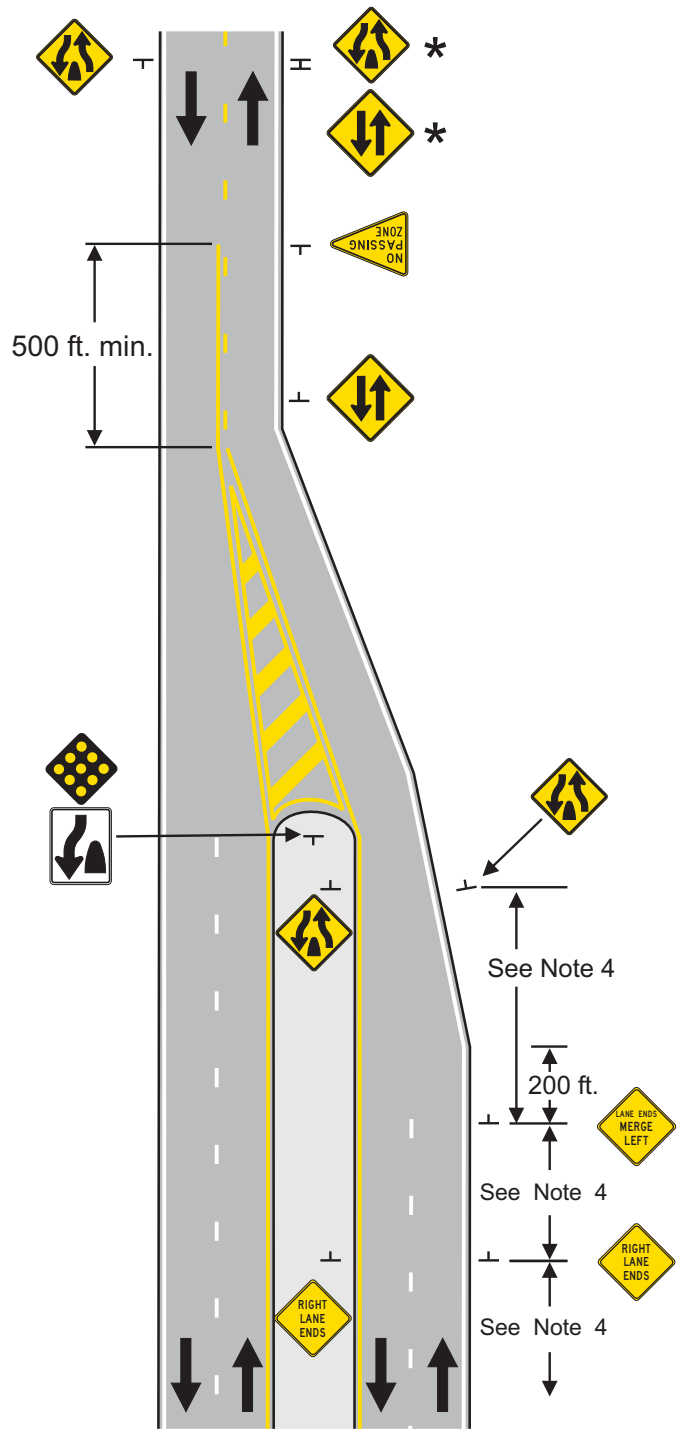
* Optional

Text Ref.: 6-6.09.01

March 1, 2008	PEDESTRIAN CROSSING SIGNING AT UNSIGNALIZED LOCATIONS	FIGURE 6.21
---------------	------------------------------------------------------------------	------------------------

March 1, 2008

TRAFFIC ENGINEERING MANUAL



NOTES:

1. All sign location distances are approximate.
2. Distances between advance signs in the two-lane, two-way section to the painted gore are 500-1200 feet.
3. See Chapter 7 for application of markings.
4. On high speed roadways (45 mph and greater), the spacing should be 400-500 feet. On low speed roadways (40 mph and less), the spacing should be 200-400 feet.
5. Do not use Divided Highway Begins and Divided Highway Ends signs when the highway is divided only at intersections or junctions.

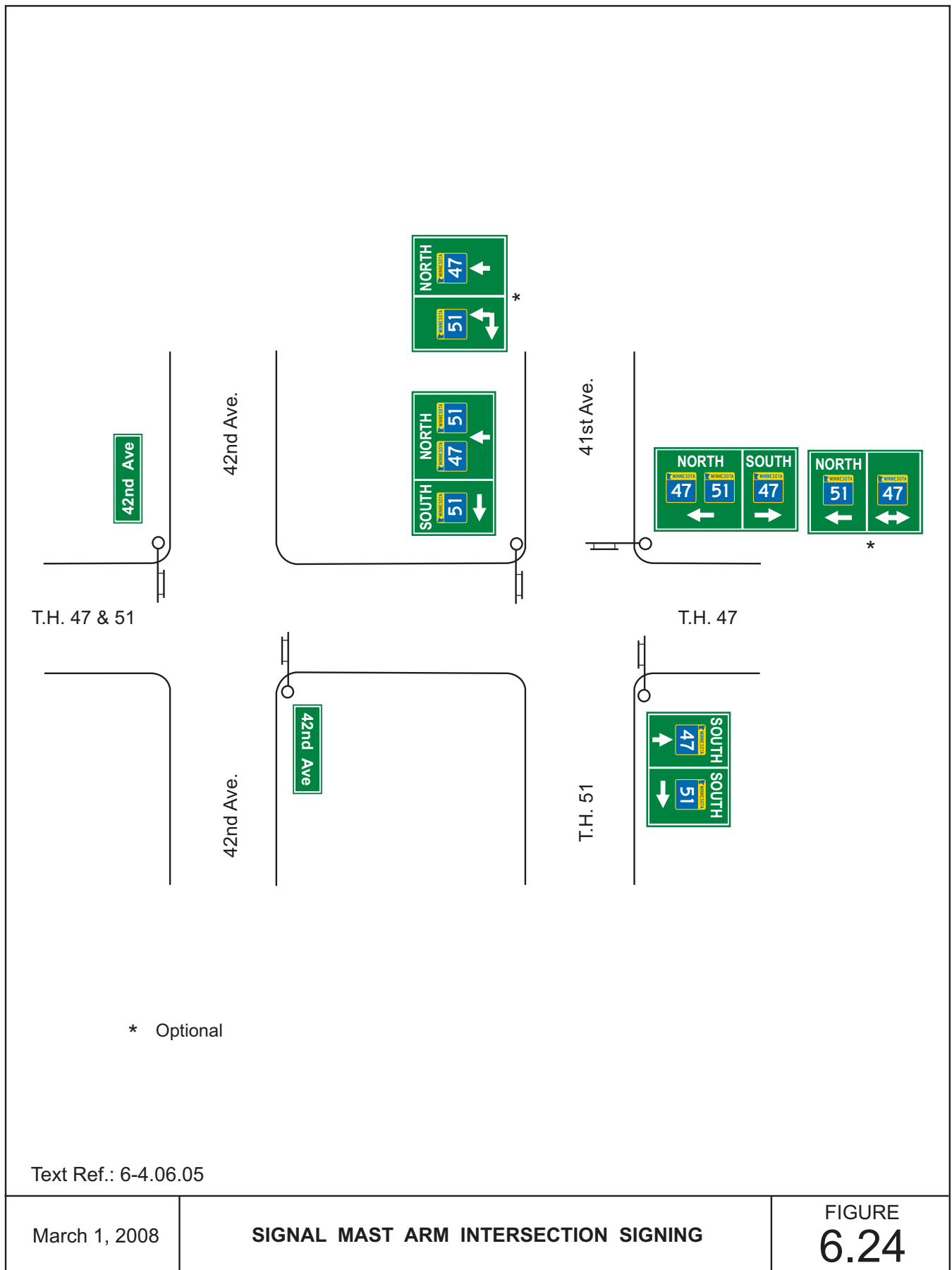
* - Optional

Text Ref.: 6-6.18

March 1, 2008	TRANSITION SIGNING DIVIDED AND UNDIVIDED ROADWAYS	FIGURE 6.23
---------------	--------------------------------------------------------------	------------------------

March 1, 2008

TRAFFIC ENGINEERING MANUAL



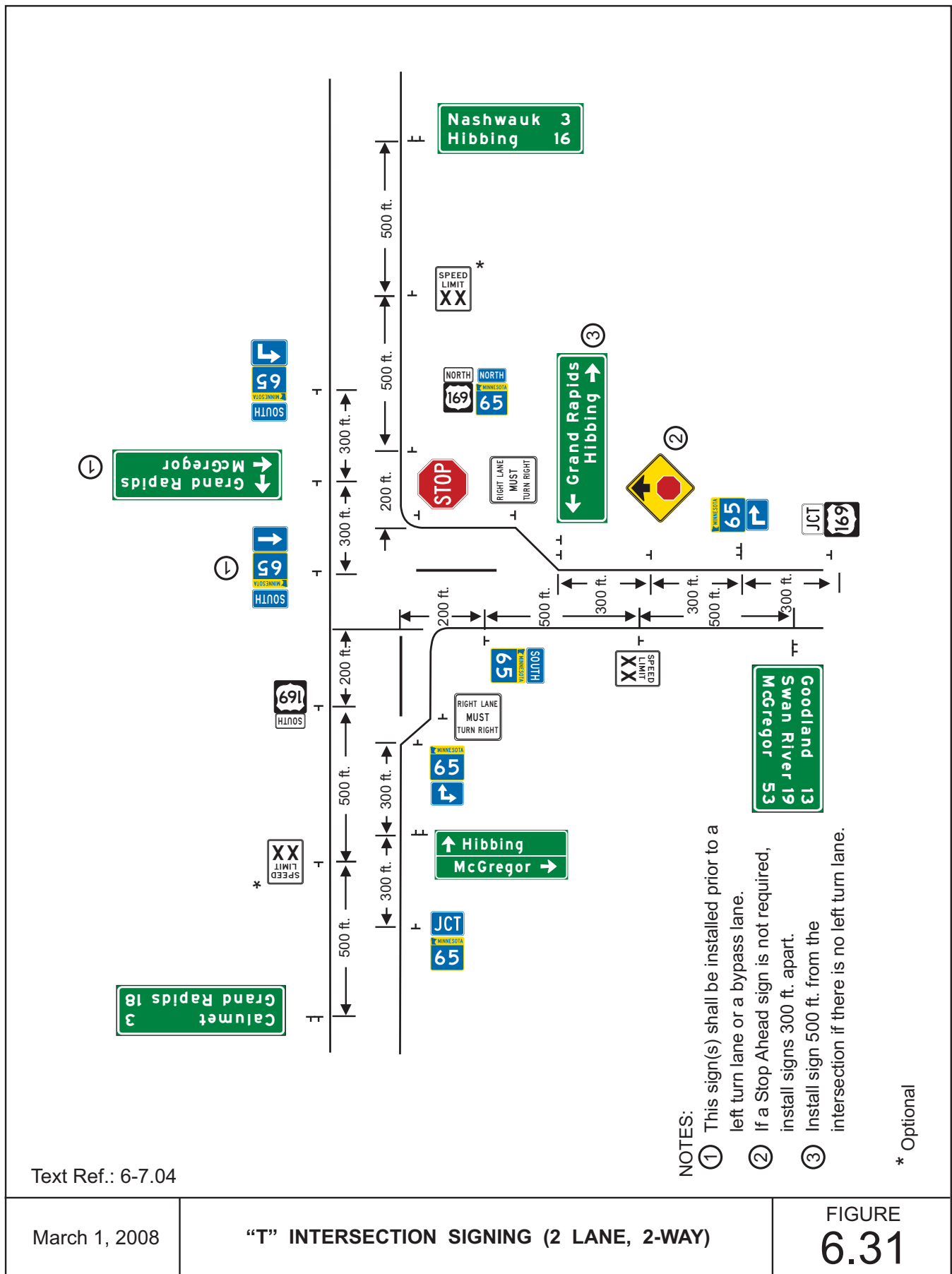
March 1, 2008

SIGNAL MAST ARM INTERSECTION SIGNING

FIGURE 6.24

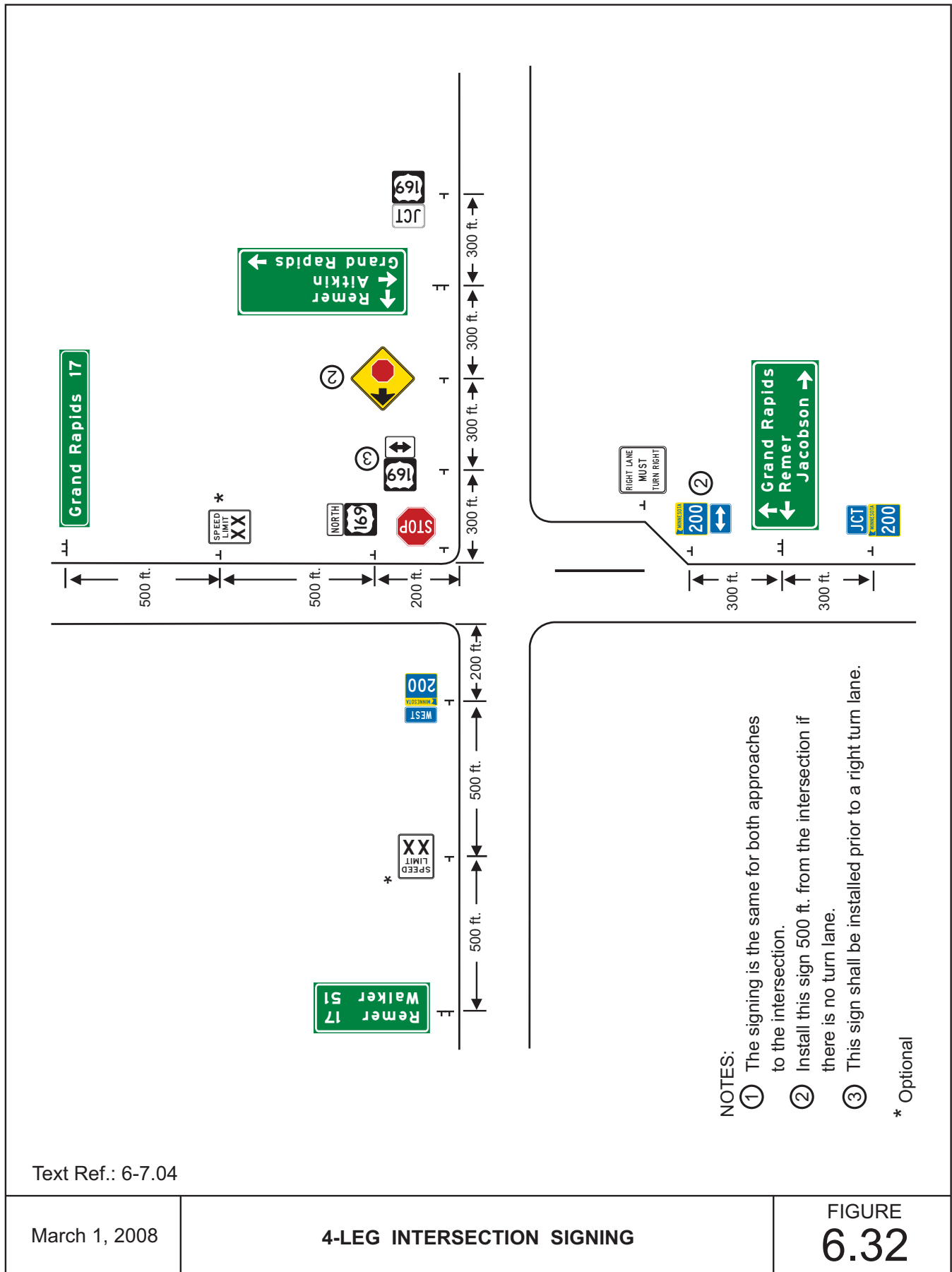
March 1, 2008

TRAFFIC ENGINEERING MANUAL



March 1, 2008

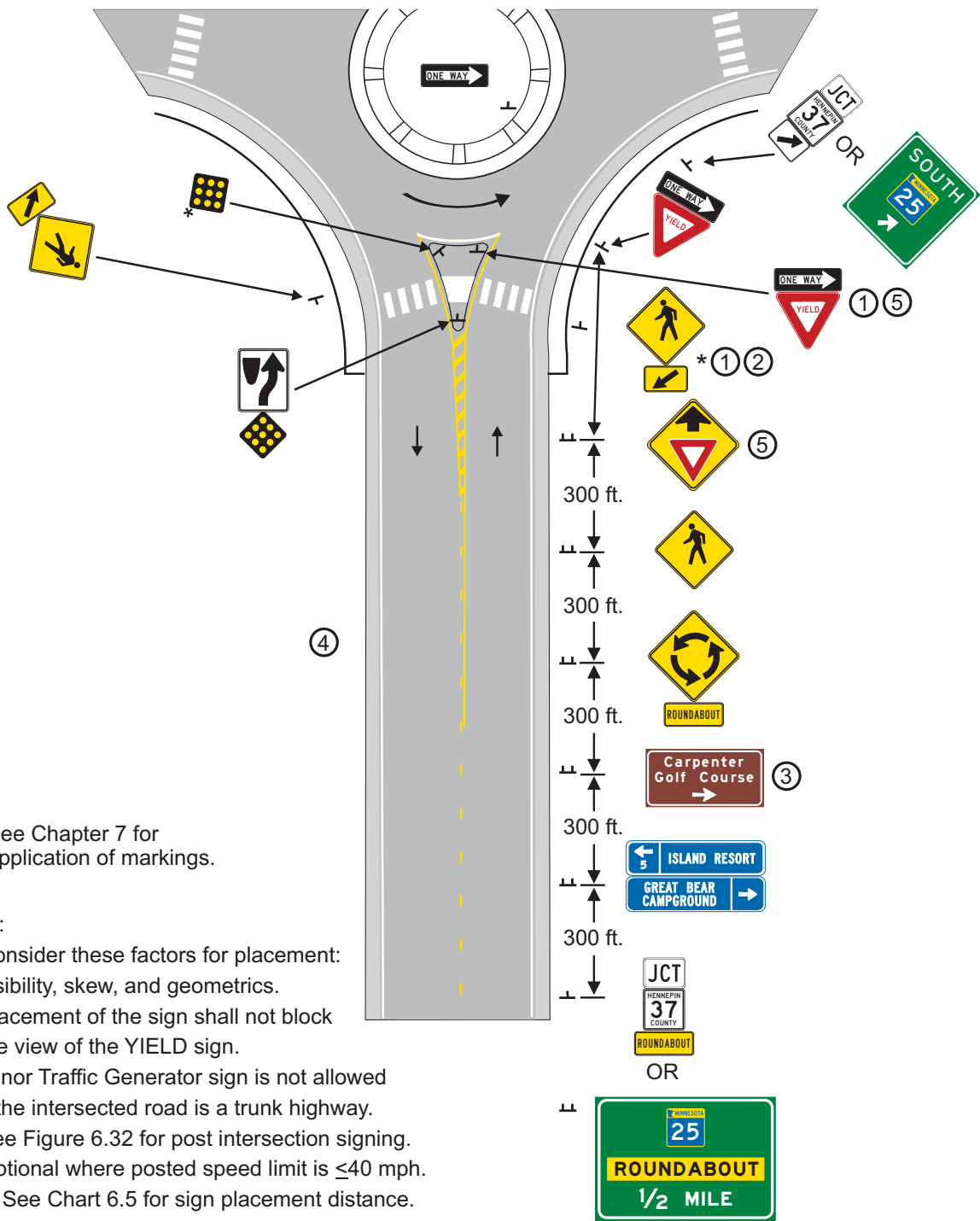
TRAFFIC ENGINEERING MANUAL



- NOTES:
- ① The signing is the same for both approaches to the intersection.
 - ② Install this sign 500 ft. from the intersection if there is no turn lane.
 - ③ This sign shall be installed prior to a right turn lane.
- * Optional

March 1, 2008

TRAFFIC ENGINEERING MANUAL



Text Ref.: 6-7.04

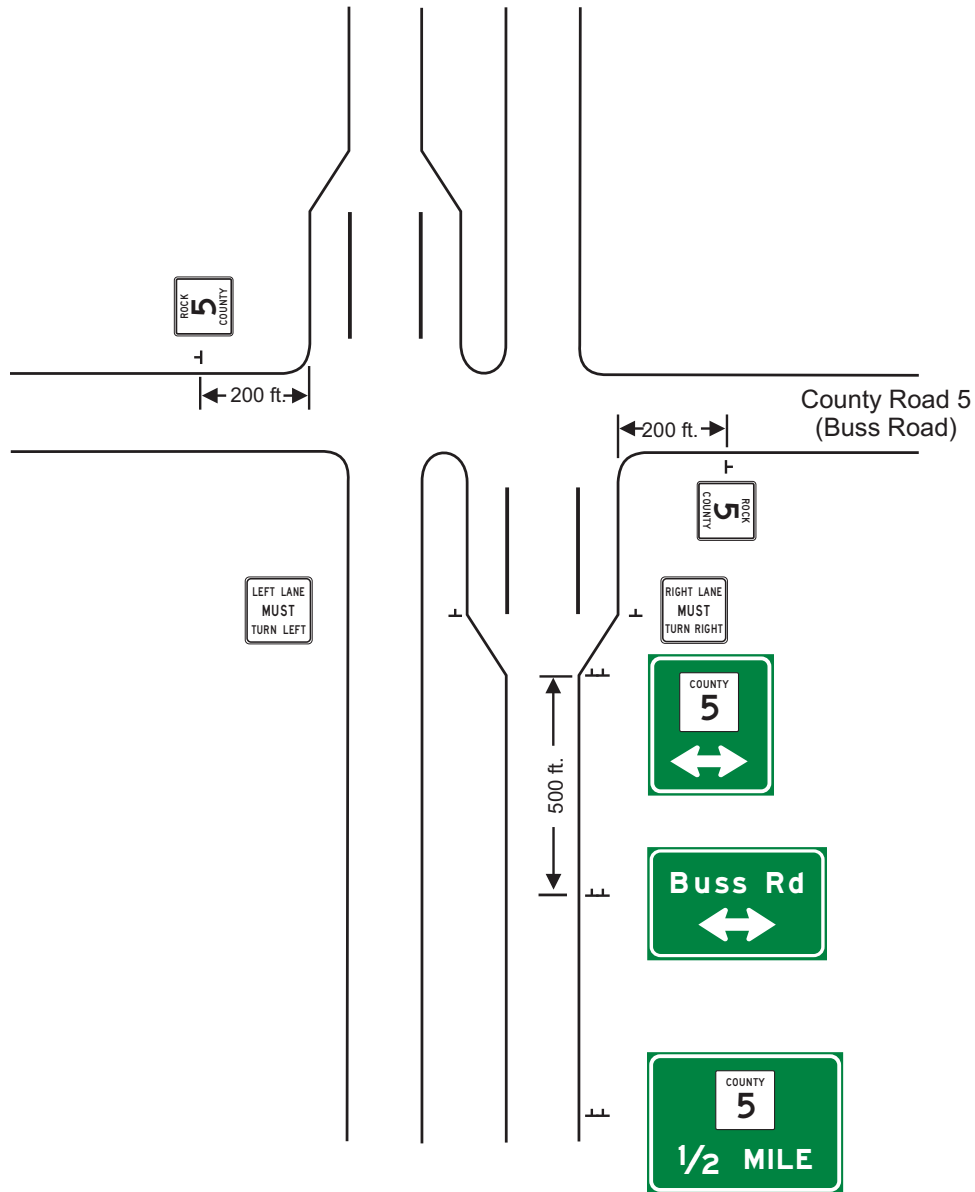
March 1, 2008

SINGLE LANE ROUNDABOUT

FIGURE 6.34

March 1, 2008

TRAFFIC ENGINEERING MANUAL



NOTES:

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

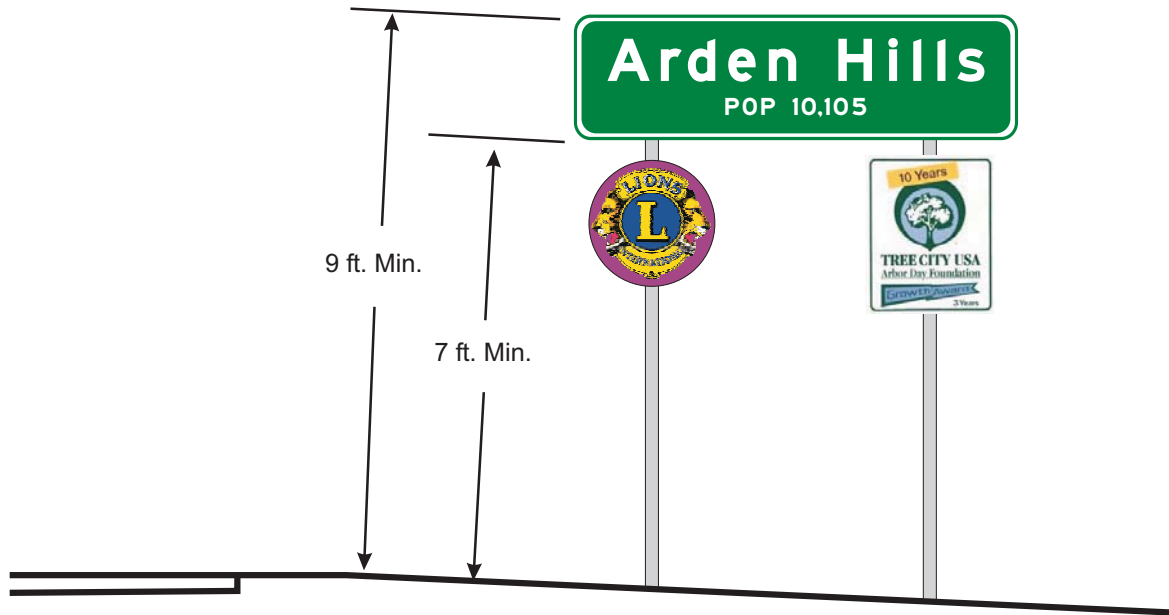
Text Ref.: 6-7.06.03

March 1, 2008	NAMED COUNTY ROAD SIGNING ON AN EXPRESSWAY	FIGURE 6.35
---------------	-------------------------------------------------------	------------------------

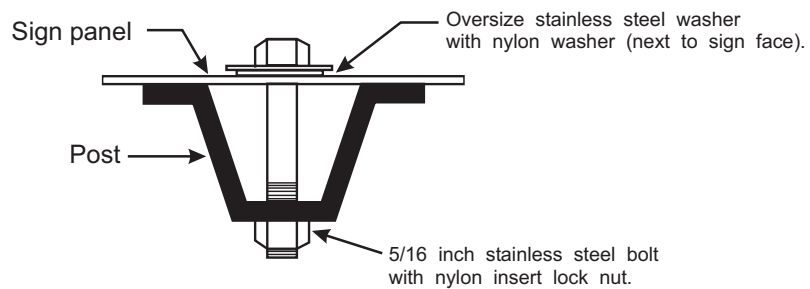
March 1, 2008

TRAFFIC ENGINEERING MANUAL

TYPICAL MOUNTING



SIGN PANEL ATTACHMENT DETAIL



U-POST MOUNTING

Text Ref.: 6-7.07.03, section 4

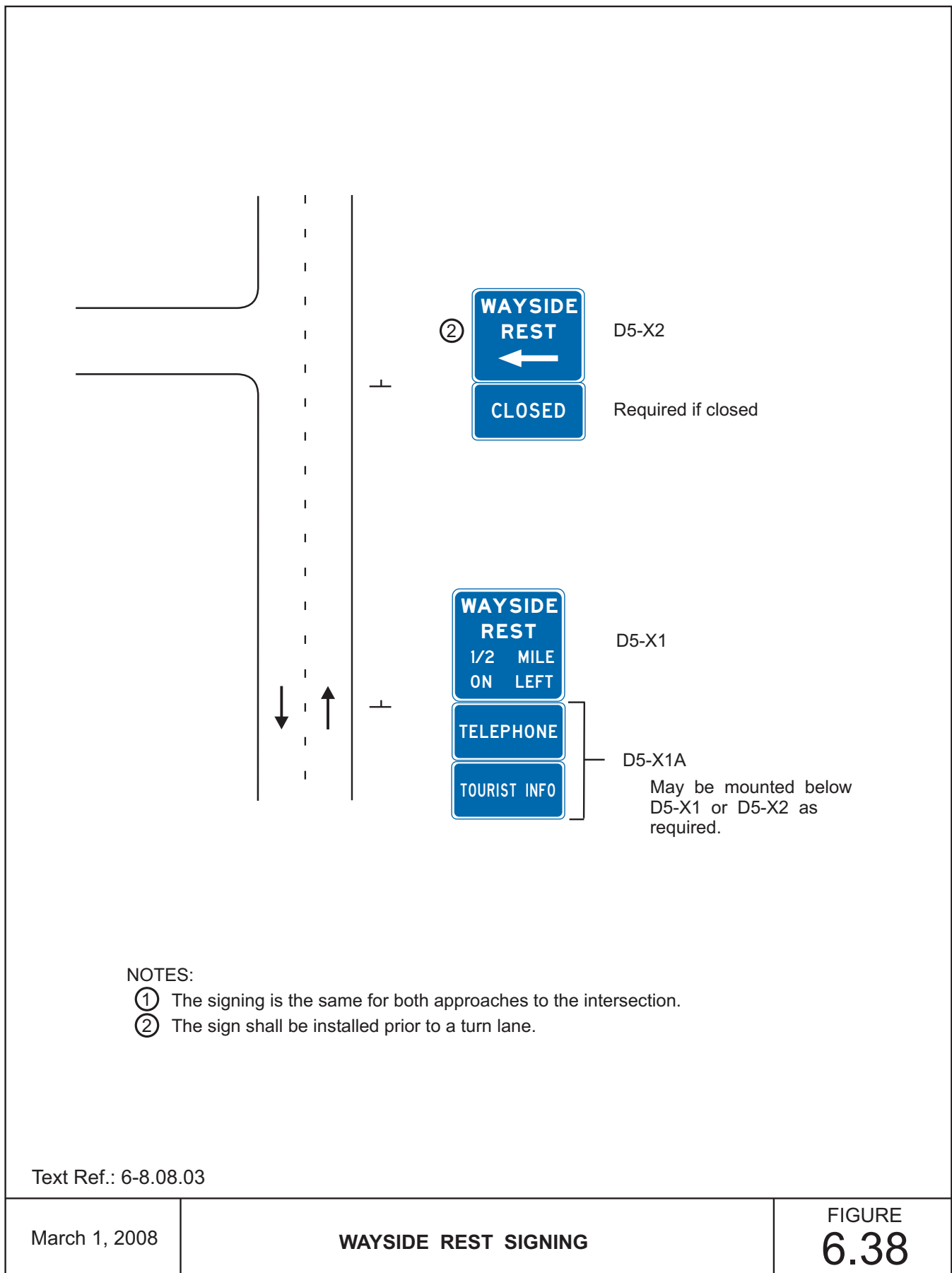
March 1, 2008

COMMUNITY RECOGNITION SIGNING

FIGURE
6.36

March 1, 2008

TRAFFIC ENGINEERING MANUAL



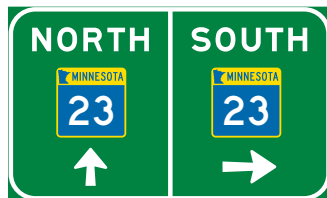
Destination Signs



Directional Signs



Bridge Mounted



Distance Signs



July 1, 1998

GUIDELINES FOR TYPE D SIGNS (cont.)

CHART
6.1D

March 1, 2008

TRAFFIC ENGINEERING MANUAL

Junction Signs



Signal Mast Arm Mounted Signs

Street Name Signs



Directional Signs



Supplemental Signs



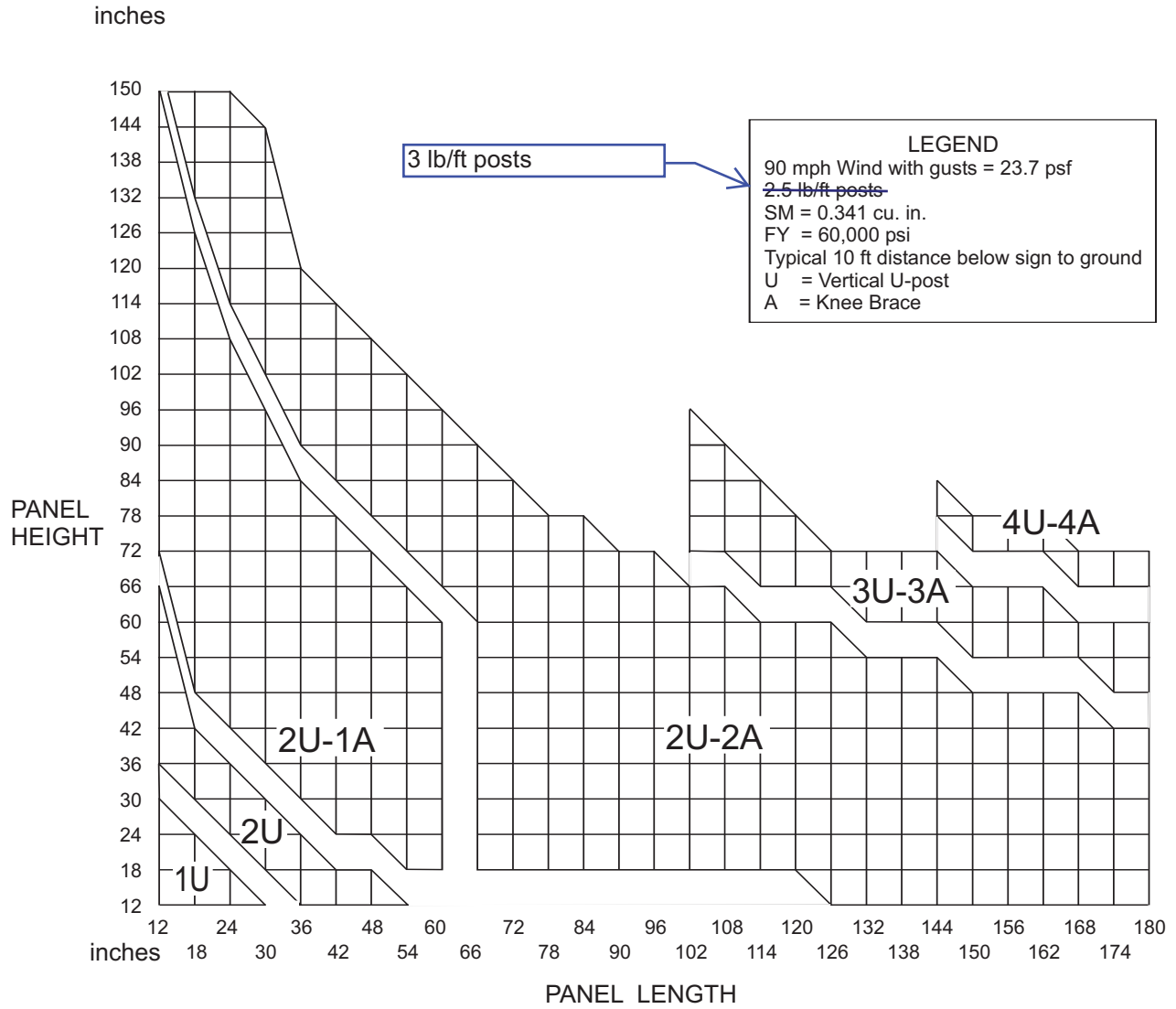
July 1, 1998

GUIDELINES FOR TYPE D SIGNS (cont.)

CHART
6.1E

March 1, 2008

TRAFFIC ENGINEERING MANUAL



Text Ref.: 6-4.08.01, page 6-18

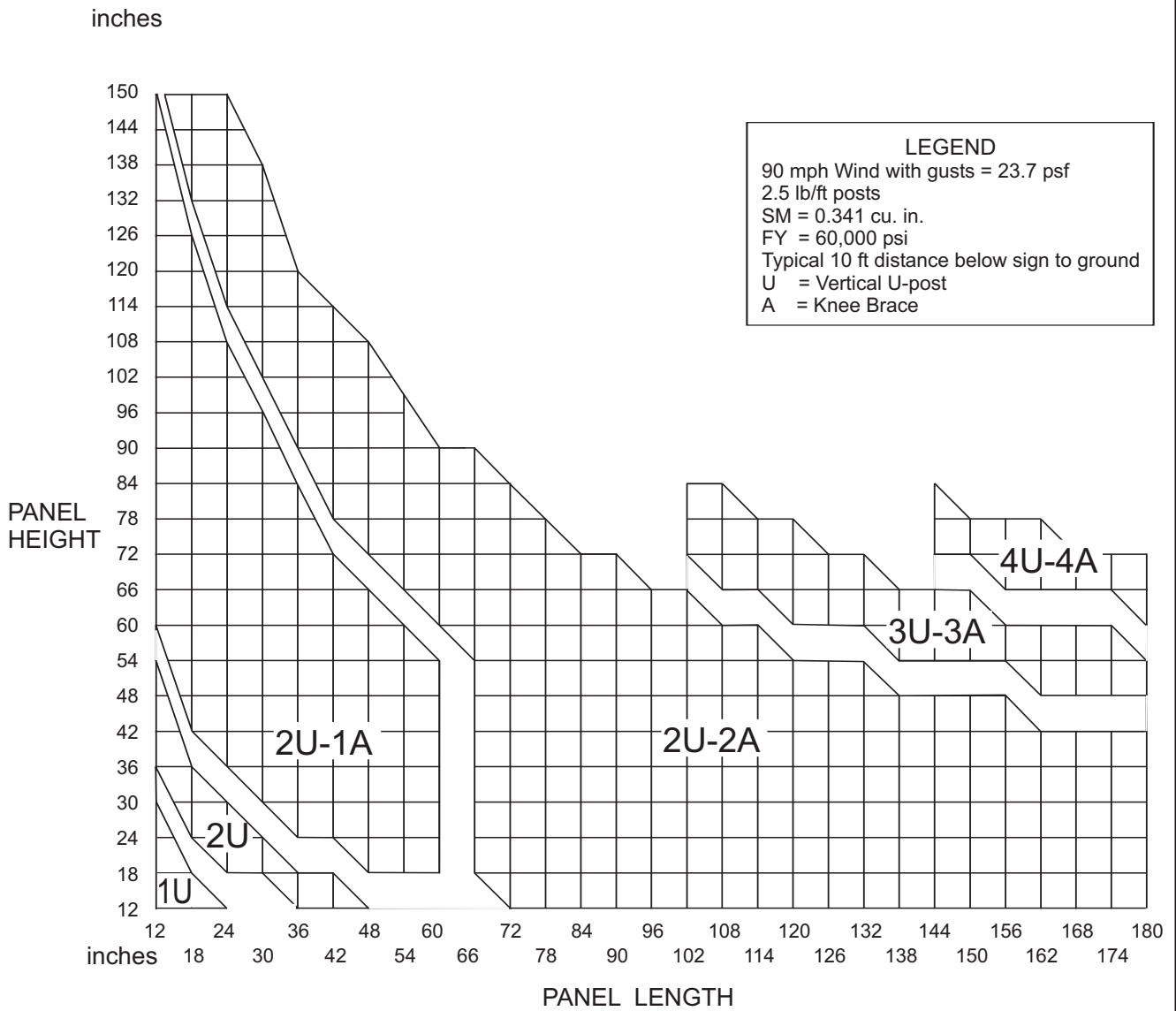
February, 2008

U-POST STRUCTURE CHART FOR GROUND-MOUNTED SIGNS using 3 lb/ft Posts

CHART 6.2

March 1, 2008

TRAFFIC ENGINEERING MANUAL



Text Ref.: 6-4.08.01, page 6-18

January 1, 1996

U-POST STRUCTURE CHART FOR GROUND-MOUNTED SIGNS using 2.5 lb/ft Posts

CHART 6.3

March 1, 2008

TRAFFIC ENGINEERING MANUAL

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

March 1, 2008

TRAFFIC ENGINEERING MANUAL

Posted or 85th percentile speed mph (mph)	Minimum Advance Placement Distance ¹								
	Condition A: Speed Reduction and Lane Changing in Heavy Traffic ² feet	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0 ³ feet	10 ⁴ feet	20 ⁴ feet	30 ⁴ feet	40 ⁴ feet	50 ⁴ feet	60 ⁴ feet	70 ⁴ feet
20	225	see Note ⁵	see Note ⁵	---	---	---	---	---	---
25	325	see Note ⁵	see Note ⁵	see Note ⁵	---	---	---	---	---
30	450	75	see Note ⁵	see Note ⁵	---	---	---	---	---
35	550	125	125	see Note ⁵	see Note ⁵	---	---	---	---
40	650	200	175	150	see Note ⁵	---	---	---	---
45	775	275	250	225	150	see Note ⁵	---	---	---
50	875	350	350	300	225	150	---	---	---
55	975	450	425	375	325	225	see Note ⁵	---	---
60	1125	525	525	475	425	325	200	---	---
65	1200	625	625	575	525	425	300	see Note ⁵	---
70	1275	750	725	700	625	525	400	275	---
75	1375	850	850	800	750	650	525	375	200

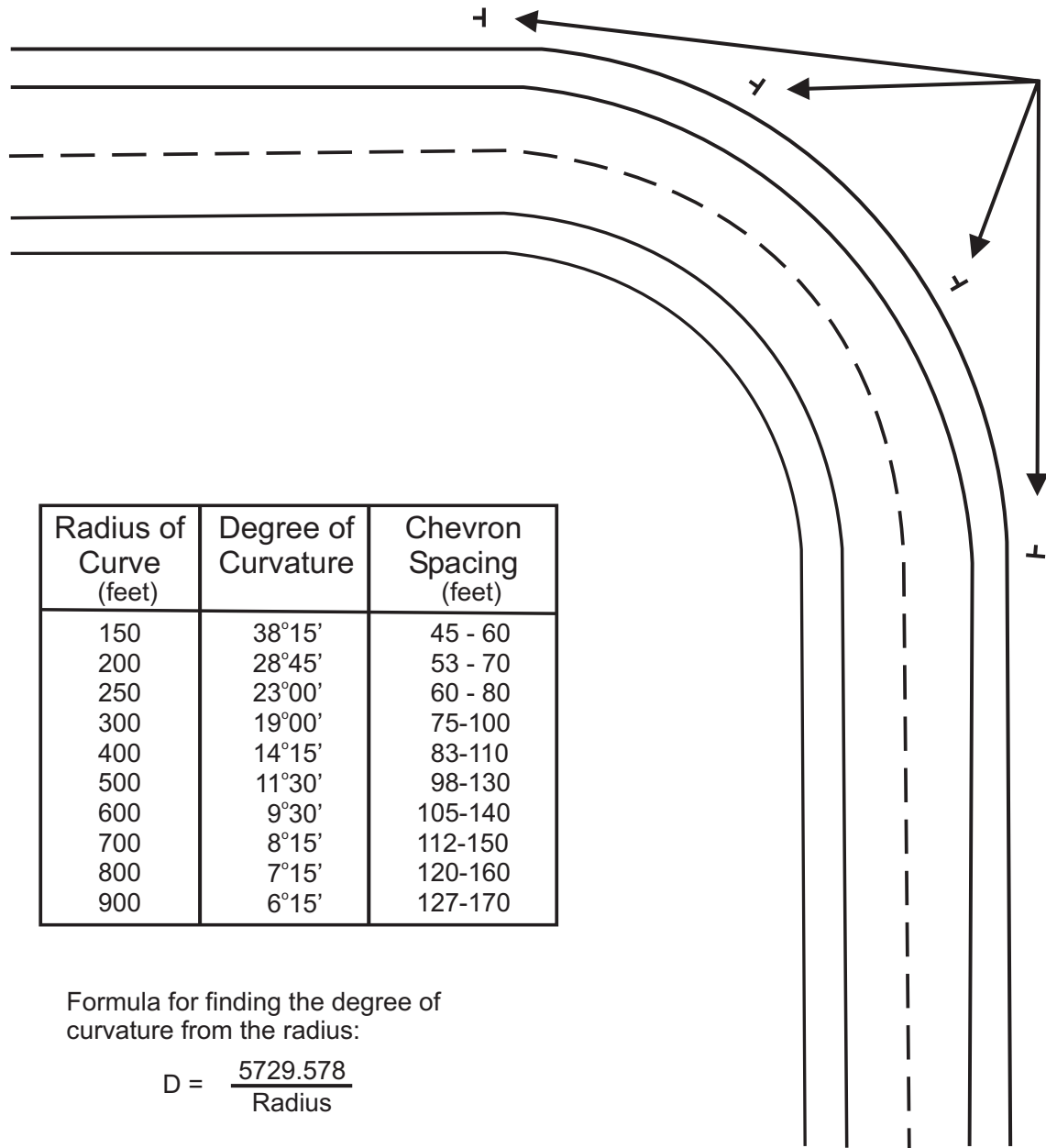
NOTES:

- ¹ The distances are adjusted for a sign legibility distance of 175 ft, which is the appropriate legibility distance for a 5 inch Series D word legend. The distances may be adjusted by deducting another 100 feet if alignment symbol signs are used. Adjustments may also be made for grades, limited sight distance, or pavement condition.
- ² Typical conditions are locations where the road user might use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. A typical sign is Right Lane Ends. The distances are based on the 2001 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E, providing the driver a PIEV/Maneuver time of 14.0 to 14.5 seconds minus the sign legibility distance of 175 feet.
- ³ Typical condition is the warning of a potential Stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2001 AASHTO Policy, Equation 3-2, providing the driver a PIEV time of 2.5 seconds, a deceleration rate of 8.1 ft/second², minus the sign legibility distance of 175 ft.
- ⁴ Typical conditions are where the road user must decelerate to the advised speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve, combined with an Advisory Speed sign. The distances are based on the 2001 AASHTO Policy, Equation 3-2, providing the driver a PIEV time of 2.5 seconds, a deceleration rate of 8.1 ft/second², minus the sign legibility distance of 175 ft.
- ⁵ No suggested minimum distances are provided for these speeds, as placement location is dependent on site conditions and other signing to provide an adequate advance warning for the driver.

March 1, 2007	WARNING SIGNS PLACEMENT CHART	CHART 6.5
---------------	-------------------------------	---------------------

March 1, 2008

TRAFFIC ENGINEERING MANUAL



Radius of Curve (feet)	Degree of Curvature	Chevron Spacing (feet)
150	38°15'	45 - 60
200	28°45'	53 - 70
250	23°00'	60 - 80
300	19°00'	75-100
400	14°15'	83-110
500	11°30'	98-130
600	9°30'	105-140
700	8°15'	112-150
800	7°15'	120-160
900	6°15'	127-170

Formula for finding the degree of curvature from the radius:

$$D = \frac{5729.578}{\text{Radius}}$$

July 1, 1999

CHEVRON SIGN SPACING

CHART
6.6

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3. AT-GRADE TRAFFIC SIGN PLAN SET

3.1 Signing Plan Assembly Steps

At the back of this chapter is a sample 11" x 17" Sample Plan set. The Sample Signing Plan has been organized to follow an established format. As the designer progresses through the following numbered sequential steps in assembling a complete signing plan, refer to the appropriate sheets in the Sample Signing Plan for clarification. The Sample Signing Plan may be downloaded from the MnDOT OTST website in whole or in parts (e.g. the entire plan is saved in Adobe Reader Format .pdf and portions of the plan are available in Microstation Design File Format .dgn, such that these sheets may be included directing into a new sign plan).

1. Eliminate levels of detail (buildings, lot lines, etc) on roadway plan sheets.

REASON: So placement of signs on roadway sheets are not cluttered by underlying details.

2. Organize roadway plan sheets: all mainline roadway comes first with stationing generally increasing from left to right (include roadway through interchanges for depicting mainline signing through interchange; next are interchange/intersection layouts for indicating signing on cross streets and at ramp terminals.

REASON: Consistency in design.

3. Place signs on roadway plan sheets for each direction of travel, as the signs would appear to a motorist (placement and spacing of signs are detailed in the MN MUTCD and the TEM, Chapter 6).



NOTE: For signing plans involving replacement of existing signs, a complete field review is required to document sign legends, sign sizes and existing sign structures.

4. Label each type of sign (Types A, C, D, EO and EA) with the following numbering system:



NOTE: Refer to the TEM Chapter 6 section 6-4.04 for general definitions of the various sign design types and see note 4.D below for handling OH sign numbering.

- A. All signs are assigned a label, whether they are new, existing being removed, or existing being salvaged. All "New Signs" are labeled with their Type and a number sequentially starting at "1", "Existing Signs to be Removed" start numbering with "101" and "Existing Signs to be Salvaged" start numbering with "201" (e.g. the first new Type A sign would be A-1, the first new Type D sign would be D-1, the first existing Type EA sign to be removed would be EA-101, and so forth for all types of signs).
- B. Begin numbering on the left edge of the first roadway sheet and progressing through the last roadway sheet. Start with the number "1" and increase numbering to the end of the roadway sheets.
- C. All completely identical Type C, D, and E (EA & EO) signs receive the same label throughout the plan. However, the signs must be identical in every aspect except location. The factors that are considered unique include the installation and mounting requirements, size, and legend.



Note: Different labels are required if the signs have any differences in mounting, legend, size, etc. For example: a Type D sign being installed in earth needs a different label than a Type D sign installed in concrete; a Type D sign installed at a mounting height of 6 feet needs a different label than a Type D sign installed at a mounting height of 7 feet; and a Type C sign that has two different sizes needs a separate label for each sign size (a 30" x 30" STOP sign needs a different label than a 36" x 36").

REASON: The uniqueness of each sign is bid differently by signing contractors.

- D. Type OH signs -each of these signs has a unique number assigned – contact the OTST Signing Unit to obtain OH sign numbers (Rick Sunstrom at 651-234-7381).
5. Place exit ramp/exit loop delineation note behind the exit nose of each exit ramp/exit loop [this note refers to a “standard” sheet (which depicts the appropriate markers and delineation) included elsewhere in the complete signing plan].

REASON: Delineation and markers for freeway ramps and loops is “standardized” and only the reference to the “standard” is needed on each appropriate roadway sheet.

6. Show appropriate delineation and markers (refer to MnDOT “Traffic Engineering Manual, Chapter 7” for the various types, and application, of delineators and markers; detailed drawings are contained in the MnDOT Standard Signs Manual).
7. Utilities: Compile a list of the utility companies within the project limits for inclusion in the plan. If signing plan includes ANY signs with concrete or H-Pile (Type A signs have H-pile footings) footings, then ALL utilities need to be shown and labeled on each roadway sheet within close proximity of each concrete or H-Pile footing.
8. Design all guide sign panels (using the latest version of SignCAD®). Refer to the MnDOT “Traffic Guide Sign Design Manual” for standards, policies and procedures. Guide sign design questions, contact Rick Sunstrom at 651-234-7381.

REASON: consistency in design of sign panels in conformance with Federal and State sign design standards.



After completion of the first 8 steps above, assemble all plan sheets and guide sign design details and forward to the MnDOT OTST Signing Unit for preliminary review (includes review of sign spacing). Once review has been completed, plan sheets will either be returned to the designer OR a meeting will be arranged to go over comments.

9. Select and verify, or coordinate, locations (engineering stations) of all Type A and/or Type OH signs with MnDOT OTST Signing Unit (Heather Lott at 651-234-7371 or Rick Sunstrom at 651-234-7381).

REASON: Signs need to be spaced properly and installed at proper locations for motorists’ safety and guidance.

10. Obtain a cross section (from design if new roadway design OR from survey crew if in place roadway) for each new Type A and Type OH sign. Plot all cross sections in Microstation and add



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the Type A or Type OH sign structure and sign panel(s) in accordance with the format of the cross sections in the back of the Sample Signing Plan.

REASON: consistency in design for bidding purposes for contractors.

11. List all appropriate notes that apply on each roadway sheet for all of the various types of work listed below each sign. Refer to the master list of notes in the Sample Signing Plan.
12. Create the appropriate data boxes (using Excel) for each sign type and type of work being done on the sign (i.e. "Salvage Signs Type C" are tabulated in one data box, "Remove Signs Type C" are tabulated in another data box, etc.). The type of work for each type of sign is already broken down on the notes on each roadway sheet. Refer to the Sample Signing Plan to determine which data boxes need to be created for each type of sign. Then FILL IN the data boxes with the appropriate data.

REASON: The listing of estimated pay quantities are derived from the totals of each of the data boxes

13. Prepare list of standard plates applicable to project.
14. Prepare list of estimated quantities using the total quantity from each of the data boxes.
15. Assemble all necessary structural and detail sheets.
16. Complete the title sheet (if signing project is NOT tied to a construction project).
17. Assemble ALL of the plan sheets in the proper order (in accordance with the Sample Signing Plan).
18. Number the roadway sheets sequentially beginning with the Title Sheet as Sheet 1.
19. Fill in, and check, all sheet cross referencing throughout the plan.



3.2 Plan Set

Standard detail sheets for signing plans can be found on the OTST website:

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

The at-grade sign plan format and sequence of details shall, generally, be as follows:

1. Title sheet.
2. Estimate of quantities.
3. Sign data sheets giving pertinent information for each sign.
4. Public utilities
5. Roadway plan sheets showing signing for mainline and interchanges.
6. Sign panel drawings for all non-standard signs.
7. Standard details.
8. Structural details.

Final signal plans should be prepared on 11" x 17" plan sheets.

The licensed professional engineer responsible for or under whose supervision the work is performed shall sign the title sheet.



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3.3 Title Sheet

The Title Sheet includes information such as the title block, project location, governing specifications, etc. A sample title sheet is shown below from the sample plan.

MINNESOTA DEPARTMENT OF TRANSPORTATION

CONSTRUCTION PLAN FOR SIGN REPLACEMENT

LOCATED ON T.H. 65 600' SO. OF 209TH AVE. N.E. TO 3/4 MILE NORTH OF 221ST AVE. N.E.

BEG. S.P. 0000-00 END S.P. 0000-00

SCALE 1" = 10 MILES

PLAN REVISIONS		
DATE	SHEET NO.	APPROVED BY

PROJECT LOCATION
HENNEPIN COUNTY
DISTRICT METRO

FOR PLANS AND UTILITIES SYMBOLS SEE TECHNICAL MANUAL
STATE PROJ. NO. _____ CHARGE IDENTIFIER _____
.....0000-00.....

FED. PROJ. NO.0000-00.....

GOVERNING SPECIFICATIONS
THE 2003 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION, SHALL CONTROL.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	ESTIMATED QUANTITIES
3-6	DATA SHEETS
7	PUBLIC UTILITIES
8-15	ROADWAY LAYOUTS
16-18	SIGN PANEL LAYOUTS
19-20	PLACEMENT DETAILS
21-25	STRUCTURAL DETAILS

THIS PLAN CONTAINS 25 SHEETS

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINT NAME LICENSE #

DATE SIGNATURE

DESIGN BOARD

I HEREBY CERTIFY THAT THE FINAL FIELD REVISIONS, IF ANY, WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINT NAME LICENSE #

DATE SIGNATURE

STATE PROJ. NO. AT GRADE SAMPLE SHEET NO. 1 OF 25 SHEETS

3.3.1 Plan Description and Location

This defines the type of work being performed and the location of the work. The location identified should list intersections from west to east or south to north.

MINNESOTA DEPARTMENT OF TRANSPORTATION

CONSTRUCTION PLAN FOR SIGN REPLACEMENT

LOCATED ON T.H. 65 600' SO. OF 209TH AVE. N.E. TO 3/4 MILE NORTH OF 221ST AVE. N.E.



MnDOT Signing Plan Design (At-Grade) Manual

3.3.2 Governing Specifications and Index of Sheets

This defines the governing specifications for the project, the project funding and the index of the sheets contained within the plan set. Generally it is located in the upper right hand corner of the title sheet, under the Federal Project number or statement "STATE FUNDS".

If designed in metric units, there must also be a statement to the left of this box: "Attention, this is a metric plan".

GOVERNING SPECIFICATIONS	
THE 2005 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION SHALL GOVERN.	
INDEX	
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	ESTIMATED QUANTITIES
3-6	DATA SHEETS
7	PUBLIC UTILITIES
8-15	ROADWAY LAYOUTS
16-18	SIGN PANEL LAYOUTS
19-20	PLACEMENT DETAILS
21-25	STRUCTURAL DETAILS
THIS PLAN CONTAINS 25 SHEETS	

3.3.3 Plan Preparation Certification Note

This identifies:

- ✓ Who the plan set was developed by (or under the direct supervision of)
- ✓ That individual's state registration information.

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.	
PRINT NAME: _____	LICENSE # _____
DATE: _____	SIGNATURE: _____
DESIGN SQUAD _____	

3.3.4 Project Numbers and Sheet Numbers

The project numbers and sheet numbers are shown in the lower right hand corner of the title sheet and on all other sheets.

A SP in the project number stands for State Project. A SP is necessary for any project on a trunk highway signal. A SAP is a State Aid Project number indicating that the local agency is using State Aid funds to finance their share of the project. If the project has federal funding the SAP becomes a SP. All state aid numbers should be listed on all sheets to which they apply.



MnDOT Signing Plan Design (At-Grade) Manual

The general format for a SP is "CCNN-A". CC is the county number in alphabetical order (i.e., Anoka County is 02). NN is the control section number within the county unique to the roadway in the County. A is the number of the project on that control section (i.e., -269 means that there have been 268 other projects on this section of roadway prior to this project).

The general format for an SAP is CCC-NNN-A. CCC is a 3-digit city number, a two digit number is a county number. NNN is a number related to the roadway and project type. A is the number of the project in that city or county of that type.

STATE PROJ. NO. AT GRADE SAMPLE SHEET NO. 1 OF 25 SHEETS

3.3.5 Signature Block

I HEREBY CERTIFY THAT THE FINAL FIELD REVISIONS, IF ANY, WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

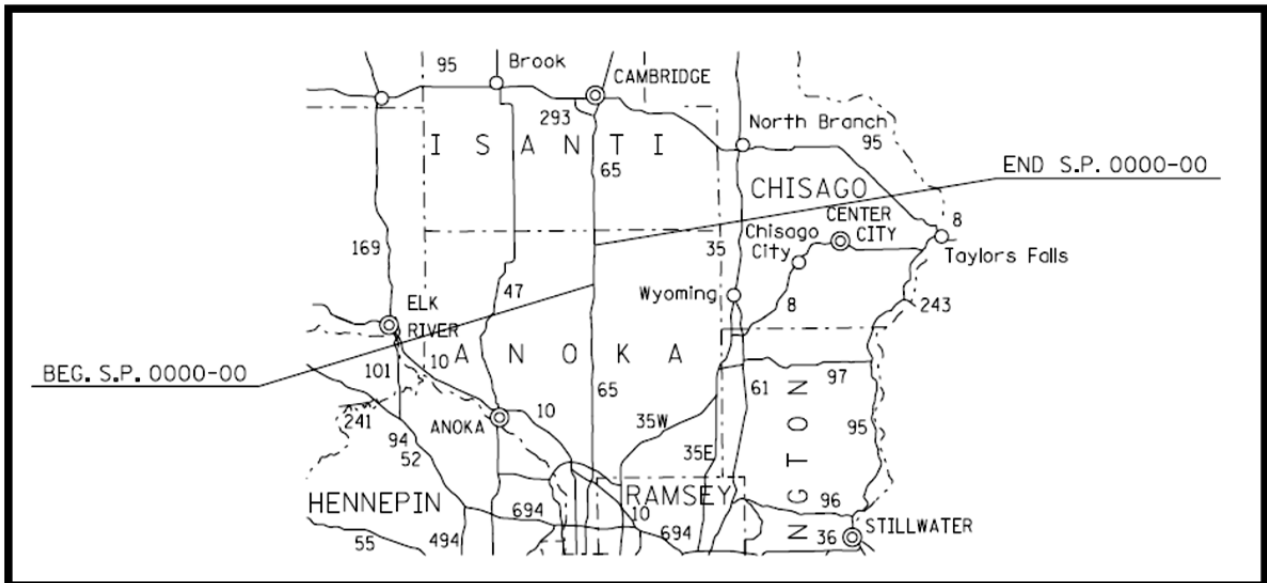
PRINT NAME: _____ LICENSE # _____

DATE: _____ SIGNATURE: _____

3.3.6 Index Map

The index map is used to identify the location of the project(s). Provide leader lines from the beginning and end of the project limits to the appropriate points on the map. This is generally located near the center of the title sheet.

If appropriate, identify all State Aid project numbers applicable to the project.





3.3.7 Project Location

The information included in this block is the generalized location (county and city). This is generally located in the lower right part of the title sheet, left of the signature block and above the project number block.



3.3.8 Plan Revisions Block

The block is included so that future plan revisions can be documented. This is generally located in lower center portion of the title sheet. Pencil in the charge identifier number. MnDOT plan processing will edit this as necessary.

PLAN REVISIONS		
DATE	SHEET NO.	APPROVED BY



3.4 Estimated Quantities Sheets

Below is an image from the estimated quantities sheets.

STATEMENT OF ESTIMATED QUANTITIES					
SHEET NO.	CHART I.D.	ITEM NO.	ITEM	UNIT	ESTIMATED QUANTITIES
		2021.501	MOBILIZATION	LUMP SUM	1
		2104.509	REMOVE SIGN TYPE C	EACH	59
5	D	2104.509	REMOVE SIGN TYPE D	EACH	16
		2104.509	REMOVE MARKER	EACH	6
3	B	2104.523	SALVAGE SIGN TYPE C	EACH	2
5	E	2104.523	SALVAGE SIGN TYPE D	EACH	2
		2563.601	TRAFFIC CONTROL	LUMP SUM	1
3	A	2564.531	SIGN PANELS TYPE C	SQ. FT.	759
4	C	2564.531	SIGN PANELS TYPE D	SQ. FT.	873
6	H	2564.531	SIGN PANELS TYPE OVERLAY	SQ. FT.	32
3	B	2564.537	INSTALL SIGN TYPE C	EACH	2
5	E	2564.537	INSTALL SIGN TYPE D	EACH	2
6	G	2564.551	REFERENCE POST MARKER	EACH	6
6	F	2564.552	HAZARD MARKER X4-2	EACH	2

ESTIMATED QUANTITIES			
DRAWN BY:	CHECKED BY:	CERTIFIED BY:	STATE PROJ. NO. AT GRADE SAMPLE SHEET NO. 2 OF 25 SHEETS

The Statement of Estimated Quantities is finalized after the layouts and data sheets are complete.

- ✓ For a list of the appropriate specification item numbers, item descriptions, and units, refer to the MnDOT Standard Specification for Construction Book (Spec Book) – see the image to the right.
- ✓ The first column is the Sheet Number listing the sheet that includes the sign data for the given Item.
- ✓ The Chart ID is the identifier for the chart as shown on the data sheets.
- ✓ The Estimated Quantities are the project quantity totals.

Payment for traffic signs and devices will be made on the basis of the following schedule:

Item No.	Item	Unit
2564.511	Concrete Footings-Type	cubic meter (cubic yard)
2564.513	Median Barrier Footing	each
2564.515	Sign Support	each
2564.518	Overhead Sign Structure Repair	man-hour
2564.522	Structural Steel --- (Specify Item & Use)	kilogram (pound)
2564.524	Modify Post	each
2564.531	Sign Panels Type ____	square meter (square foot)
2564.533	Furnish Sign Panels Type ____	square meter (square foot)
2564.534	Saw Sign Panel Type ____	meter (linear foot)
2564.535	Sign Panel Overlay Type ____	square meter (square foot)
2564.536	Install Sign Panel Type ____	each
2564.537	Install Sign Type ____	each
2564.538	Sign Legend Revision	each
2564.539	Overhead Sign Identification Plate	each
2564.540	Extend Walkway Support	each
2564.541	Friction Fuse	each
2564.542	Keeper Plate	each
2564.550	Delineator, Type ____	each
2564.551	Reference Post Marker	each
2564.552	Hazard Marker X4-2	each
2564.553	Clearance Marker X4-4	each
2564.554	Snowplow Marker X4-5	each
2564.555	End of Roadway Marker X4-11	each



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3.5 Sign Data Sheets

The sign data sheets include a summary of data that is pertinent to the signs within the project area. These are Sheets 3 through 6 in the sample plan (refer to the sample plan at the back of the chapter).

3.5.1 Chart A and Chart B Sign Data Sheets

A 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	4	2-U	1	19	7	48 x 18	6.00	24.00	RE-1(L)	ONE WAY	(2)
						48 x 18	6.00	24.00	RE-1(R)	ONE WAY	(2)
						36 x 36	9.00	36.00	RI-1	STOP	(2)
C-2	4	2-U	1	17	7	30 x 24	5.00	20.00	RE-3a	DIVIDED HIGHWAY	(2)
						48 x 18	6.00	24.00	RE-1(L)	ONE WAY	(2)
C-3	7	2-U	1	16	7	36 EQUIL.	3.90	15.60	RI-2	YIELD	(2)
C-4	6	2-U	1	14	7	48 x 18	6.00	36.00	RE-1(L)	ONE WAY	(2)
C-5	9	2-U	1	15	7	30 x 30	6.25	36.25	R3-7	RIGHT LANE MUST TURN RIGHT	(2)
C-6	8	2-U	1	15	7	30 x 30	6.25	50.00	R3-7	LEFT LANE MUST TURN LEFT	(2)
C-7	4	2-U	1	17	7	48 x 18	6.00	24.00	RE-1(R)	ONE WAY	(2)
						36 EQUIL.	3.90	15.60	RI-2	YIELD	(2)
C-8	3	2-U	1	14	7	48 x 18	6.00	18.00	RE-1(R)	ONE WAY	(2)
C-9	2	2-U	1	17	7	48 x 48	16.00	32.00	R1-3	SIGNAL AHEAD	(2)
C-10	4	2-U	1	18	7	48 x 60	20.00	80.00	R2-1	SPEED LIMIT 65	(2)
C-11	2	2-U	1	17	7	30 x 15	3.13	6.25	M3-3M0	SOUTH	(2)
						36 x 36	9.00	18.00	MI-50	MINNESOTA 65	(2)
C-12	2	2-U	1	17	7	48 x 18	6.00	12.00	RE-1(L)	ONE WAY	(3)
						30 x 15	3.13	6.25	M3-1M0	NORTH	(2)
C-13	2	2-U	1	17	7	36 x 36	9.00	18.00	MI-50	MINNESOTA 65	(2)
						48 x 18	6.00	12.00	RE-1(R)	ONE WAY	(2)
C-14	2	2-U	1	17	7	36 x 36	9.00	18.00	RI-1	STOP	(2)
						48 x 18	6.00	12.00	RE-1(L)	ONE WAY	(2)
C-15	2	2-U	1	19	7	48 x 18	6.00	12.00	RE-1(R)	ONE WAY	(2)
						30 x 24	5.00	10.00	RE-3	DIVIDED HIGHWAY	(2)
						48 x 18	6.00	12.00	RE-1(R)	ONE WAY	(2)
C-16	2	2-U	1	17	7	36 EQUIL.	3.90	7.80	RI-2	YIELD	(4)
C-17	2	1-ST	1	11	7	36 x 36	9.00	18.00	RS-1	DO NOT ENTER	(2)
C-18	2	1-ST	1	10	7	48 x 18	6.00	12.00	RE-1(L)	ONE WAY	(3)
TOTAL								758.75			

B SALVAGE & INSTALL SIGN TYPE C											
SIGN NO.	QUANT.	NO. & TYPE	POSTS		MTG. HT. (FT.)	PANEL			PANEL LEGEND		
			KNEE BRACES QUANT.	LEN. (FT.)		SIZE (IN.)	AREA (SQ. FT.)	TOTAL AREA (SQ. FT.)			
C-201	2	2-U	1	16	7	60 x 36			ADOPT A HIGHWAY		
TOTAL											

SPECIFIC NOTES*

- (1) MOUNTING HEIGHT IS MINIMUM. SEE SHEET 22 FOR TYPICAL MOUNTING.
- (2) FOR PUNCHING AND MOUNTING DETAILS, SEE SHEET 23.
- (3) MOUNTED BACK TO BACK.
- (4) MOUNTED BACK TO BACK WITH ONEWAY ABOVE YIELD.
- (5) MOUNTED IN CONCRETE, SEE SHEET 24.
- (6) MOUNTED ON SIGNAL, SEE SHEET 25.

GENERAL NOTES*

1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEETS 21-25 FOR STRUCTURAL DETAILS.
3. SEE STANDARD SIGNS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS.

C SIGN DATA											
DRAWN BY:	CHECKED BY:	CERTIFIED BY:	LIC. NO.:	DATE: 6/14/2012	STATE PROJ. NO. AT GRADE SAMPLE	SHEET NO. 3	OF 25 SHEETS				

Chart A is for signs to be furnished and installed. Chart B is for signs to be salvaged and installed. The columns in the charts include:

- ✓ SIGN NO. is the number of the sign . Note that each SIGN NO. could include multiple signs.
 - Order in accordance with the Standard Signs Summary
 - Regulatory
 - Warning
 - Route Markers and Auxiliaries
- ✓ TOTAL QUANTITY is the total number of signs found in the plan set.
- ✓ POST: NO. & TYPE is the number of posts and type
 - TEM Charts 6.2 and 6.3
- ✓ POST: KNEE BRACES QUANT. Is the quantity of knee braces used
- ✓ POST: LEN. (FT.) is the length of the U-post
 - See Appendix C for post length determination
- ✓ MTG. HT. is the mounting height of the sign. This is the minimum mounting height.

- ✓ PANEL: SIZE (IN.) is the sign of the panel in length and height
 - Specified in the Standard Sign Summary
 - Stop signs in TEM section 6-5.12
- ✓ PANEL: AREA (SQ. FT.) is the area of the sign (not used for Chart B)
- ✓ PANEL: TOTAL AREA (SQ. FT.) is the total area of the sign group (not used for Chart B)
- ✓ CODE NO. is the nomenclature name of the sign (not used for Chart B)
- ✓ PANEL LEGEND is the legend text found on the sign

The image below shows a sample of sign C-1 on Chart A as laid out on Sheet 8 of the sample plan layout sheets.

A SIGN PANELS TYPE C											
SIGN NO.	QUANT.	POSTS			MTG HT. (1) (FT.)	PANEL			CODE NO.	PANEL LEGEND	
		NO. & TYPE	KNEE BRACES QUANT.	LEN. (FT.)		SIZE (IN.)	AREA (SQ. FT.)	TOTAL AREA (SQ. FT.)			
C-1	4	2-U	1	19	7	48 x 18	6.00	24.00	R6-1 (L)	ONE WAY	(2) (3)
						48 x 18	6.00	24.00	R6-1 (R)	ONE WAY	(2)
						36 x 36	9.00	36.00	R1-1	STOP	(2)
						30 x 24	5.00	20.00	R6-3a	DIVIDED HIGHWAY	(2)
C-2	4	2-U	1	17	7	48 x 18	6.00	24.00	R6-1 (L)	ONE WAY	(2)
						36 EQUIL.	3.90	15.60	R1-2	YIELD	(2)
C-3	7	2-U	1	16	7	36 x 36	9.00	63.00	R5-1	DO NOT ENTER	
C-4	6	2-U		14	7	48 x 18	6.00	36.00	R6-1 (L)	ONE WAY	
C-5	9	2-U		15	7	30 x 30	6.25	56.25	R3-7	RIGHT LANE MUST TURN RIGHT	
C-6	8	2-U		15	7	30 x 30	6.25	50.00	R3-7	LEFT LANE MUST TURN LEFT	

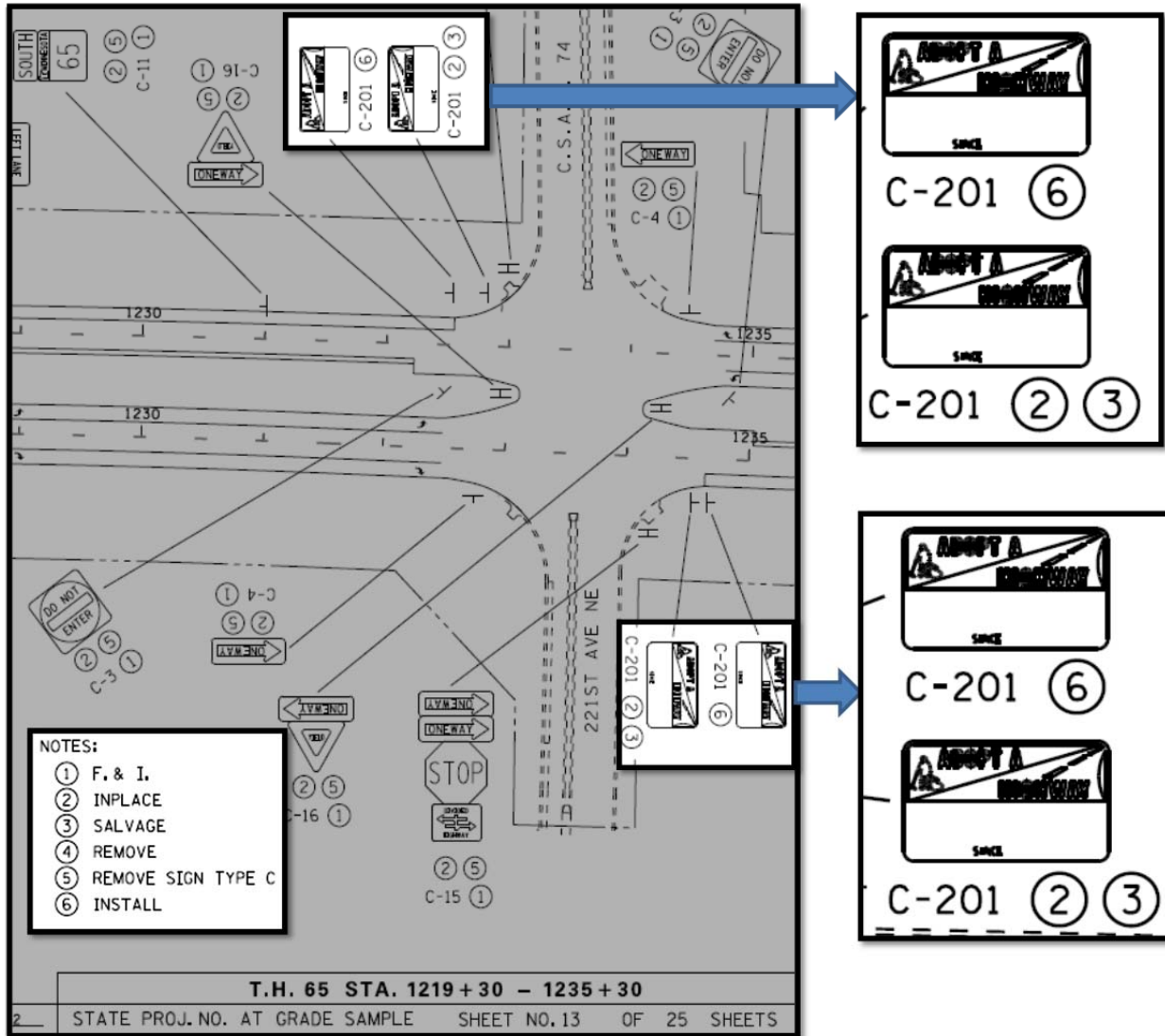
In the above image, the sign C-1 is highlighted on the Sign Panels Type C summary table. Also shown is an example of the Sign No. C-1 on sheet 8 of 25 of the sample plan set. Notice that this sign (C-1) is a cluster of 4 different signs (R6-1(L), R6-1(R), R1-1, R6-3a).



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The image below shows a sample of sign C-201 on Chart B as laid out on Sheet 13 of the sample plan layout sheets.

B SALVAGE & INSTALL SIGN TYPE C							
SIGN NO.	QUANT.	POSTS			MTG HT. (FT.) (1)	PANEL SIZE (IN.)	PANEL LEGEND
		NO. & TYPE	KNEE BRACES QUANT.	LEN. (FT.)			
C-201	2	2-U	1	16	7	60 x 36	ADOPT A HIGHWAY
TOTAL	2						



3.5.2 Chart C Sign Data Sheet

Chart C

SIGN PANELS TYPE D										
SIGN NO.	QUANT.	POSTS					PANEL			PANEL LEGEND
		NO. & TYPE	KNEE BRACES QUANT.	LEN. (FT.)	SPACING (IN.)	MTG. HT. (11" (FT.))	SIZE (IN.)	AREA (SQ. FT.)	TOTAL AREA (SQ. FT.)	
D-1	2	2-U	2	18	42	7	72 x 60	30.00	60.00	
D-2	1	2-U	2	17	54	7	84 x 48	28.00	28.00	
D-3	2	2-U	2	17	54	7	84 x 48	28.00	56.00	
D-4	1	2-U	2	18	30	7	48 x 66	22.00	22.00	
D-5	1	2-U	2	18	30	7	48 x 66	22.00	22.00	
D-6	1	2-U	2	17	54	7	84 x 48	28.00	28.00	
D-7	2	3-U	3	19	45	7	102 x 78	55.25	110.50	
D-8	1	2-U	2	17	60	7	102 x 48	34.00	34.00	
D-9	1	2-U	2	17	60	7	102 x 48	34.00	34.00	
D-10	1	2-U	2	17	60	7	102 x 48	34.00	34.00	
D-11	2	3-U	3	19	45	7	102 x 78	55.25	110.50	
D-12	1	2-U	2	17	60	7	102 x 48	34.00	34.00	
TOTAL									573.00	

SPECIFIC NOTES:
 (1) MOUNTING HEIGHT IS MINIMUM, SEE SHEET 22 FOR TYPICAL MOUNTING.

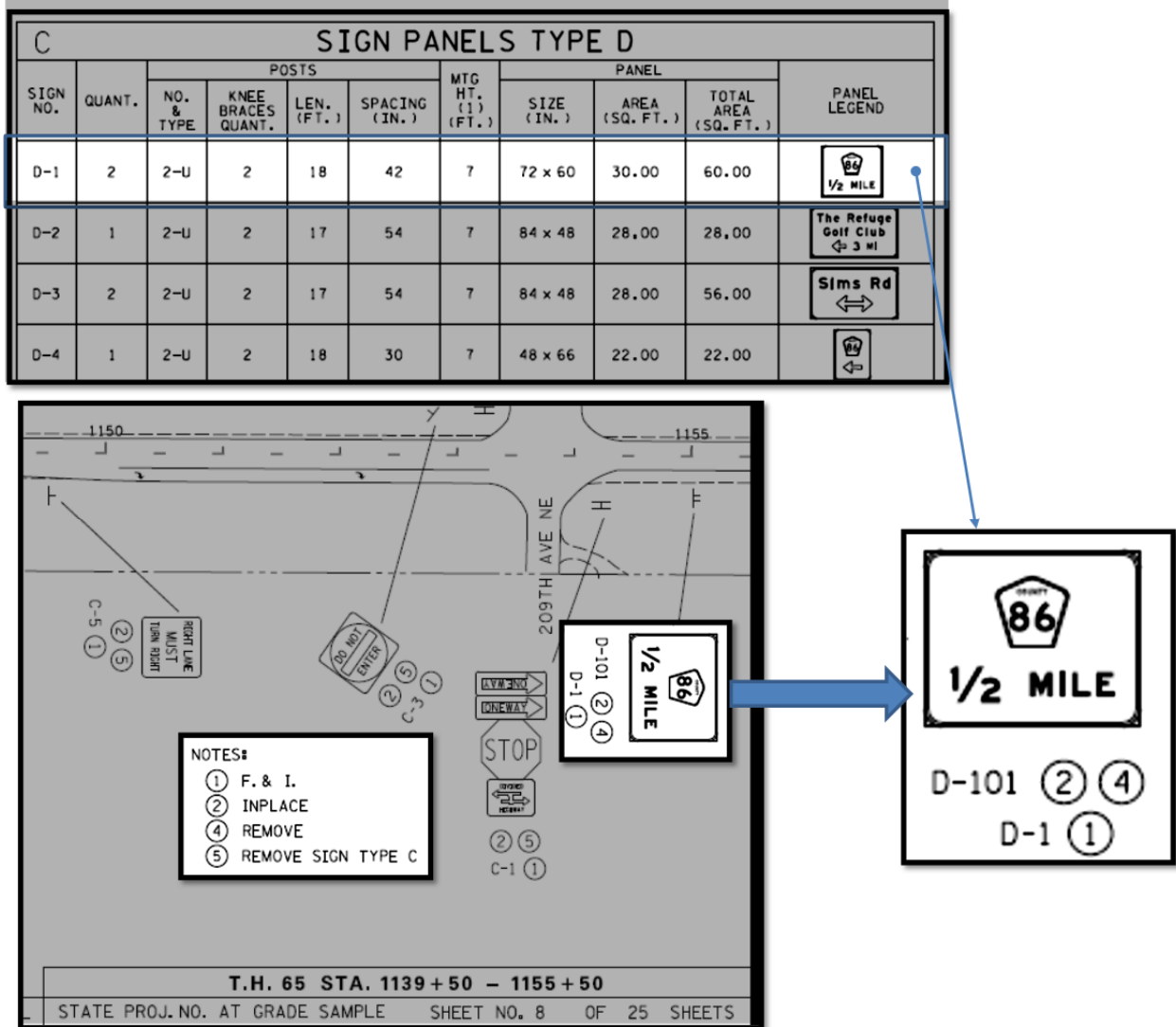
GENERAL NOTES:
 1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
 2. SEE SHEETS 21-25 FOR STRUCTURAL DETAILS.
 3. SEE STANDARD SIGNS MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS.

DRAWN BY:	CHECKED BY:	CERTIFIED BY:	LIC. NO.:	DATE: 6/14/2012	D SIGN DATA
					STATE PROJ. NO. AT GRADE SAMPLE SHEET NO. 4 OF 25 SHEETS

Chart C is for Sign Panels Type D. The columns in the chart include:

- ✓ SIGN NO. is the number of the sign
- ✓ QUANTITY is the total number of signs found in the plan set.
- ✓ POSTS: NO. & TYPE is the number of posts and type
 - TEM Charts 6.2 and 6.3
- ✓ POSTS: KNEE BRACES QUANT. Is the quantity of knee braces used
 - TEM Charts 6.2 and 6.3
- ✓ POSTS: LEN. (FT.) is the length of the post
 - See Appendix C for post length determination
- ✓ POSTS: SPACING (IN.) is the spacing between the sign posts
- ✓ MTG. HT. is the mounting height of the sign. This is the minimum mounting height.
- ✓ PANEL: SIZE (IN.) is the sign of the panel in length and height
- ✓ PANEL: AREA (SQ. FT.) is the area of the sign
- ✓ PANEL: TOTAL AREA (SQ. FT.) is the total area of the signs for the plan set
- ✓ PANEL LEGEND is the legend text found on the sign

The image below shows a sample of sign D-1 on Chart C as laid out on Sheet 8 of the sample plan layout sheets.



Sign panels are laid out with the SignCad® software.



3.5.3 Chart D and E Sign Data Sheet

Chart D

Chart E

D REMOVE SIGN TYPE D							
SIGN NO.	QUANT.	POSTS		PANEL SIZE (IN.)	PANEL LEGEND	MTG. HT. (FT.)	PANEL SIZE (IN.)
		NO. & TYPE	KNEE BRACES QUANT.				
D-101	2	2-U	2	72 x 60			
D-102	1	2-U	2	84 x 48			
D-103	2	2-U	2	84 x 48			
D-104	1	2-U	1	48 x 66			
D-105	1	2-U	1	48 x 66			
D-106	1	2-U	2	84 x 48			
D-107	2	3-U	3	102 x 78			
D-108	1	2-U	2	102 x 48			
D-109	1	2-U	2	102 x 48			
D-110	1	2-U	2	102 x 48			
D-111	2	3-U	3	102 x 78			
D-112	1	2-U	2	102 x 48			
TOTAL	16						

E SALVAGE & INSTALL SIGN TYPE D							
SIGN NO.	QUANT.	POSTS		LEN. (FT.)	SPACING (IN.)	MTG. HT. (FT.)	PANEL SIZE (IN.)
		NO. & TYPE	KNEE BRACE QUANT.				
D-201	1	2-U	2	17	90	7	144 x 48
D-202	1	2-U	2	17	90	7	144 x 48
TOTAL	2						

D SIGN DATA

DRAWN BY: _____ CHECKED BY: _____ CERTIFIED BY: _____ LIC. NO. _____ DATE 6/14/2012 STATE PROJ. NO. AT GRADE SAMPLE SHEET NO. 5 OF 25 SHEETS

Chart D is for type D signs to be removed. Chart E is for type D signs to be salvaged and installed. The columns in the charts include:

- ✓ SIGN NO. is the number of the sign .
- ✓ QUANTITY is the total number of signs found in the plan set.
- ✓ POSTS: NO. & TYPE is the number of posts and type
 - TEM Charts 6.2 and 6.3
- ✓ POSTS: KNEE BRACES QUANT. Is the quantity of knee braces used
 - TEM Charts 6.2 and 6.3
- ✓ POSTS: LEN. (FT.) is the length of the post
- ✓ POSTS: SPACING (IN.) is the spacing between the sign posts
- ✓ MTG. HT. is the mounting height of the sign. This is the minimum mounting height.
- ✓ PANEL: SIZE (IN.) is the sign of the panel in length and height
- ✓ PANEL LEGEND is the legend text found on the sign



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The image below shows a sample of sign D-101 on Chart D as laid out on Sheet 8 of the sample plan layout sheets.

D REMOVE SIGN TYPE D					
SIGN NO.	QUANT.	POSTS		PANEL SIZE (IN.)	PANEL LEGEND
		NO. & TYPE	KNEE BRACES QUANT.		
D-101	2	2-U	2	72 x 60	1/2 MILE
D-102	1	2-U	2	84 x 48	The Refuge Golf Club 3 MI
D-103	2	2-U	2	84 x 48	Sims Rd

D-101 (2) (4)
D-1 (1)

NOTES:
 ① F. & I.
 ② INPLACE
 ④ REMOVE
 ⑤ REMOVE SIGN TYPE C

T.H. 65 STA. 1139 + 50 - 1155 + 50
 STATE PROJ. NO. AT GRADE SAMPLE SHEET NO. 8 OF 25 SHEETS

The below image shows a sample of sign D-201 on Chart E as laid out on Sheet 12 of the sample plan layout sheets.

E SALVAGE & INSTALL SIGN TYPE D								
SIGN NO.	QUANT.	POSTS				MTC HT. (FT.) (1)	PANEL SIZE (IN.)	PANEL LEGEND
		NO. & TYPE	KNEE BRACE QUANT.	LEN. (FT.)	SPACING (IN.)			
D-201	1	2-U	2	17	90	7	144 x 48	CITY HALL - COMMUNITY CENTER 1 MI
D-202	1	2-U	2	17	90	7	144 x 48	CITY HALL - COMMUNITY CENTER 1 MI
TOTAL	2							

D-201 (6)

D-201 (2) (3)

NOTES:
 ① F. & I.
 ② INPLACE
 ③ SALVAGE
 ④ REMOVE
 ⑤ REMOVE SIGN TYPE C
 ⑥ INSTALL

STA. 1203 + 50 - 1219 + 30
 SAMPLE SHEET NO. 12 OF 25 SHEETS



3.5.4 Chart F, G and H Sign Data Sheet

Chart F

F MARKERS (1)			
TYPE	QUANTITY	LOCATION	
HAZARD MARKER (X4-2)	2	ISLAND	

(2)(3)

Chart G

G REFERENCE POST MARKER (1)			
CODE NO.	QUANTITY	SIZE (IN.)	LEGEND
D10-2	2	12 x 36	MILE 26
D10-2	2	12 x 36	MILE 27
D10-2	2	12 x 36	MILE 28
TOTAL	6		

Chart H

H SIGN PANELS TYPE OVERLAY				
CODE NO.	QUANT.	SIZE (IN.)	AREA (SQ. FT.)	TOTAL (SQ. FT.)
W1-60	4	24 x 24	4.00	16.00
W1-60	4	24 x 24	4.00	16.00
TOTAL				32.00

LEGEND: COUNTY 74, COUNTY 86

SPECIFIC NOTES*
 (1) PLACE ON 3 LB/FT POST (MNDOT 3401).
 (2) MOUNTED IN CONCRETE.
 (3) YELLOW ON BLACK

MARKER & OVERLAY DATA

DRAWN BY: _____ CHECKED BY: _____ CERTIFIED BY: _____ LIC. NO. _____ DATE: 8/14/2012 STATE PROJ. NO. AT GRADE SAMPLE SHEET NO. 6 OF 25 SHEETS

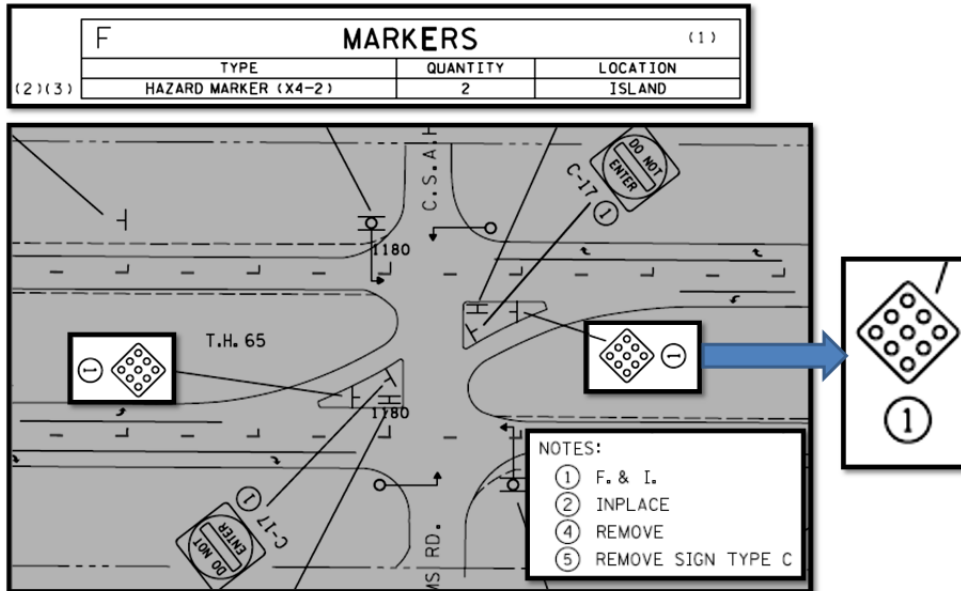
Chart F is for markers, Chart G is for Reference Post Markers and Chart H is for Sign Panel Overlays. The columns in the charts include:

- ✓ TYPE is the type of marker (Chart F only)
- ✓ CODE NO. is the number of the sign (excludes Chart F)
- ✓ QUANTITY/QUANT. is the total number of signs found in the plan set.
- ✓ LOCATION is the location of the sign
- ✓ SIZE (IN.) is the sign of the panel in length and height (excludes Chart F)
- ✓ AREA (SQ. FT.) is the area of the sign
- ✓ TOTAL (SQ. FT.) is the total area of the signs for the plan set
- ✓ LEGEND is the legend text found on the sign (excludes Chart F)

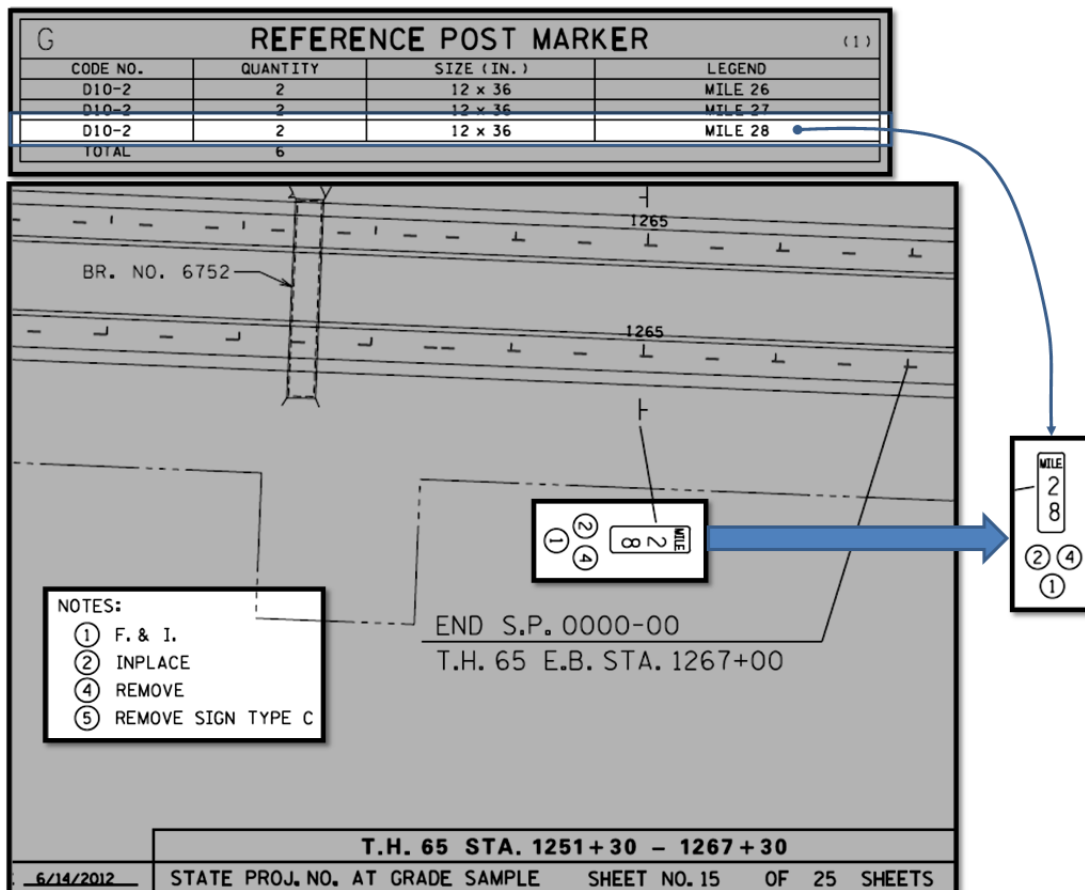


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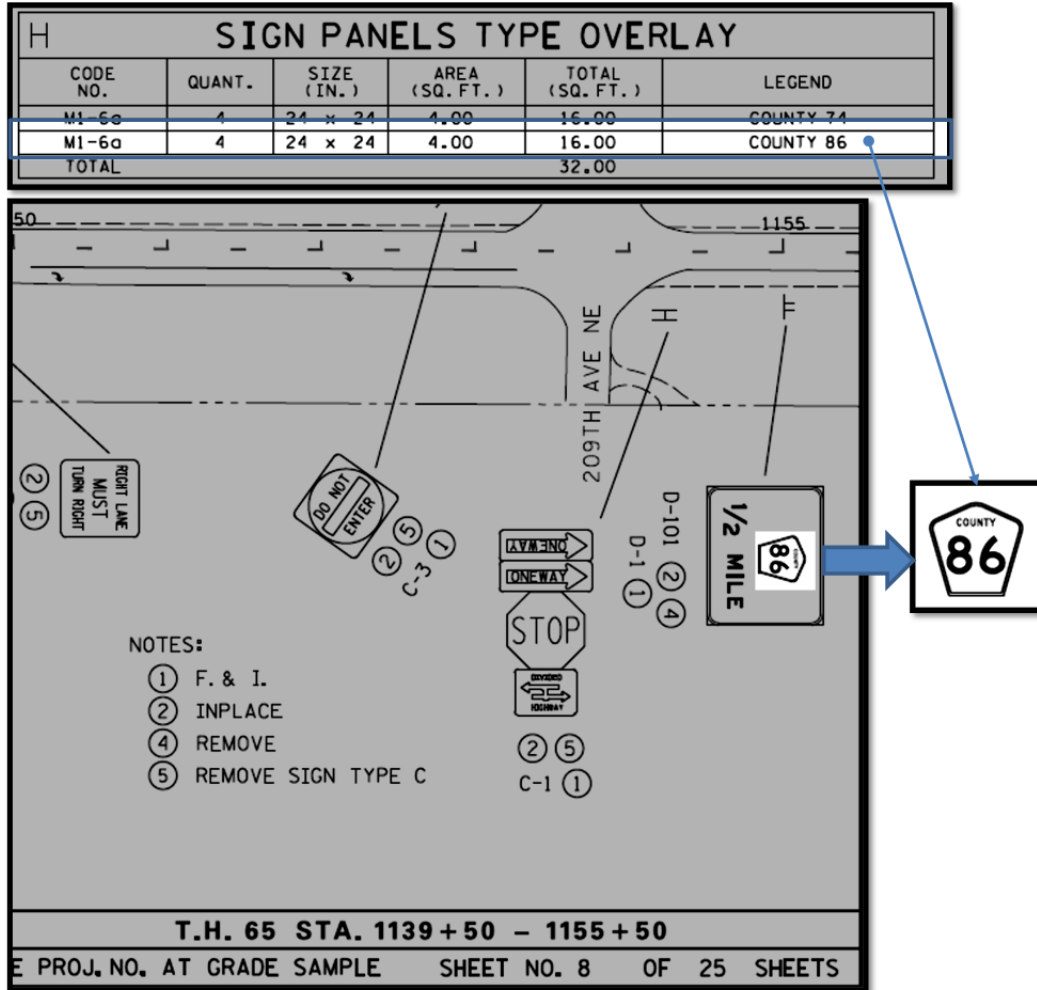
The below image shows a sample of the markers on Chart F as laid out on Sheet 10 of the sample plan layout sheets.



The below image shows a sample of the reference post marker on Chart G as laid out on Sheet 15 of the sample plan layout sheets.



The image below shows a sample of the sign panel overlay "COUNTY 86" on Chart H as laid out on Sheet 8 of the sample plan layout sheets.



3.6 Public Utilities Sheet

See the sample plans, sheet 7 for the full size utilities.

GENERAL NOTES:

- NO UTILITIES WILL BE AFFECTED BY WORK ON THIS PROJECT.
- THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF C/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."

UTILITIES

THE FOLLOWING LIST SHOWS THE UTILITY COMPANIES WITHIN THE PROJECT LIMITS

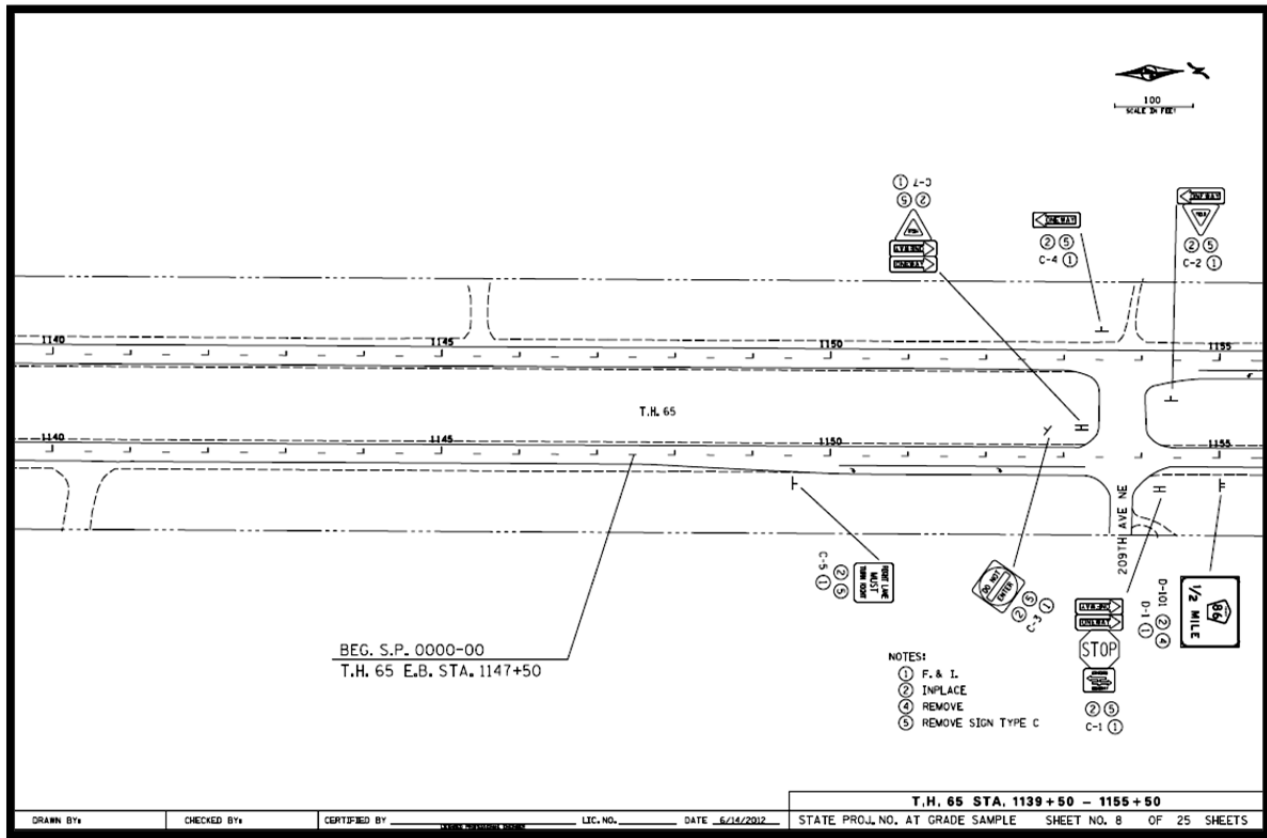
CENTERPOINT ENERGY
 MN/DOT
 MINNESOTA POWER
 QWEST CORPORATION
 US CABLE
 XCEL ENERGY

(THIS IS JUST AN EXAMPLE OF HOW TO LIST UTILITY COMPANIES)

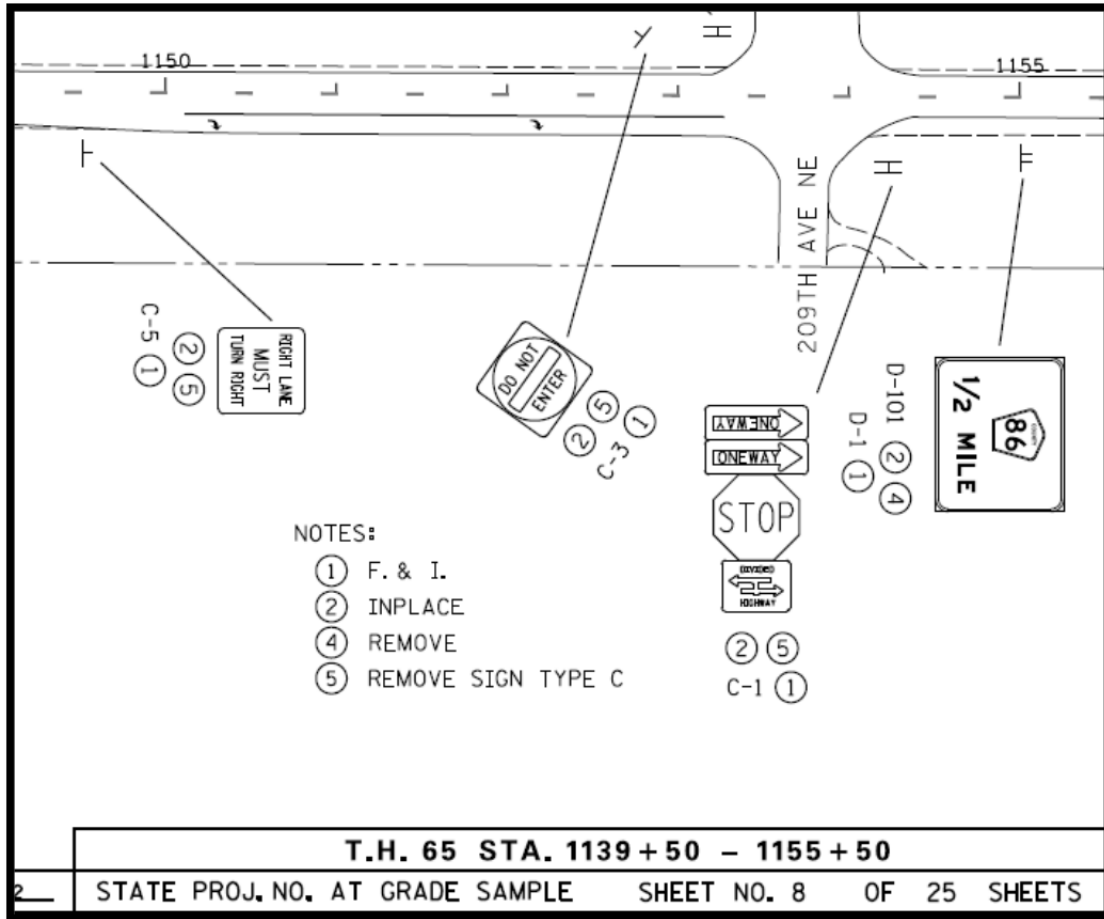


3.7 Roadway Layout Sheets

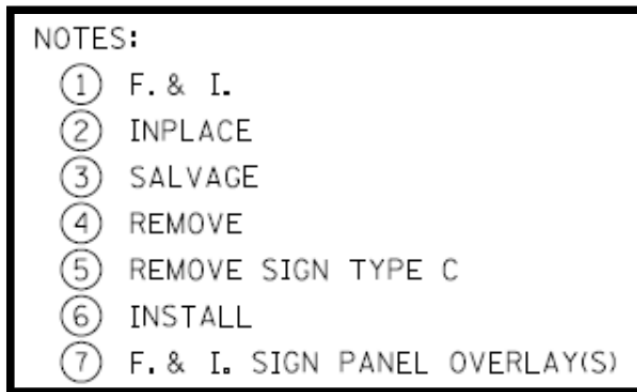
The general layout sheets show the layout of the signs within the project area. Refer to the sample plan set in the appendix for a larger image to show the detail. Below is sheet 8. The sample plan includes 8 roadway layout sheets (sheet 8 to 15).



The layout sheets show the detailed layout and location of the signs. The circles numbers are the notes that indicate the action. For instance, in the image above and below, the circled 1 is for Furnish and Install (F&I), the 3 is to Salvage the sign and the 6 is to install.



The notes on this sample plan are:



F. & I. = Furnish and Install
 INPLACE = Signs to keep in place
 SALVAGE = Signs that should be salvaged
 REMOVE = Signs that should be removed
 INSTALL = Signs that should be installed

See the handout with the sample plan for a complete list of the roadway notes that are used on a plan set.



3.8 Clear Zone Requirements

Clear Zones (from the Road Design Manual)

The roadside clear zone is the distance from the edge of the travel lane which should be free of any non-traversable hazard such as steep slopes or fixed objects. The clear zone distances are targeted towards allowing approximately 80 to 85 percent of all run-off-the-road vehicles to recover or come to a safe stop. The width of a clear zone along the horizontal alignment is dependent on roadside geometry, design speed, radius of horizontal curve, and the ADT. Higher speeds mean vehicles will travel farther before recovering. Horizontal curvature increases the likelihood of a vehicle leaving the highway and increases the distance it will travel off the highway, as will steeper fill slopes. In general, hazards within the clear zone which cannot be removed, relocated, or made breakaway will warrant guardrail.

The designer should not apply rigid adherence to the calculated clear zone distance. If a formidable hazard lies just beyond the clear zone, it should be removed or shielded if costs are reasonable. Conversely, the designer should not have the philosophy that the clear zone should be achieved at all costs. Limited right of way or unacceptable construction costs may lead to installation of a barrier or, perhaps, no protection at all if there are many hazards along the entire length of the roadway inside the calculated clear zone.

The designer should not use the clear zone distances as boundaries for introducing roadside hazards such as bridge piers, non-breakaway sign supports, or trees. These should be placed as far from the roadway as practical.



3.9 Sign Panel Layout Sheet

D-1; 6.0" Radius, 1.3" Border, White on Green;
[1/2 MILE] E Mod;

D-2; 6.0" Radius, 1.3" Border, White on Brown;
[The Refuge] E Mod; [Golf Club] E Mod;
Arrow 5 - 13.0" 180"; [3 MI] E Mod;

D-3; 6.0" Radius, 1.3" Border, White on Green;
[Sims Rd] E Mod; Double Headed Arrow 6 - 34.0" 0°;

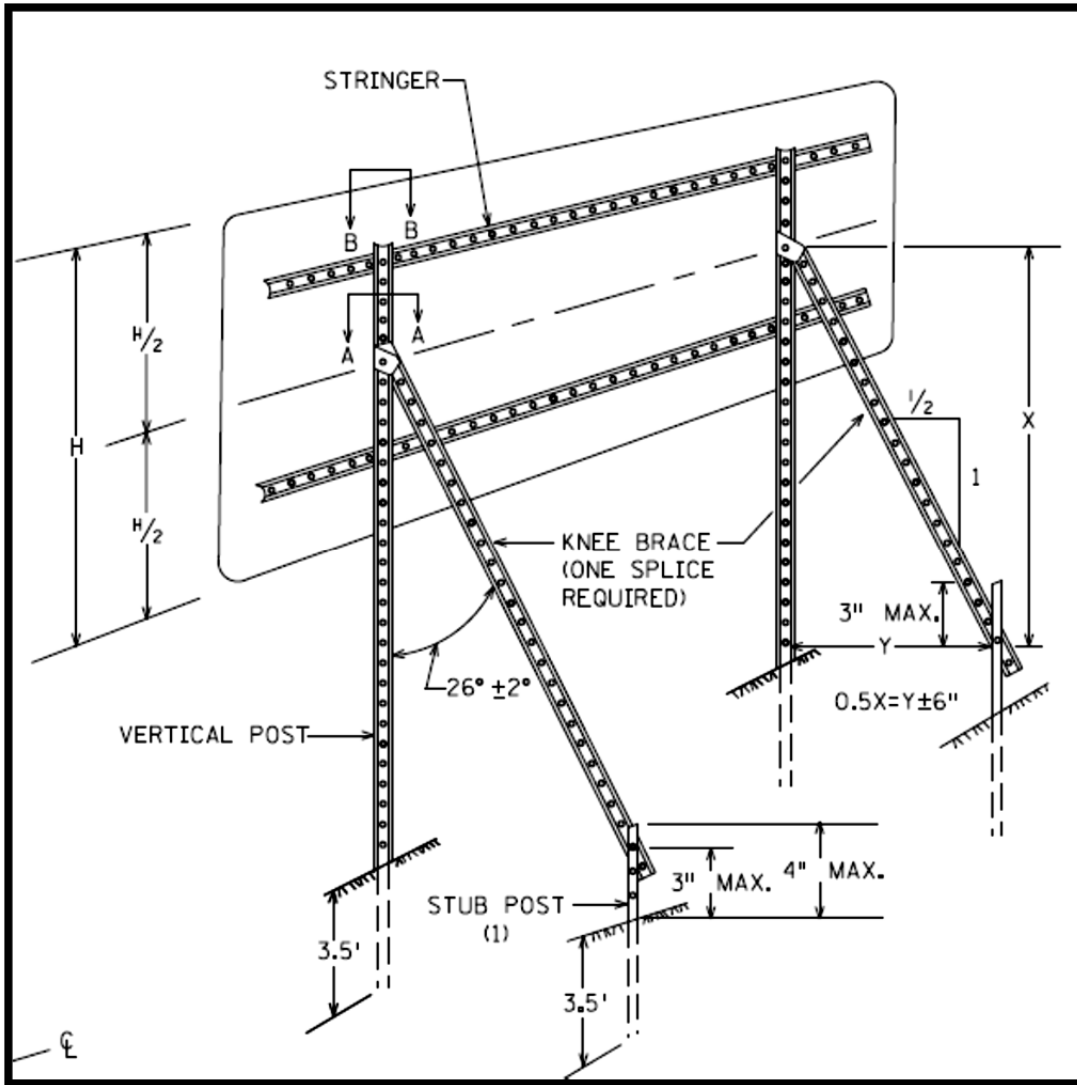
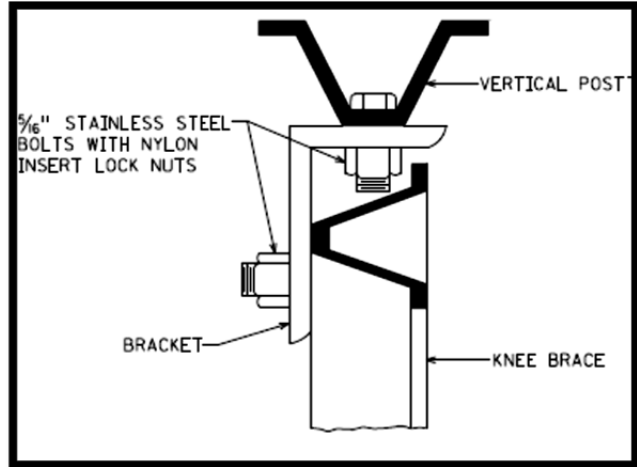
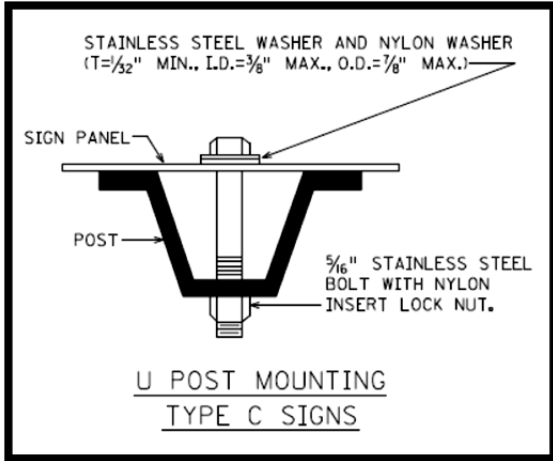
D-4;
6.0" Radius, 1.3" Border, White on Green;
Arrow 15 - 24.0" 180°;

SEE SHEET 18 FOR NOTES

TYPE D SIGN PANELS			
DRAWN BY:	CHECKED BY:	CERTIFIED BY:	LIC. NO. _____ DATE 6/14/2012
STATE PROJ. NO. AT GRADE SAMPLE		SHEET NO. 16 OF 25 SHEETS	

D-1; 6.0" Radius, 1.3" Border, White on Green;
[1/2 MILE] E Mod;

When sign panels exist, the layout details will be shown on these sheets. MnDOT uses the software SignCad® to layout guide signs.





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

Nov. 15, 1984

TECHNICAL MANUAL

Fig. B 5-292.620 (11)

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

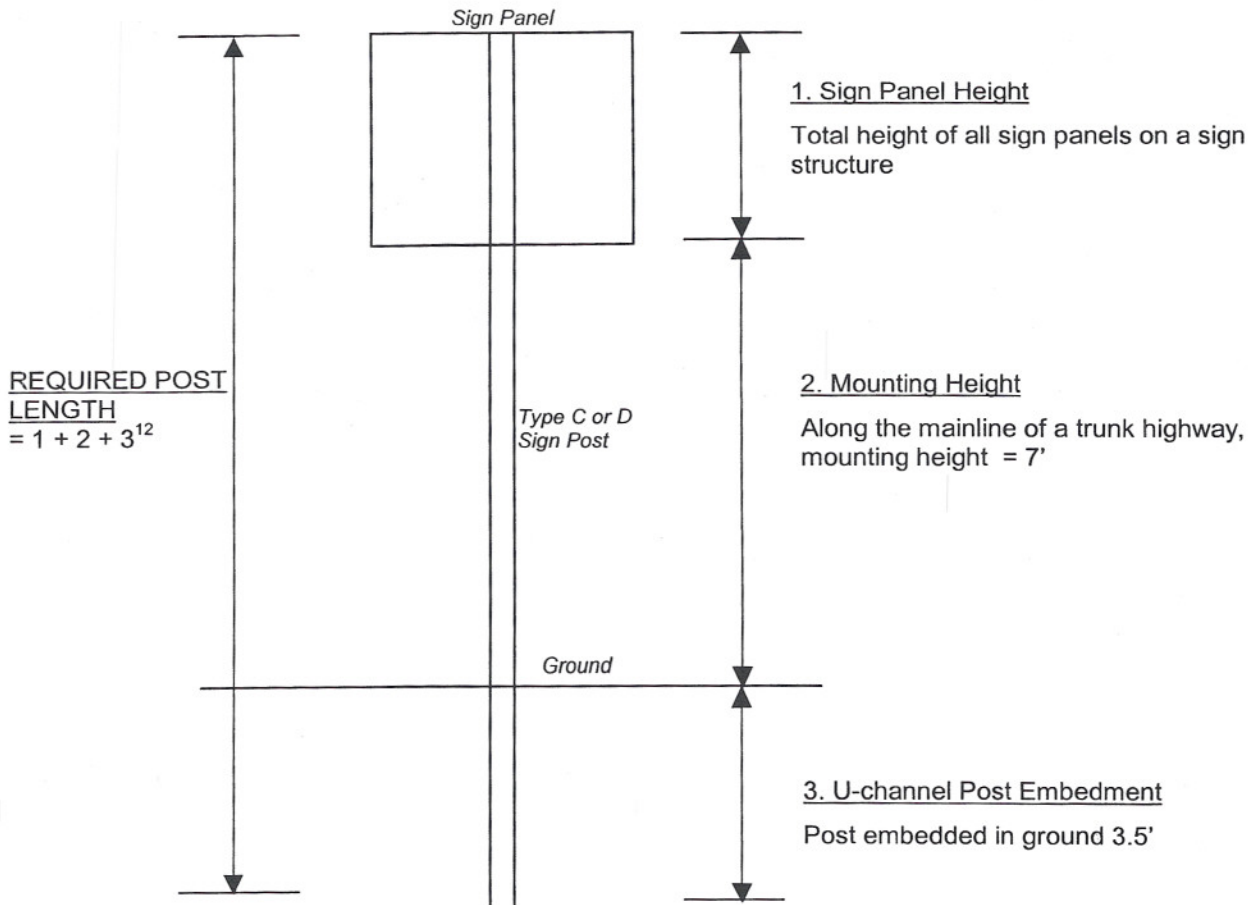
- ③ Arrow indicates Signal Face direction



Appendix C - Type C & D Sign Post Length Determination

Mn/DOT Signing Plan Design (At-Grade) Manual

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).



Appendix D - MN MUTCD Table 2C-4

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

NOTES:

- ¹ The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is the appropriate for an alignment warning symbol sign. For Condition A and B, warning signs with less than 6-inch legend or more than 4 words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.
- ² Typical conditions are locations where the road user might use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2004 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.
- ³ Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2004 AASHTO Policy, Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second², minus the sign legibility distance of 180 feet.
- ⁴ Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second², minus the sign legibility distance of 180 ft.
- ⁵ No suggested distances are provided for these speeds, as placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other sign.
- ⁶ The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

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



Appendix E - New Bracketing System for Mast Arm Mounted Signs Memo



Minnesota Department of Transportation

Memorandum

Office of Traffic Engineering &
Intelligent Transportation Systems
MS 725, Room 2 North
395 John Ireland Boulevard
St. Paul, MN 55155

GEN: 651-284-3500
FAX: 651-205-4526

August 12, 2002

To: Mn/DOT Signal Designers

From: Ray Starr
State Signal Engineer

Mike Weiss
State Signing Engineer

Subject: New Bracketing System for Mast Arm Mounted Signs

The structural details for signal mast arm mounted signs found on Pages 105A and 105B of the Mn/DOT Standard Signs Manual are hereby deleted. We have replaced those details with the attached "Structural Details for Signal Mast Arm Mounted Signs, Page 105A". This detail will be included in the next update to the Mn/DOT Standard Signs Manual. However, until that time, the details will be included in the Special Provisions when these type signs are required on any signal project.

The Type "D" Sign chart that is normally included in the Plan will also be replaced with the attached modified chart.

This change will take effect immediately. It will be the District's and Metro Division's responsibility to ensure that all Consultants that design signal plans for Mn/DOT or design signal plans on the Trunk Highway System (City and County Projects) are made aware of these changes in mast arm mounted signs.

If there are any questions and/or concerns, please feel free to give Mike Weiss (651-284-3440) or Ray Starr (651-284-3434) a call.

Thank You.

TYPE "D" SIGNS								
SIGN PANEL	SIGNAL SYSTEM	POLE NO.	a (ft)	SIZE (IN)	MOUNTING BRACKET		AREA/SIGN (SQ FT)	NO. REQ.
					NO.	SPACING (1)		
D-1	117 TH ST	1	1	42 X 54	2	---	15.75	1
D-2	117 TH ST	2	32	96 X 36	4	---	24	1
D-3	117 TH ST	2	33	96 X 36	4	---	24	1

(1) SPACING BETWEEN STIFFNERS SHALL NOT EXCEED 36 INCHES AND SHALL BE UNIFORMLY SPACED. SEE SPECIAL PROVISIONS FOR BRACKET SPACING REQUIREMENTS.

CONSTRUCTION REQUIREMENTS SECTION OF SPECIAL PROVISIONS:

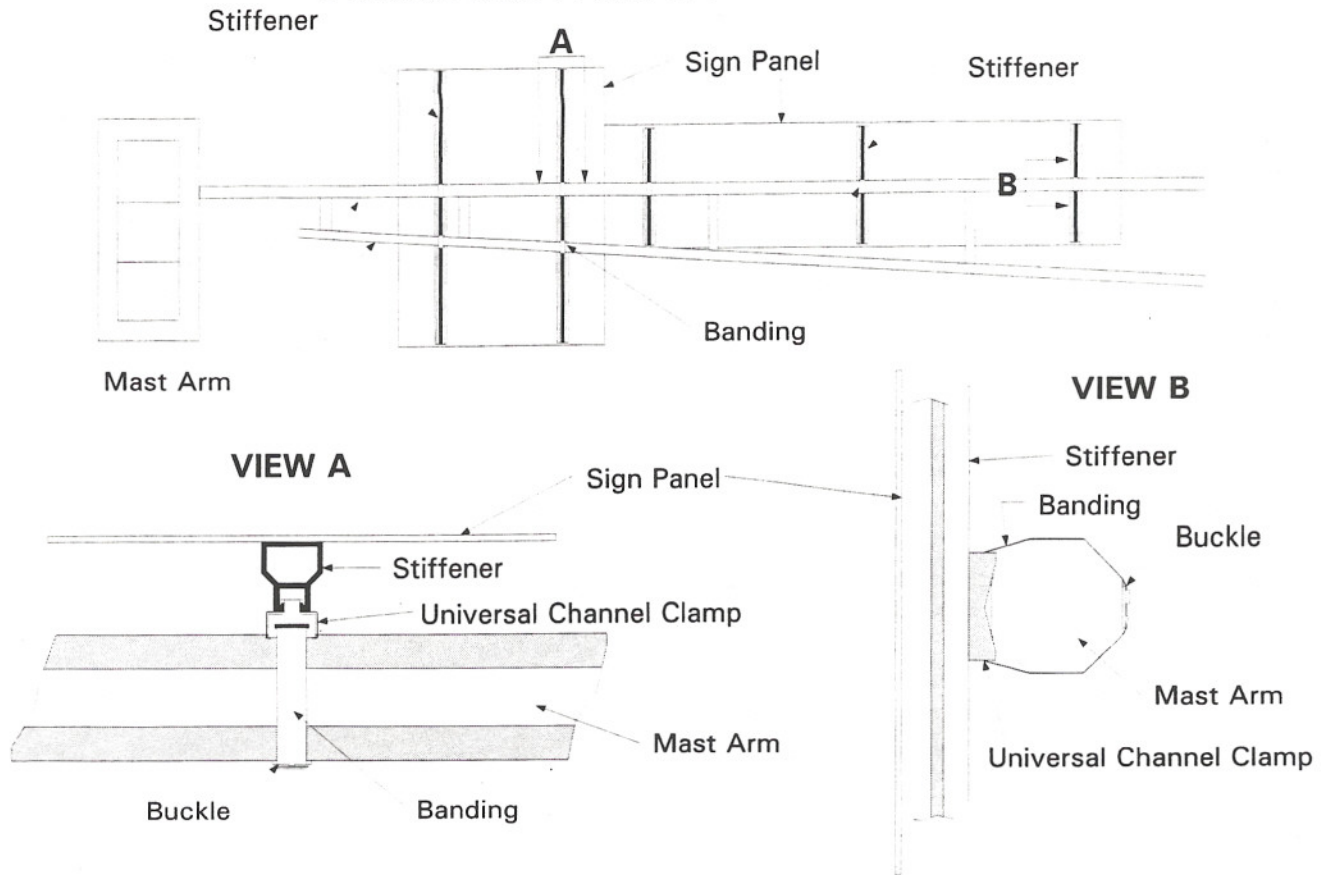
Type D Sign Installation

The Contractor shall install the Type D mast arm mounted signs at the locations indicated in the Plans; to the satisfaction of the Engineer; and as follows:

The structural details for signal mast arm mounted signs on Pages 105A and 105B of the Mn/DOT Standards Sign Manual are hereby deleted and shall be installed in accordance with the "Structural Details for Signal Mast Arm Mounted Signs" detail included elsewhere in these Special Provisions. Each mast arm mounted Type D sign panel shall be provided with the Ultra-Lok Mounting Bracket System by Band-It/Idex, or approved equal. Approval shall be obtained by submitting product specifications and strength calculations, demonstrating compliance with the 2001 Edition of the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals". Submittals shall be sent to:

J7 - 200
Fabrication Methods Engineer
Mn/DOT Office of Bridges and Structures
Mailstop 610
3485 Hadley Ave. N.
Oakdale, MN 55128

TYPICAL MAST ARM SIGN MOUNTING



STIFFENER (LARGE CHANNEL EXTRUSION) REQUIREMENT TABLE

(Based on Sign Panel Dimensions in Feet)
 (Where sign panel dimensions fall between one foot increments use the next highest foot length and/or height)

		Length												
		2	3	4	5	6	7	8	9	10	11	12	13	14
Height	2	2	2	2	3	3	3	4	4	4	5	5	5	5
	3	2	2	2	3	3	3	4	4	5	5	5	5	5
	4	2	2	2	3	3	3	4	4	5	5	5	5	6
	5	2	2	2	3	4	4	5	5	5	5	5	5	6
	6	X	X	X	3	4	4	5	5	5	5	5	5	6
	7	X	X	X	4	4	5	5	5	5	5	5	5	6

- NOTES:
1. Signs shall be affixed to upper and lower mast arm chords whenever possible.
 2. Position bottom of sign panel 17' minimum above centerline elevation.
 3. Sign panels shall be mounted plumb. Shim as required.
 4. Band pretension shall not exceed 1300 pounds.
 5. Horizontal spacing between stiffeners shall not exceed 36".
 6. Horizontal inset from panel edge to stiffener shall not exceed 12".
 7. Vertical inset from panel edge to stiffener shall be 0" to 1".
 8. The approved mounting product is the Ultra-Lok system of Bandit-Idex, Inc. using .75" x .030" banding straps of Type 201 "1/4 Hard" stainless steel, double-wrapped around the mast arm, or approved equal mounting bracket.

APPROVED
8/9/02

DATE OF REV.

STRUCTURAL DETAILS FOR SIGNAL
MAST ARM MOUNTED SIGNS



PAGE NUMBER
105A

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Appendix F – Selected Sections from the MN MUTCD



Appendix F – Selected Sections from the MN MUTCD

Chapter 2B. REGULATORY SIGNS

2B.1 Application of Regulatory Signs

STANDARD:

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

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

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

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

SUPPORT:

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

2B.2 Design of Regulatory Signs

STANDARD:

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

OPTION:

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

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

SUPPORT:

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

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

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

GUIDANCE:

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

2B.3 Size of Regulatory Signs

STANDARD:

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

Compliance Date: December 22, 2013

SUPPORT:

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

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

STANDARD:

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

OPTION:

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

2B.37 DO NOT ENTER Sign (R5-1)



R5-1"

STANDARD:

The DO NOT ENTER (R5-1) sign shall be used where traffic is prohibited from entering a restricted roadway.

GUIDANCE:

The DO NOT ENTER sign, if used, should be placed directly in view of a road user at the point where a road user could wrongly enter a divided highway, one-way roadway, or ramp (see Figure 2B-12). The sign should be mounted on the right-hand side of the roadway, facing traffic that might enter the roadway or ramp in the wrong direction.

If the DO NOT ENTER sign would be visible to traffic to which it does not apply, the sign should be turned away from, or shielded from, the view of that traffic.

OPTION:

The DO NOT ENTER sign may be installed where it is necessary to emphasize the one-way traffic movement on a ramp or turning lane.

A second DO NOT ENTER sign on the left-hand side of the roadway may be used, particularly where traffic approaches from an intersecting roadway (see Figure 2B-12).

SUPPORT:

Section 2B.41 contains information regarding an optional lower mounting height for DO NOT ENTER signs that are located along an exit ramp facing a road user who is traveling in the wrong direction.

2B.38 WRONG WAY Sign (R5-1a)



R5-1a

OPTION:

The WRONG WAY (R5-1a) sign may be used as a supplement to the DO NOT ENTER sign where an exit ramp intersects a crossroad or a crossroad intersects a one-way roadway in a manner that does not physically discourage or prevent wrong-way entry (see Figure 2B-12).

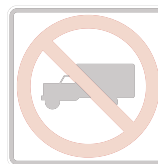
GUIDANCE:

If used, the WRONG WAY sign should be placed at a location along the exit ramp or the one-way roadway farther from the crossroad than the DO NOT ENTER sign (see Section 2B.41).

SUPPORT:

Section 2B.41 contains information regarding an optional lower mounting height for WRONG WAY signs that are located along an exit ramp facing a road user who is traveling in the wrong direction.

2B.39 Selective Exclusion Signs



R5-2



R5-3



R5-4



R5-5



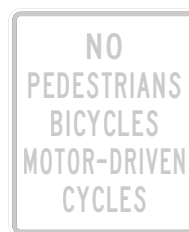
R5-6



R5-7



R5-8



R5-10a



R5-10d



R5-10b



R5-10c

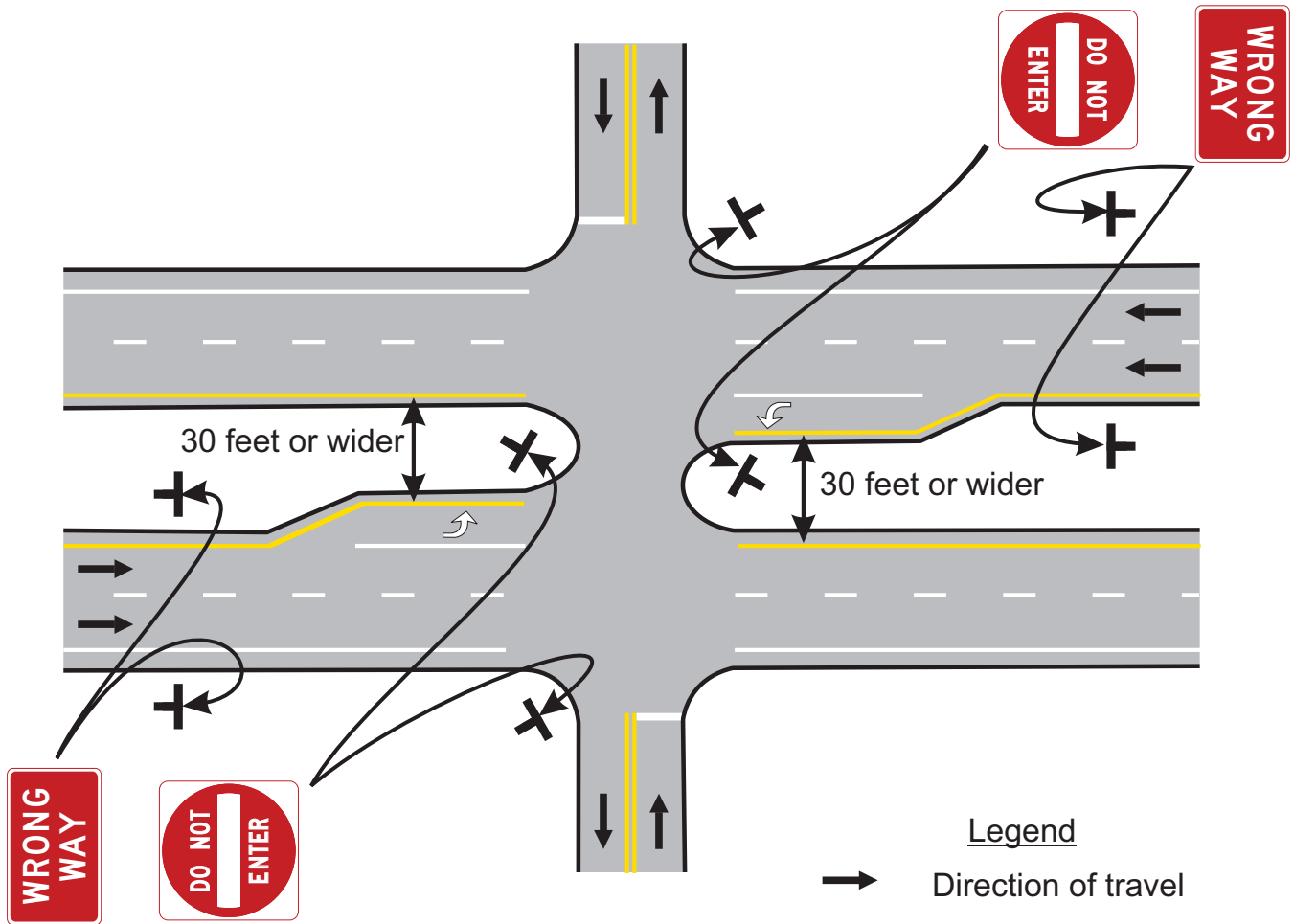


Figure 2B-12. Locations of Wrong-Way Signing for Divided Highways with Medians of 30 Feet or Wider



R9-3



R9-13



R9-14

SUPPORT:

Selective Exclusion signs give notice to road users that State or local statutes or ordinances exclude designated types of traffic from using particular roadways or facilities.

STANDARD:

If used, Selective Exclusion signs shall clearly indicate the type of traffic that is excluded.

SUPPORT:

Typical exclusion messages include:

- A. No Trucks (R5-2);
- B. NO MOTOR VEHICLES (R5-3);
- C. NO COMMERCIAL VEHICLES (R5-4);
- D. NO TRUCKS (VEHICLES) WITH LUGS (R5-5);
- E. No Bicycles (R5-6);
- F. NO NON-MOTORIZED TRAFFIC (R5-7);
- G. NO MOTOR-DRIVEN CYCLES (R5-8);
- H. No Pedestrians (R9-3),
- I. No Skaters (R9-13),
- J. No Equestrian (R9-14), and

K. No Hazardous Material (R14-3) (see Section 2B.62).

Compliance Date: December 22, 2013

OPTION:

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

STANDARD:

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

GUIDANCE:

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

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

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

OPTION:

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

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

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

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



R5-X1

GUIDANCE:

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

GUIDANCE:

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

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



R6-1



R6-2

Compliance Date: December 22, 2013

STANDARD:

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

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

Compliance Date: January 17, 2008

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

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

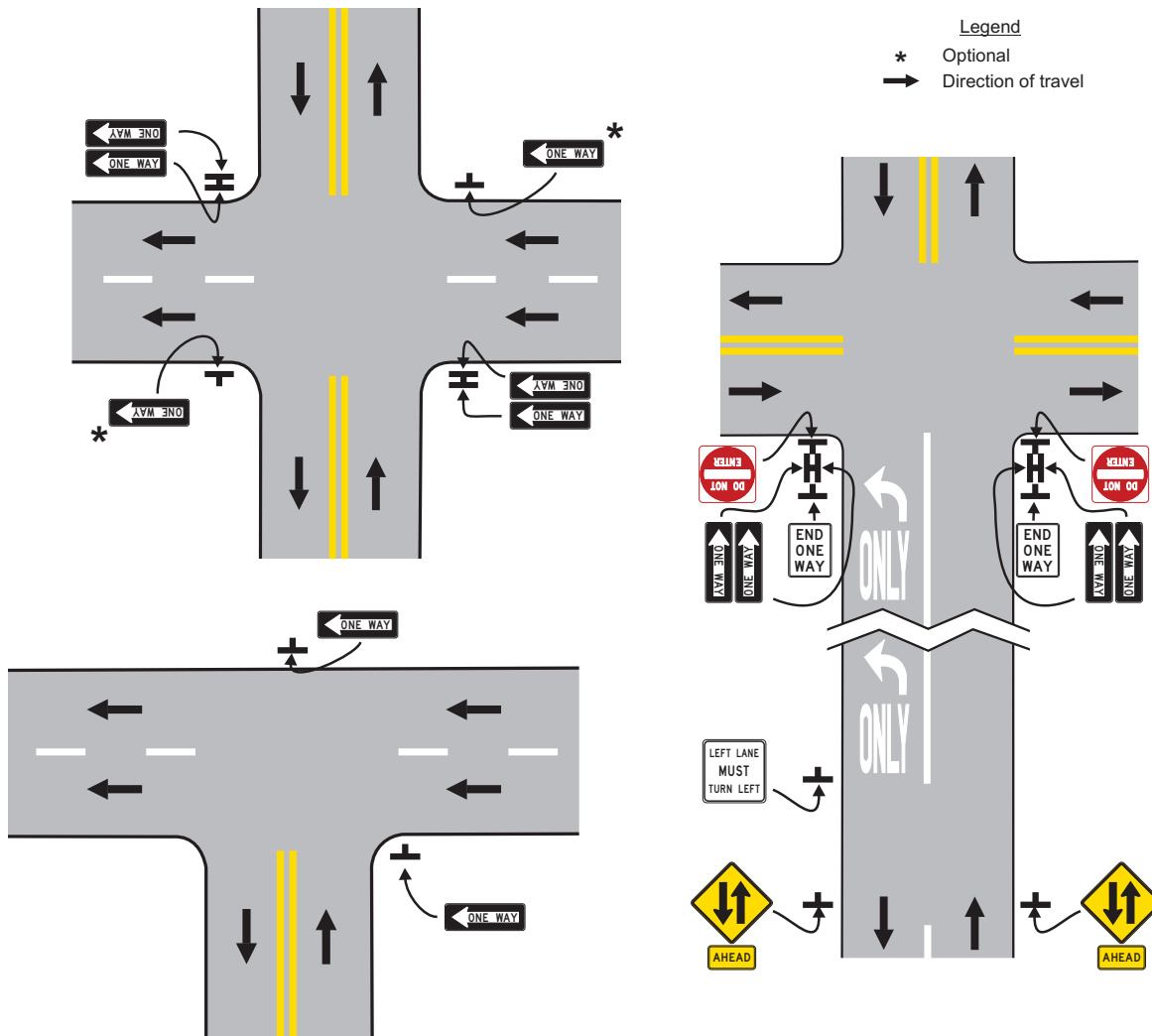


Figure 2B-14. Locations of ONE WAY Signs

on the divided highway and each crossroad approach. If ONE WAY signs are installed, they shall be placed on the near right and far left corners of the intersection and shall be visible to each crossroad approach.

OPTION:

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

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

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

STANDARD:

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

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

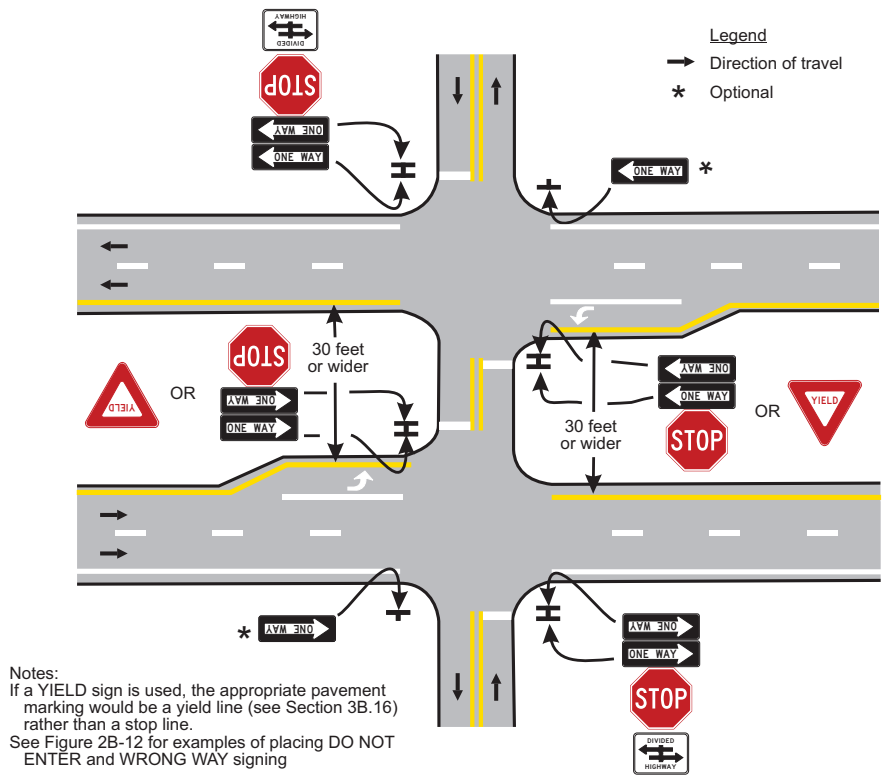


Figure 2B-15. ONE WAY Signing for Divided Highways with Median Widths of 30 Feet or Wider

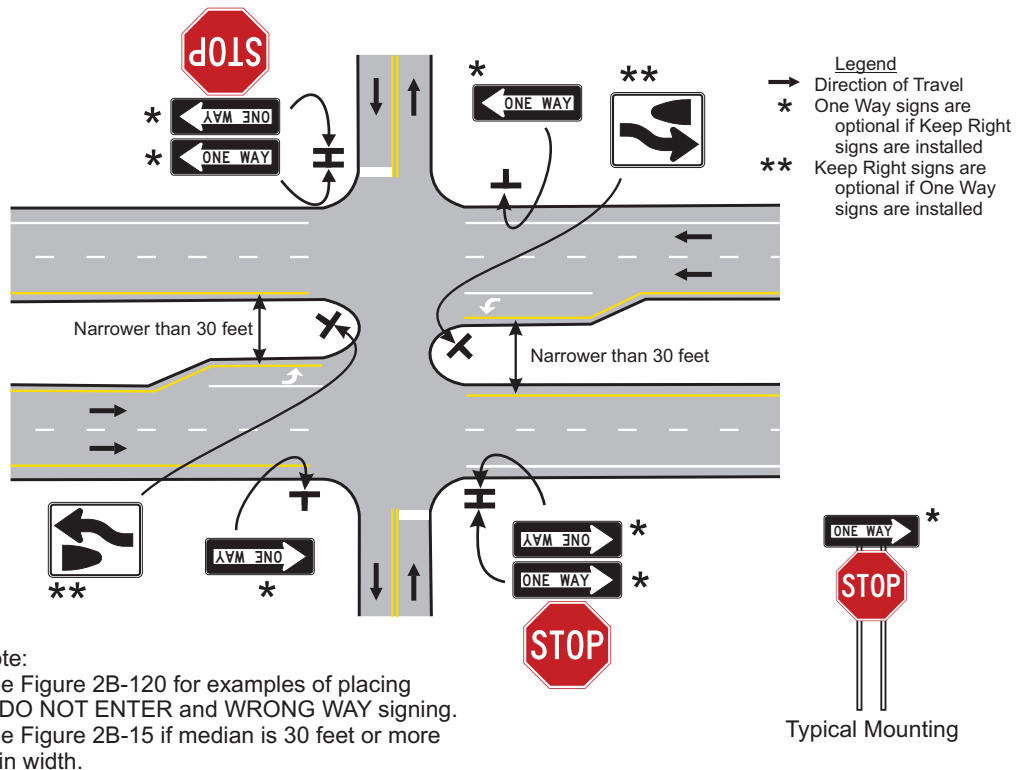
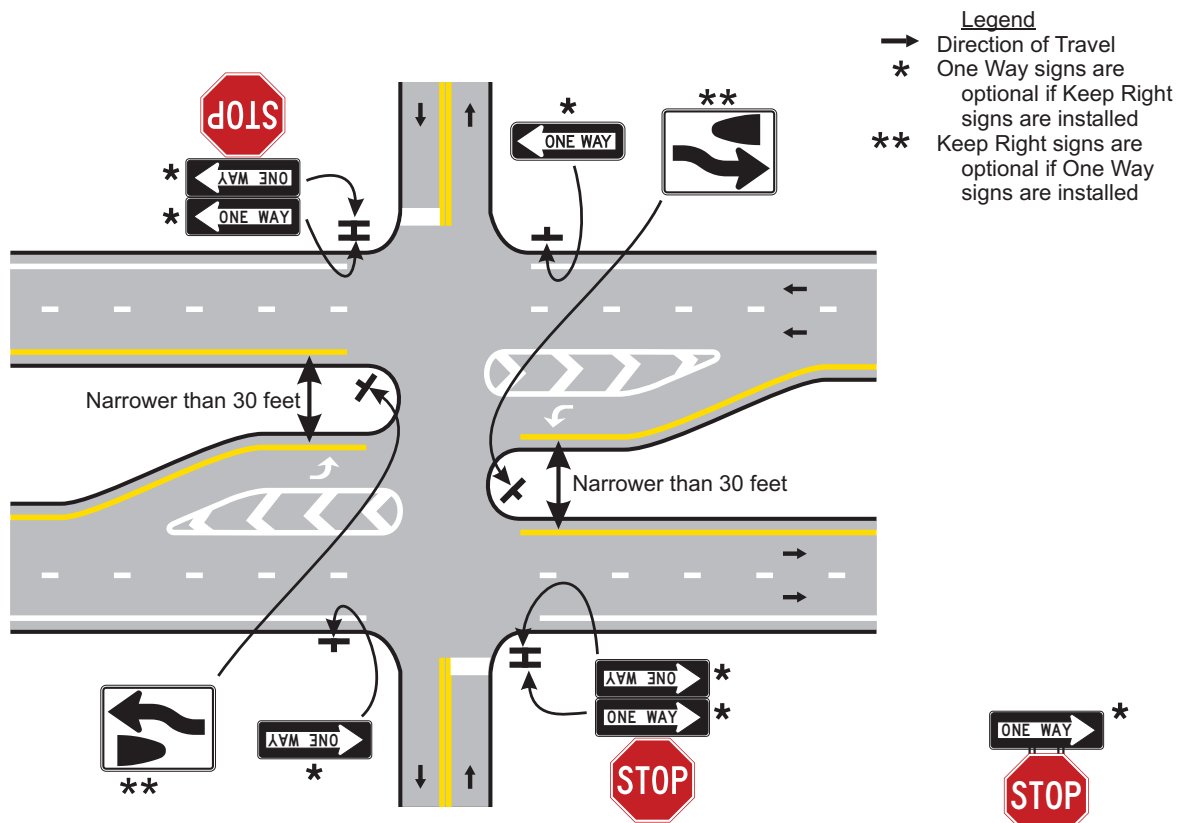


Figure 2B-16. ONE WAY Signing for Divided Highways with Median Widths Narrower Than 30 Feet



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



Figure 2B-17. ONE WAY Signing for Divided Highways with Median Widths Narrower Than 30 Feet and Separated Left-Turn Lanes

At unsignalized T-intersections where the roadway at the top of the T-intersection is a one-way roadway, ONE WAY signs shall be placed on the near right and the far side of the intersection facing traffic on the stem approach (see Figure 2B-14).

At signalized T-intersections where the roadway at the top of the T-intersection is a one-way roadway, ONE WAY signs shall be placed near the appropriate signal faces, on the poles holding the traffic signals, on the mast arm or span wire holding the signals, or at the locations specified for unsignalized intersections.

OPTION:

Where the central island of a roundabout allows for the installation of signs, ONE WAY signs may be used instead of or in addition to Roundabout Directional Arrow (R6-4 series) signs (see Section 2B.43) to direct traffic counter-clockwise around the central island.

GUIDANCE:

Where used on the central island of a roundabout, the mounting height of a ONE WAY sign should be at least 4 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way.

SUPPORT:

Using ONE WAY signs on the central island of a roundabout might result in some drivers incorrectly concluding that the cross street is a one-way street. Using Roundabout Directional Arrow signs might reduce this confusion. However, using ONE WAY signs might be necessary in States that have defined a roundabout as a series of T-intersections.

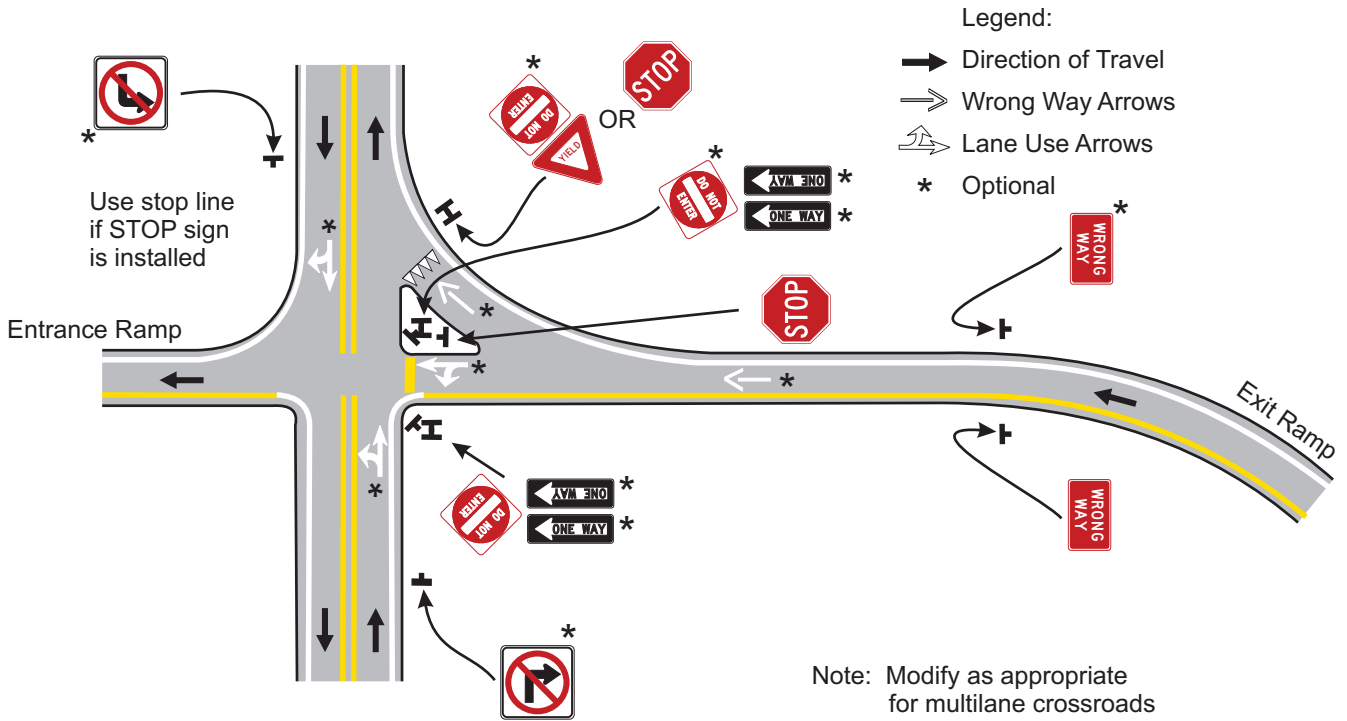


Figure 2B-18. Example of Application of Regulatory Signing and Pavement Markings at an Exit Ramp Termination to Deter Wrong-Way Entry

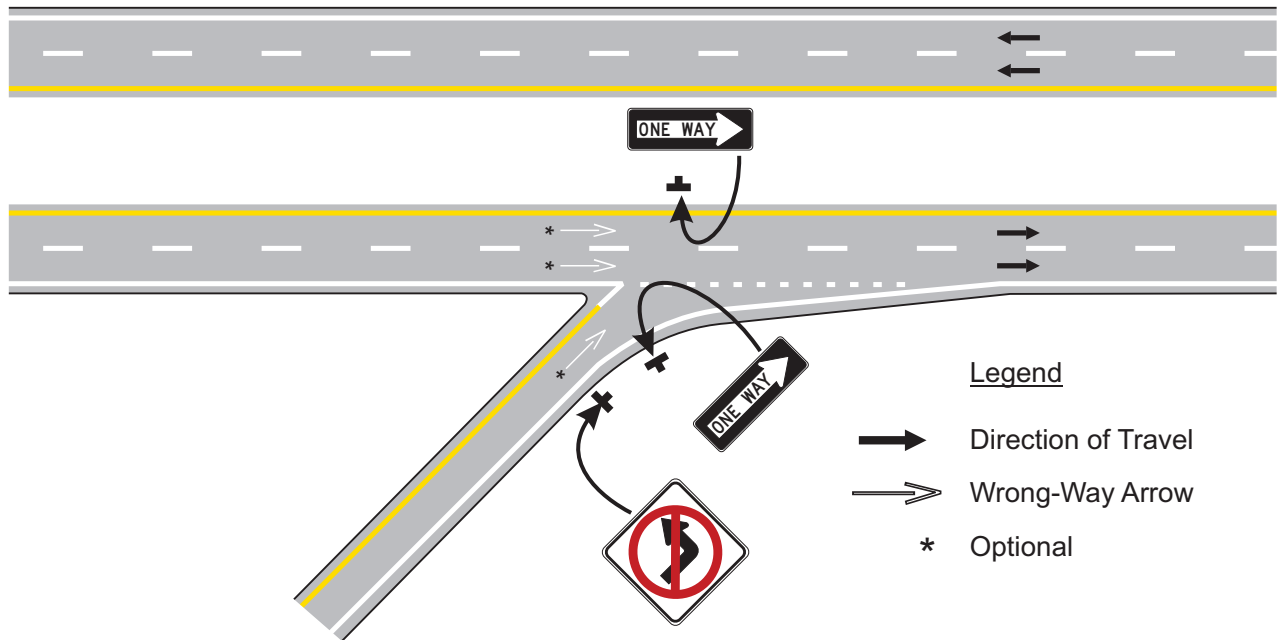


Figure 2B-19. Example of Application of Regulatory Signing and Pavement Markings at an Exit Ramp Termination Where the Design Does Not Clearly Indicate the Direction of Flow

PART 2. SIGNS

Chapter 2C. Warning Signs and Object Markers

2C.1 Function of Warning Signs

SUPPORT:

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

2C.2 Application of Warning Signs

STANDARD:

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

GUIDANCE:

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

OPTION:

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

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

SUPPORT:

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

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

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

2C.3 Design of Warning Signs

STANDARD:

Except as provided in the following Option or unless specifically designated otherwise, all warning signs shall be diamond-shaped (square with one diagonal vertical) with a black legend and border on a yellow background. Warning signs shall be designed in accordance with sizes, shapes, colors, and legends contained in the Mn/DOT "Standard Signs Manual" (see Map & Manual Sales Unit, page ii), and the FHWA "Standard Highway Signs and Markings" book (see Section 1A.11).

OPTION:

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

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

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

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

STANDARD:

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

2C.4 Size of Warning Signs

STANDARD:

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

SUPPORT:

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

STANDARD:

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

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

OPTION:

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

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

GUIDANCE:

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

2C.5 Placement of Warning Signs

SUPPORT:

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

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

GUIDANCE:

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

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

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

OPTION:

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

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

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

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

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

NOTES:

- ¹ The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is the appropriate for an alignment warning symbol sign. For Condition A and B, warning signs with less than 6-inch legend or more than 4 words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.
- ² Typical conditions are locations where the road user might use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2004 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.
- ³ Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2004 AASHTO Policy, Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second², minus the sign legibility distance of 180 feet.
- ⁴ Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second², minus the sign legibility distance of 180 ft.
- ⁵ No suggested distances are provided for these speeds, as placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other sign.
- ⁶ The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

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

PART 2. SIGNS

Chapter 2D. Guide Signs - Conventional Roads

2D.1 Scope of Conventional Road Guide Sign Standards

STANDARD:

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

2D.2 Application

SUPPORT:

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

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

2D.3 Color, Retroreflection, and Illumination

SUPPORT:

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

STANDARD:

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

SUPPORT:

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

STANDARD:

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

OPTION:

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

SUPPORT:

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

2D.4 Size of Signs

STANDARD:

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

SUPPORT:

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

OPTION:

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

SUPPORT:

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

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.

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

GUIDANCE:

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

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



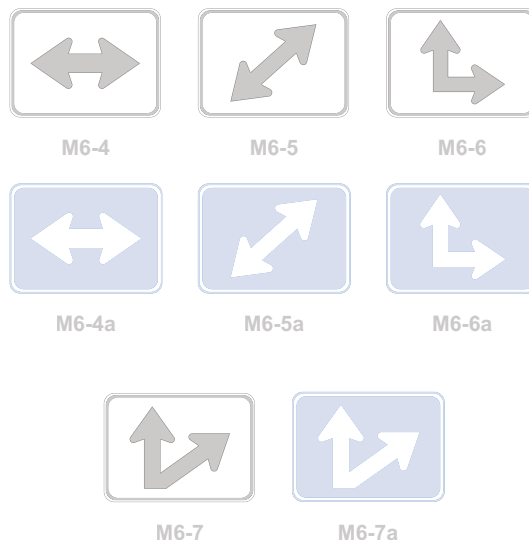
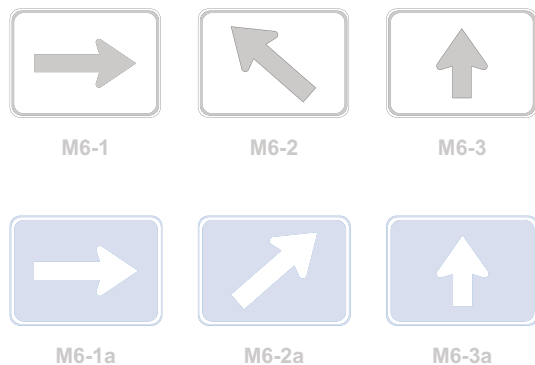
OPTION:

A Lane Designation (M5-4, M5-5, or M5-6) auxiliary sign (see Figure 2D-5) may be mounted directly below the route sign in an Advance Route Turn assembly on multi-lane roadways to allow road users to move into the appropriate lane prior to reaching the intersection or interchange.

STANDARD:

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

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



STANDARD:

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

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

OPTION:

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

STANDARD:

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

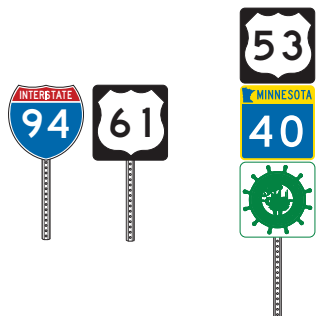
2D.29 Route Sign Assemblies

STANDARD:

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

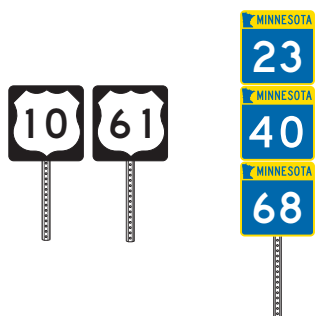
Where two or more routes follow the same section of highway, the route signs for Interstate, U.S., State, and County routes shall be mounted in that order from the left in

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

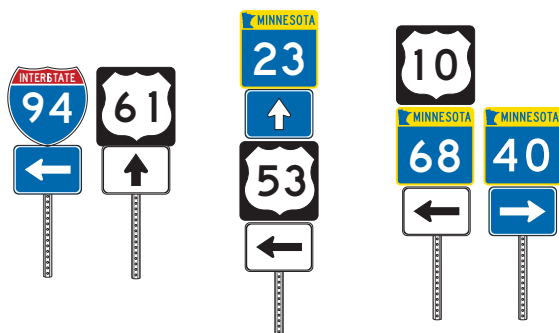


Route Markers Arranged by Class of Highway

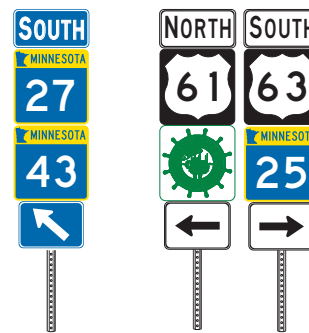
Within groups of assemblies, information for routes intersecting from the left shall be mounted at the left in horizontal arrangements and at the top or center of vertical arrangements. Similarly, information for routes intersecting from the right shall be at the right or bottom, and for straight-through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



Route Markers Arranged by Number Within the Class of Highway



Route Markers Arranged by Directional Arrows



Route Markers Arranged by Common Direction

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

GUIDANCE:

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

OPTION:

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

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

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

SUPPORT:

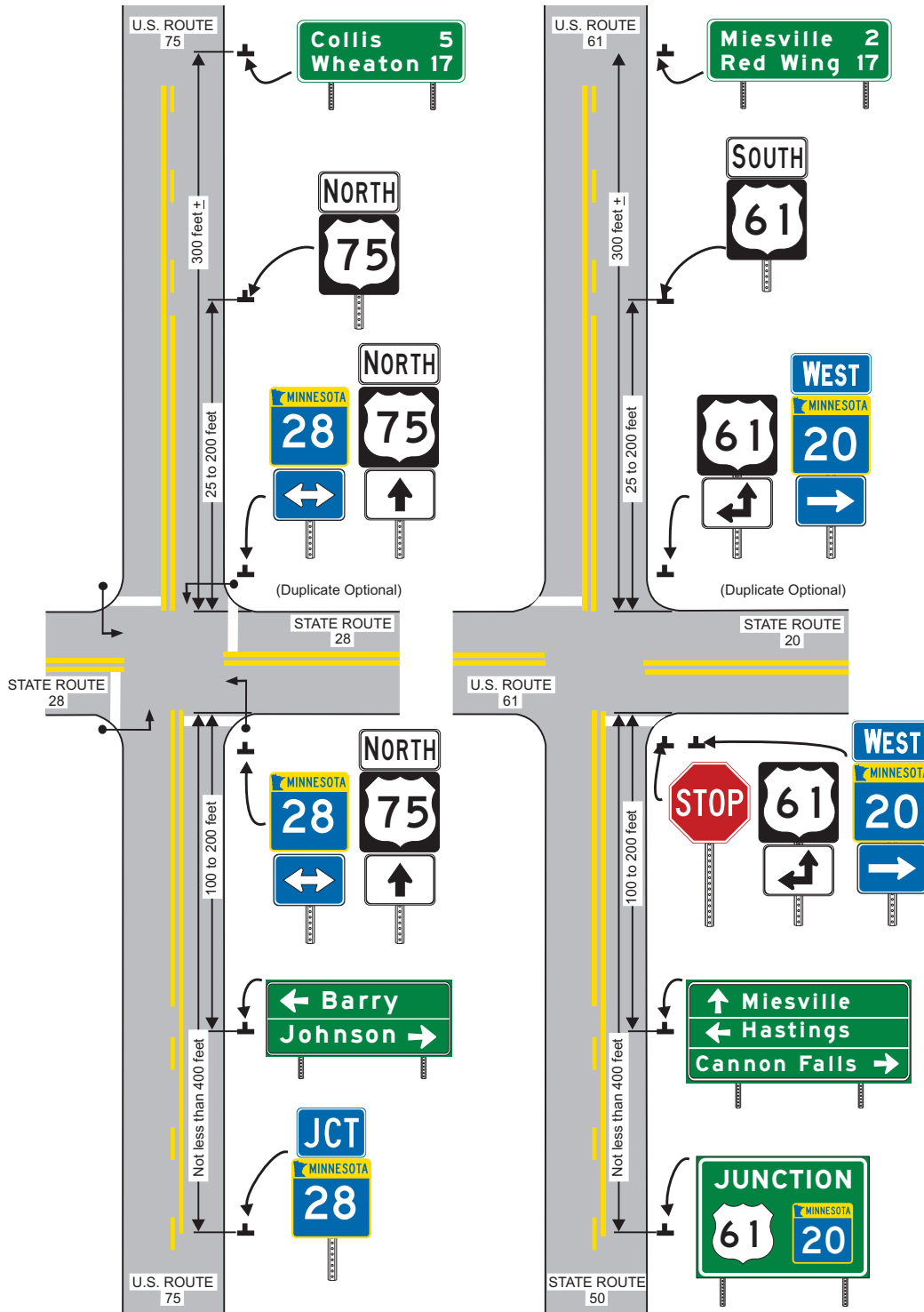
Figure 2D-6 shows typical placements of route signs.

2D.30 Junction Assembly

STANDARD:

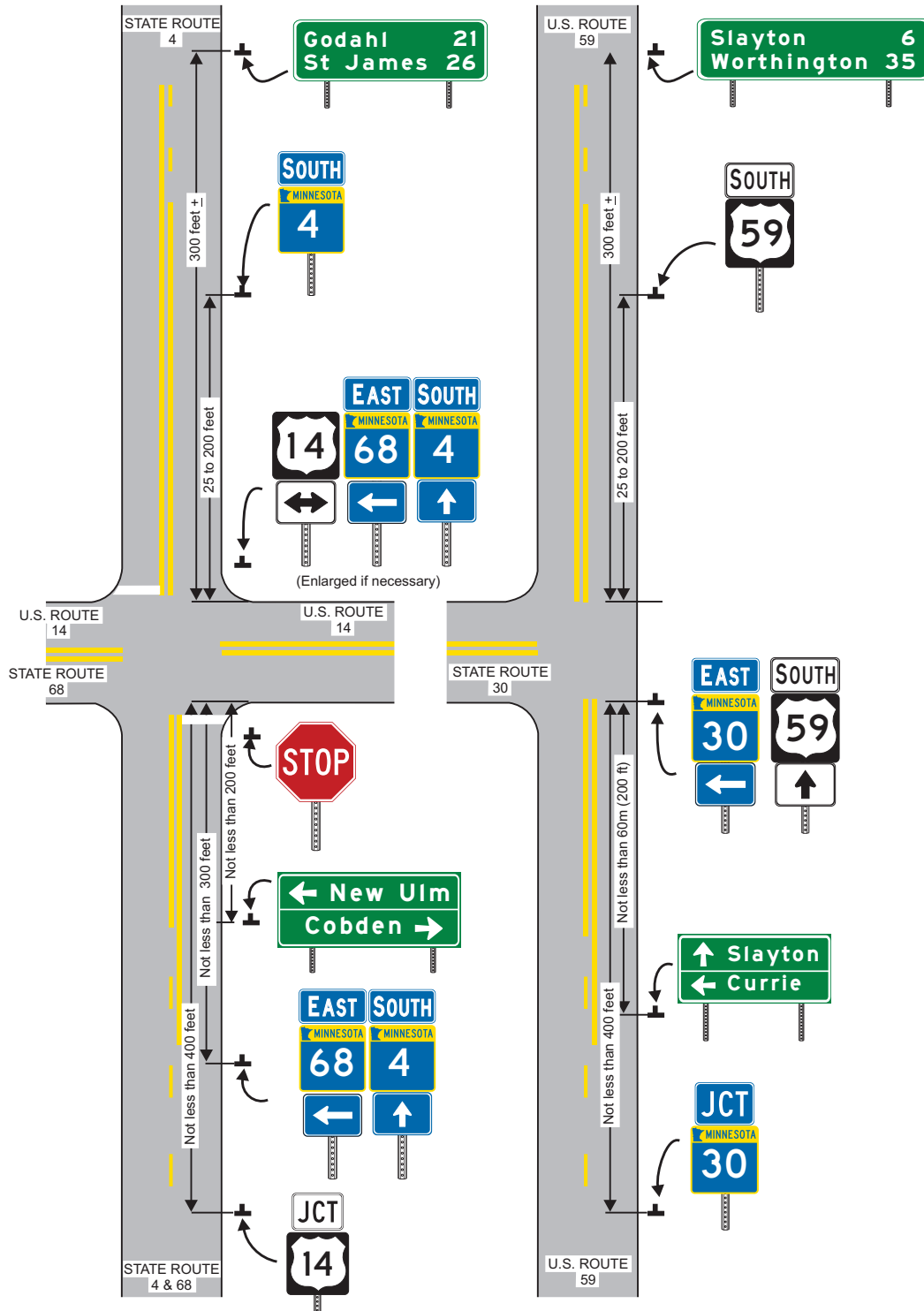
A Junction assembly shall consist of a Junction auxiliary sign and a route sign. The route sign shall carry the number of the intersected or joined route.

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



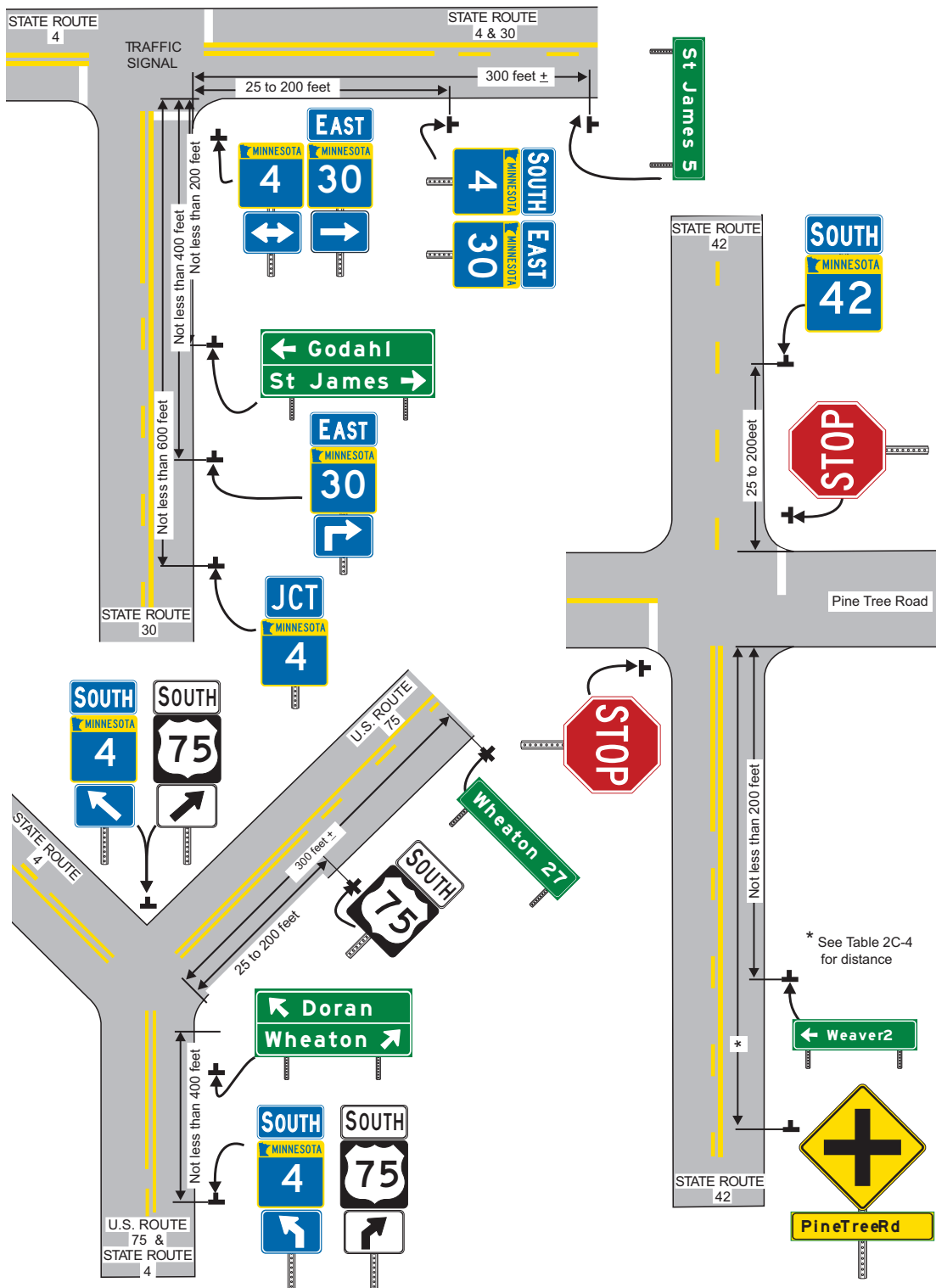
Note: The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32, 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions.

Figure 2D-6. Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only)
(Sheet 1 of 4)



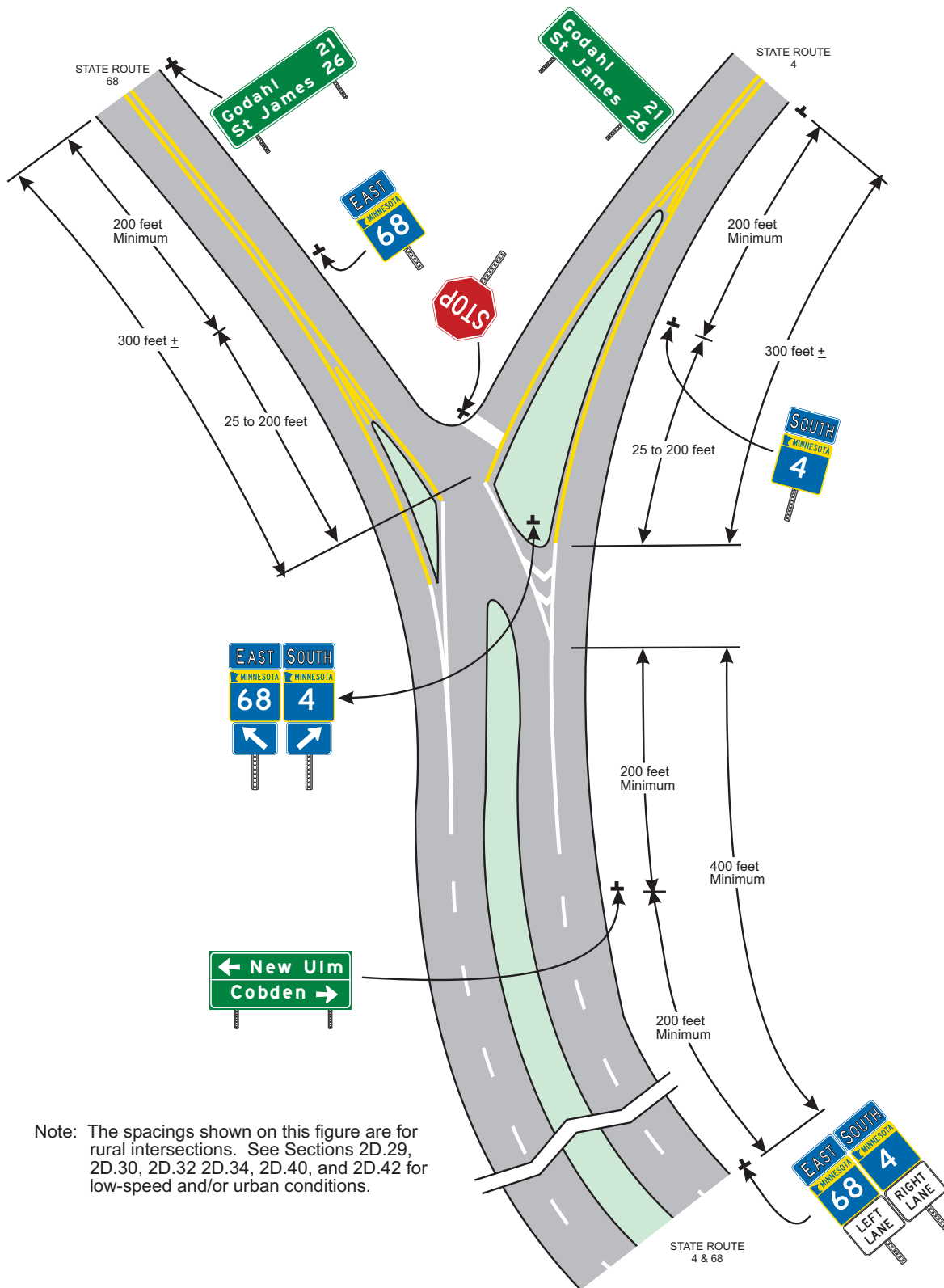
Note: The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32, 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions.

Figure 2D-6. Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only)
(Sheet 2 of 4)



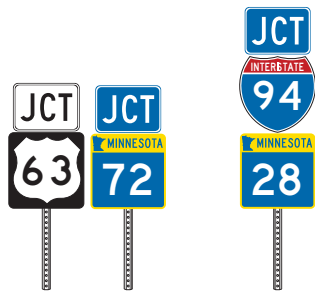
Note: The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32, 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions.

Figure 2D-6. Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only)
(Sheet 3 of 4)



Note: The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions.

Figure 2D-6. Illustration of Directional Assemblies and Other Route Signs (For One Direction of Travel Only)
(Sheet 4 of 4)



Examples of Junction Assemblies

GUIDANCE:

In urban areas, the Junction assembly should be installed in the block preceding the intersection. In urban areas where speeds are low, the Junction assembly should not be installed more than 300 feet in advance of the intersection.

In rural areas, the Junction assembly should be installed at least 400 feet in advance of the intersection. In rural areas, the minimum distance between a Junction assembly and either a Destination sign or an Advance Route Turn assembly should be 200 feet.

Where speeds are high, greater spacings should be used.

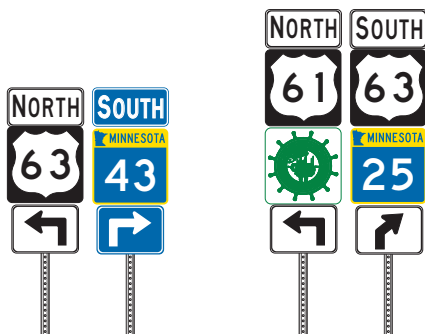
OPTION:

Where two or more routes are to be indicated, a single Junction auxiliary sign may be used for the assembly and all route signs grouped in a single mounting, or a Combination Junction (M2-2) sign (see Section 2D.14) may be used.

2D.31 Advance Route Turn Assembly

STANDARD:

An Advance Route Turn assembly shall consist of a route sign, an Advance Turn Arrow or word message auxiliary sign, and a Cardinal Direction auxiliary sign, if needed. It shall be installed in advance of an intersection where a turn must be made to remain on the indicated route.



Examples of Advance Route Turn Assemblies

OPTION:

The Advance Route Turn assembly may be used to supplement the required Junction assembly in advance of intersecting routes.

GUIDANCE:

Where a multiple-lane highway approaches an interchange or intersection with a numbered route, the Advance Route Turn assembly should be used to pre-position turning vehicles in the correct lanes from which to make their turn.

OPTION:

Lane Designation auxiliary signs (see Section 2D.27) may be used in Advance Route Turn Assemblies in place of the Advance Turn Arrow auxiliary signs where engineering judgment indicates that specific lane information associated with each route is needed and overhead signing is not practical and the designated lane is a mandatory movement lane. An assembly with the Lane Designation auxiliary signs may supplement or substitute for an assembly with Advance Turn Arrow auxiliary signs.

GUIDANCE:

In low-speed areas, the Advance Route Turn assembly should be installed not less than 200 feet in advance of the turn. In high-speed areas, the Advance Route Turn assembly should be installed not less than 300 feet in advance of the turn. In rural areas, the minimum distance between an Advance Route Turn assembly and either a Destination sign or a Junction assembly should be 200 feet.

STANDARD:

An assembly that includes an Advance Turn Arrow auxiliary sign shall not be placed where there is an intersection between it and the designated turn.

GUIDANCE:

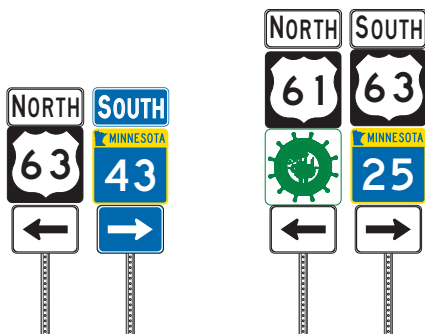
Sufficient distance should be allowed between the assembly and any preceding intersection that could be mistaken for the indicated turn.

2D.32 Directional Assembly

STANDARD:

A Directional assembly shall consist of a Cardinal Direction auxiliary sign, if needed; a route sign; and a Directional Arrow auxiliary sign. The various uses of Directional assemblies shall be as provided in Items A through D:

- A. Turn movements (indicated in advance by an Advance Route Turn assembly) shall be marked by a Directional assembly with a route sign displaying the number of the turning route and a single-headed arrow pointing in the direction of the turn.
- B. The beginning of a route (indicated in advance by a Junction assembly) shall be marked by a Directional assembly with a route sign displaying the number of that route and a single-headed arrow pointing in the direction of the route.
- C. An intersected route (indicated in advance by a Junction assembly) on a crossroad where the route is designated on both legs shall be designated by:
 - 1. Two Directional assemblies, each with a route sign displaying the number of the intersected route, a Cardinal Direction auxiliary sign, and a single-headed arrow pointing in the direction of movement on that route; or
 - 2. A Directional assembly with a route sign displaying the number of the intersected route and a double-headed arrow, pointing at appropriate angles to the left, right, or ahead.
- D. An intersected route (indicated in advance by a Junction assembly) on a side road or on a crossroad where the route is designated only on one of the legs shall be designated by a Directional assembly with a route sign displaying the number of the intersected route, a Cardinal Direction auxiliary sign, and a single-headed arrow pointing in the direction of movement on that route.



Examples of Directional Assemblies

GUIDANCE:

Straight-through movements should be indicated by a Directional assembly with a route sign displaying the number of the continuing route and a vertical upward pointing arrow. A Directional assembly should not be used for a straight-through movement in the absence of other assemblies indicating right or left turns, as the Confirming assembly sign beyond the intersection normally provides adequate guidance.

Directional assemblies should be located in advance of the intersection or on the near right corner of the intersection if approaching traffic must stop. At major intersections and at Y or offset intersections, additional Directional assemblies should be installed on the far right or left corner to confirm the near-side assemblies. When the near-corner position is not practical for Directional assemblies, the far right corner should be the preferred alternative, with oversized signs, if necessary, for legibility. Where unusual conditions exist, the location of a Directional assembly should be determined by engineering judgment with the goal being to provide the best possible combination of view and safety.

SUPPORT:

It is more important that guide signs be readable, and that the information and direction displayed thereon be readily understood, at the appropriate time and place than to be located with absolute uniformity.

Figure 2D-6 shows typical placements of Directional assemblies.

2D.33 Combination Lane-Use/Destination Overhead Guide Sign (D15-1)

OPTION:

At complex intersection approaches involving multiple turn lanes and destinations, a Combination Lane-Use/Destination (D15-1) overhead guide sign that combines a lane-use regulatory sign with destination information such as a cardinal direction, a route number, a street name, and/or a place name may be used.

SUPPORT:

At such locations, the combined information on the D15-1 signs can be even more effective than separate lane-use and guide signs for conveying to unfamiliar drivers which lane or lanes to use for a particular destination.

Figure 2D-7 shows an example of a D15-1 sign that combines lane-use and route number information and an example of a D15-1 sign that combines lane-use and street name information.

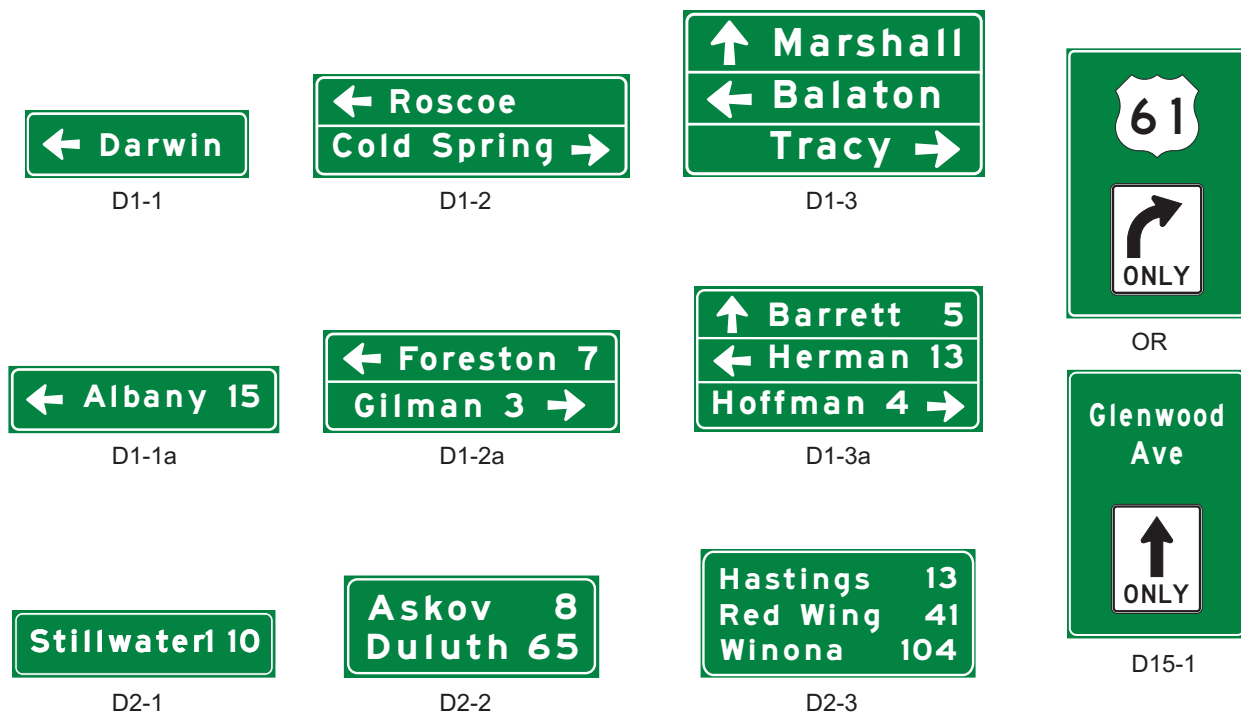


Figure 2D-7. Destination and Distance Signs

STANDARD:

The Combination Lane-Use/Destination (D15-1) overhead guide sign shall be used only where the designated lane is a mandatory movement lane. The D15-1 sign shall not be used for lanes with optional movements.

The D15-1 sign shall have a green background with a white border. As shown in Figure 2D-7, the lane-use sign (see Chapter 2B) shall be placed near the bottom of the sign and the destination information shall be placed near the top of the sign. The D15-1 sign shall be located approximately over the center of the lane to which it applies.

2D.34 Confirming or Reassurance Assemblies

STANDARD:

If used, Confirming or Reassurance assemblies shall consist of a Cardinal Direction auxiliary sign and a route sign. Where the Confirming or Reassurance assembly is for an alternative route, the appropriate auxiliary sign for an alternative route (see Section 2D.16) shall also be included in the assembly.



Example of Confirming or Reassurance Assembly

GUIDANCE:

A Confirming assembly should be installed just beyond intersections of numbered routes. It should be placed 25 to 200 feet beyond the far shoulder or curb line of the intersected highway.

If used, Reassurance assemblies should be installed between intersections in urban areas as needed, and beyond the built-up area of any incorporated city or town.

Route signs for either confirming or reassurance purposes should be spaced at such intervals as necessary to keep road users informed of their routes.

2D.35 Trailblazer Assembly

SUPPORT:

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

STANDARD:

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



Example of Trailblazer Assembly

OPTION:

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

GUIDANCE:

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

OPTION:

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

2D.36 Destination and Distance Signs

SUPPORT:

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

OPTION:

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

GUIDANCE:

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

2D.37 Destination Signs (D1 Series)

STANDARD:

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

OPTION:

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

GUIDANCE:

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

SUPPORT:

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

STANDARD:

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

OPTION:

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

GUIDANCE:

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

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

Destination signs should be used:

- A. At the intersections of U.S. or State numbered routes with Interstate, U.S., or State numbered routes; and
- B. At points where they serve to direct traffic from U.S. or State numbered routes to the business section of towns, or to other destinations reached by unnumbered routes.

STANDARD:

Where a total of three or less destinations are provided on the Advance Guide (see Section 2E.33) and Supplemental Guide (see Section 2E.35) signs, no more than three destination names shall be used on a Destination sign. Where four destinations are provided by the Advance Guide and Supplemental Guide signs, no more than four destination names shall be used on a Destination sign.

GUIDANCE:

If space permits, four destinations should be displayed as two separate signs at two separate locations.

OPTION:

Where space does not permit, or where all four destinations are in one direction, a single sign may be used. Where a single sign is used and all destinations are in the same direction, the arrow may be placed below the destinations for the purpose of enhancing the conspicuity of the arrow.

STANDARD:

Where a single four-name sign assembly is used, a heavy line entirely across the sign or separate signs shall be used to separate destinations by direction.

GUIDANCE:

The closest destination lying straight ahead should be at the top of the sign or assembly, and below it the closest destinations to the left and to the right, in that order. The destination displayed for each direction should ordinarily be the next county seat or the next principal city, rather than a more distant destination. In the case of overlapping routes, only one destination should be displayed in each direction for each route.

STANDARD:

If more than one destination is displayed in the same direction, the name of a nearer destination shall be displayed above the name of a destination that is further away.

2D.38 Destination Signs at Circular Intersections

STANDARD:

Destination signs that are used at circular intersections shall comply with the provisions of Section 2D.37, except as provided in this Section.

OPTION:

Exit destination (D1-1d, D1-1e) signs (see Figure 2D-8) with diagonal upward-pointing arrows or Directional assemblies (see Section 2D.32) may be used to designate a particular exit from a circular intersection.

Exit destination (D1-2d, D1-3d) signs (see Figure 2D-8) with curved-stem arrows may be used on approaches to circular intersections to represent the left-turn movements.

Curved-stem arrows on circular intersection destination signs may point in diagonal directions to depict the location of an exit relative to the approach roadway and entry into the intersection.

Exit destination (D1-4 or D1-5) signs (see Figure 2D-8) with a diagram of the circular intersection may be used on approaches to circular intersections.

GUIDANCE:

If curved-stem arrows are used on destination signs, then this arrow type should also be used consistently on any regulatory lane-use signs (see Chapter 2B), Directional assemblies (see Section 2D.32), and pavement markings (see Part 3) for a particular destination or movement.

SUPPORT:

Figure 2D-9 illustrates two examples of guide signing for circular intersections.

Diagrammatic guide signs might be preferable where space is available and where the geometry of the circular

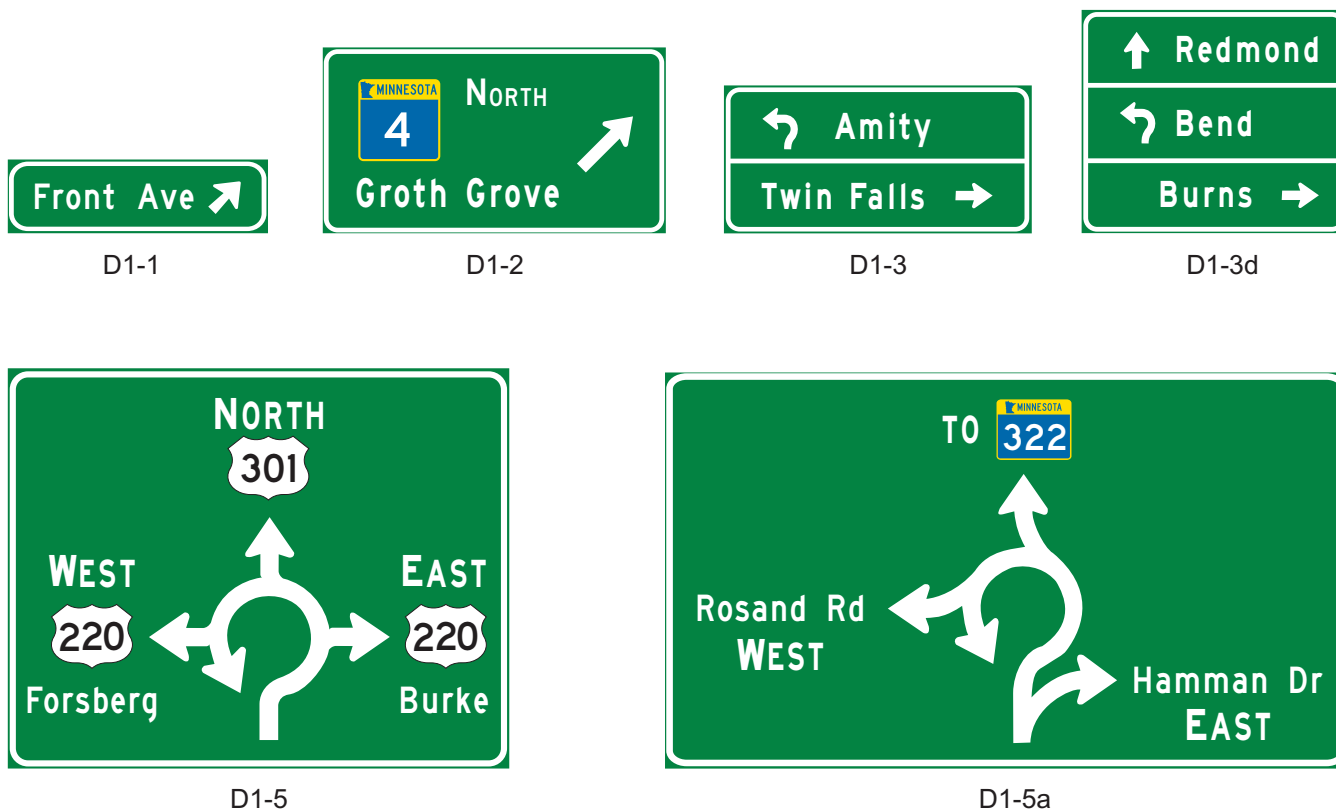


Figure 2D-8. Destination Signs for Roundabouts

intersection is non-typical, such as where more than four legs are present or where the legs are not at approximately 90-degree angles to each other.

STANDARD:

If used, diagrammatic guide signs for circular intersections shall not depict the number of lanes within the intersection circulatory roadway, or on its approaches or exits, through the use of lane lines, multiple arrow shafts for the same movement, or other methods.

SUPPORT:

Chapter 2B contains information regarding regulatory signs at circular intersections, Chapter 2C contains information regarding warning signs at circular intersections, and Chapter 3C contains information regarding pavement markings at circular intersections.

2D.39 Destination Signs at Jughandles

STANDARD:

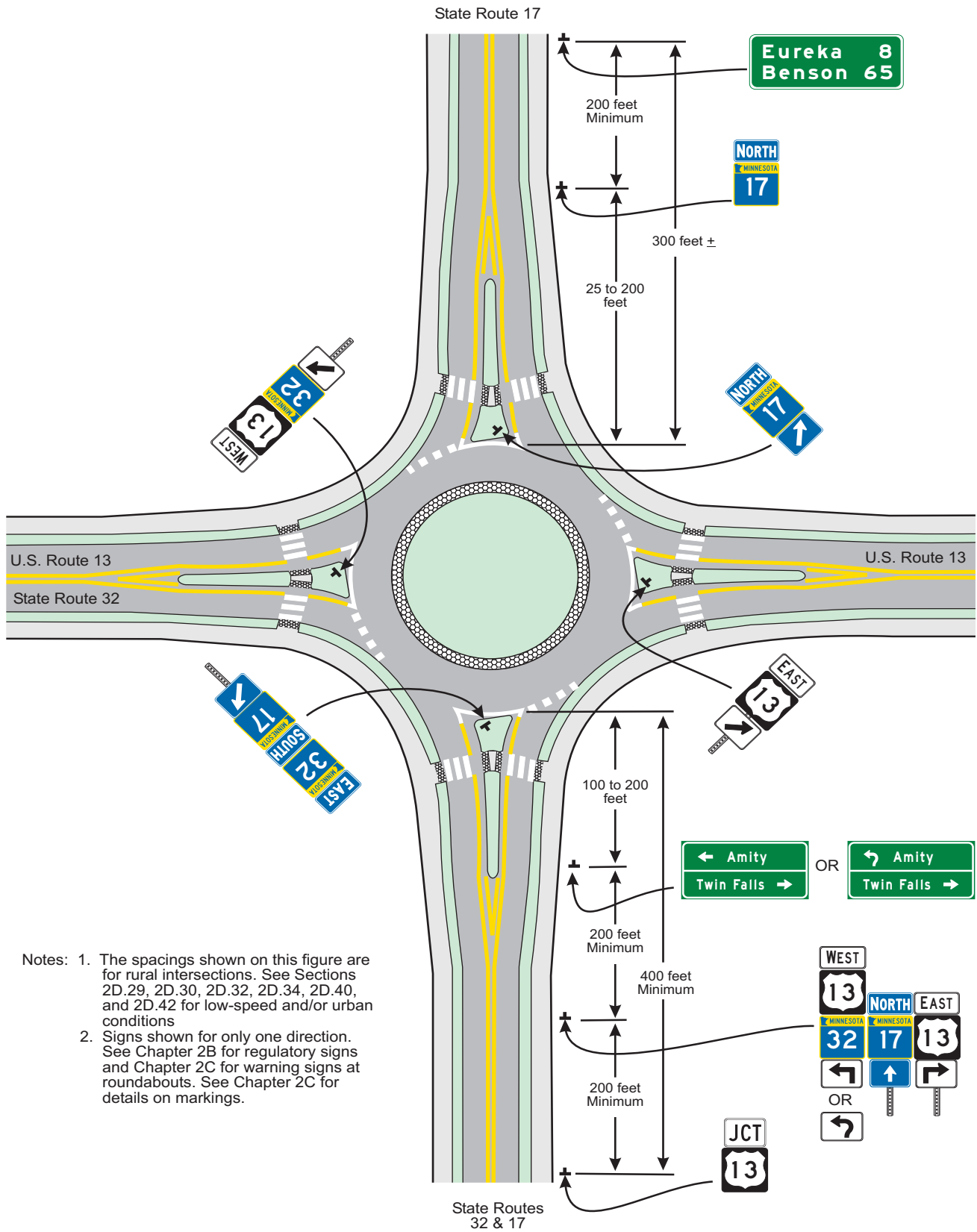
Destination signs that are used at jughandles shall comply with the provisions of Section 2D.37, except as provided in this Section.

OPTION:

If engineering judgment indicates that standard destination signs alone are insufficient to direct road users to their destinations at a jughandle, a diagrammatic guide sign depicting the appropriate geometry may be used to supplement the normal destination signs.

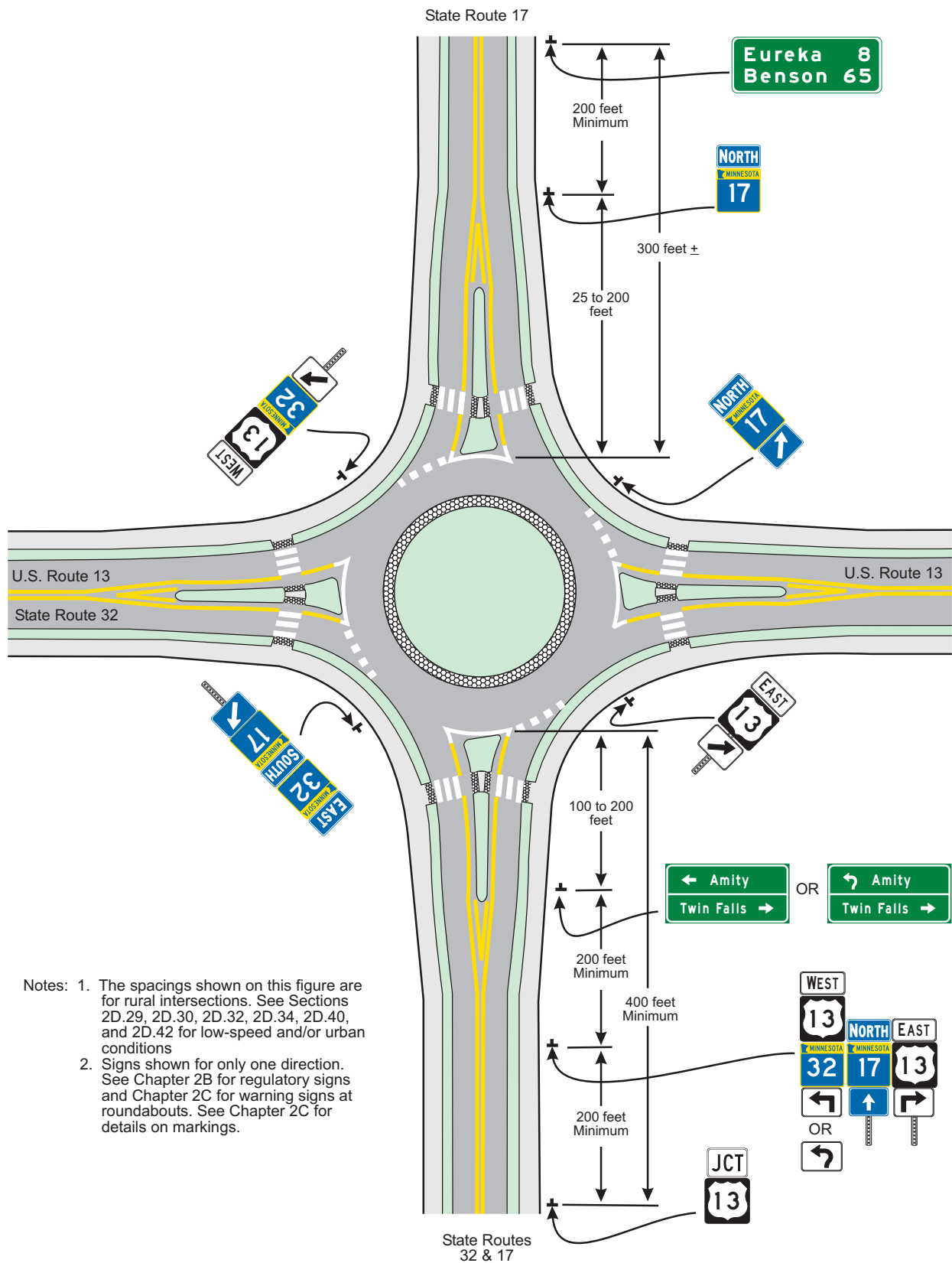
SUPPORT:

Section 2B.27 contains information regarding regulatory signs for jughandle turns. Figure 2B-9 shows examples of regulatory and destination guide signing for various types of jughandle turns.



- Notes:
1. The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32, 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions
 2. Signs shown for only one direction. See Chapter 2B for regulatory signs and Chapter 2C for warning signs at roundabouts. See Chapter 2C for details on markings.

Figure 2D-9. Examples of Guide Signs for Roundabouts (Sheet 1 of 2)



- Notes:
1. The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32, 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions
 2. Signs shown for only one direction. See Chapter 2B for regulatory signs and Chapter 2C for warning signs at roundabouts. See Chapter 2C for details on markings.

Figure 2D-9. Examples of Guide Signs for Roundabouts (Sheet 2 of 2)

2D.40 Location of Destination Signs

GUIDANCE:

When used in high-speed areas, Destination signs should be located 200 feet or more in advance of the intersection, and following any Junction or Advance Route Turn assemblies that might be required. In rural areas, the minimum distance between a Destination sign and either an Advance Route Turn assembly or a Junction assembly should be 200 feet.

OPTION:

In urban areas, shorter advance distances may be used.

Because the Destination sign is of lesser importance than the Junction, Advance Route Turn, or Directional assemblies, the Destination sign may be eliminated when sign spacing is critical.

SUPPORT:

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

2D.41 Distance Signs (D2 Series)

STANDARD:

If used, the Distance (D2-1 through D2-3) sign shall be a horizontal rectangle of a size appropriate for the required legend, carrying the names of no more than three cities, towns, junctions, or other traffic generators, and the distance (to the nearest mile) to those places.

The distance numerals shall be placed to the right of the destination names as shown in Figure 2D-7..



GUIDANCE:

The distance displayed should be selected on a case-by-case basis by the jurisdiction that owns the road or by statewide policy. A well-defined central area or central business district should be used where one exists. In other cases, the layout of the community should be considered in

relation to the highway being signed and the decision based on where it appears that most drivers would feel that they are in the center of the community in question.

The top name on the Distance sign should be that of the next place on the route having a post office or a railroad station, a route number or name of an intersected highway, or any other significant geographical identity. The bottom name on the sign should be that of the next major destination or control city. If three destinations are displayed, the middle line should be used to indicate communities of general interest along the route or important route junctions.

OPTION:

The choice of names for the middle line may be varied on successive Distance signs to give road users additional information concerning communities served by the route.

GUIDANCE:

The control city should remain the same on all successive Distance signs throughout the length of the route until that city is reached.

OPTION:

If more than one distant point may properly be designated, such as where the route divides at some distance ahead to serve two destinations of similar importance, and if these two destinations cannot appear on the same sign, the two names may be alternated on successive signs.

On a route continuing into another State, destinations in the adjacent State may be displayed.

2D.42 Location of Distance Signs

GUIDANCE:

If used, Distance signs should be installed on important routes leaving municipalities and just beyond intersections of numbered routes in rural areas. If used, they should be placed just outside the municipal limits or at the edge of the built-up area if it extends beyond the limits.

Where overlapping routes separate a short distance from the municipal limits, the Distance sign at the municipal limits should be omitted. The Distance sign should be installed approximately 90 m (300 ft) beyond the separation of the two routes.

Where, just outside of an incorporated municipality, two routes are concurrent and continue concurrently to the next incorporated municipality, the top name on the Distance sign should be that of the place where the routes separate; the bottom name should be that of the city to which the greater part of the through traffic is destined.

SUPPORT:

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

Type of Mounting	Type of Street or Highway	Speed Limit	Recommended Minimum Letter Height	
			Initial Upper-Case	Lower-Case
Overhead	All types	All speed limits	12 inches	9 inches
Post-Mounted	Multi-lane	More than 40 mph	8 inches	6 inches
Post Mounted	Multi-lane	40 mph or less	6 inches	4.5 inches
Post-Mounted	2-lane	All speed limits	6 inches*	4.5 inches*

* On local two-lane streets with speed limits of 25 mph or less, 4-inch initial upper-case letters with 3-inch lower-case letters may be used.

Table 2D-2. Recommended Minimum Letter Heights on Street Name Signs

2D.43 Street Name Sign (D3-1or D3-1a)

GUIDANCE:

Street Name (D3-1 or D3-1a) signs should be installed in urban areas at all street intersections regardless of other route signs that might be present and should be installed in rural areas to identify important roads that are not otherwise

OPTION:

For streets that are part of a U.S., State, or county numbered route, a D3-1a Street Name sign that incorporates a route shield may be used to assist road users who might not otherwise be able to associate the name of the street with the route number.

STANDARD:

The lettering for names of streets and highways on Street Name signs shall be composed of a combination of lower-case letters with initial upper-case letters (see Section 2A.13).

GUIDANCE:

Lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 6 inches in height and lower-case letters at least 4.5 inches in height.

Compliance Date: January 9, 2012

On multi-lane streets with speed limits greater than 40 mph, the lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 8 inches in height and lower-case letters at least 6 inches in height.

Compliance Date: December 22, 2018



D3-1



D3-1a

OPTION:

For local roads with speed limits of 25 mph or less, the lettering on post-mounted Street Name signs may be composed of initial upper-case letters at least 4 inches in height and lower-case letters at least 3 inches in height.

GUIDANCE:

If overhead Street Name signs are used, the lettering should be composed of initial upper-case letters at least 12 inches in height and lower-case letters at least 9 inches in height.

SUPPORT:

The recommended minimum letter heights for Street Name signs are summarized in Table 2D-2.

OPTION:

Supplementary lettering to indicate the type of street (such as Street, Avenue, or Road) or the section of the city (such as NW) on the D3-1 and D3-1a signs may be in smaller lettering, composed of initial upper-case letters at least 3 inches in height and lower-case letters at least 2.25 inches in height. Conventional abbreviations (see Section 1A.15) may be used except for the street name itself.

A pictograph (see definition in Section 1A.13) may be used on a D3-1 sign.

STANDARD:

Pictographs shall not be displayed on D3-1a or Advance Street Name (D3-2) signs (see Section 2D.44).

If a pictograph is used on a D3-1 sign, the height and width of the pictograph shall not exceed the upper-case letter height of the principal legend of the sign.

GUIDANCE:

The pictograph should be positioned to the left of the street name.

STANDARD:

The Street Name sign shall be retroreflective or illuminated to show the same shape and similar color both day and night. The color of the legend (and border, if used) shall contrast with the background color of the sign.

OPTION:

The border may be omitted from a Street Name sign.

An alternative background color other than the normal guide sign color of green may be used for Street Name (D3-1 or D3-1a) signs where the highway agency determines this is necessary to assist road users in determining jurisdictional authority for roads.

STANDARD:

Alternative background colors shall not be used for Advance Street Name (D3-2) signs (see Section 2D.44).

The only acceptable alternative background colors for Street Name (D3-1 or D3-1a) signs shall be blue, brown, or white. Regardless of whether green, blue, or brown is used as the background color for Street Name (D3-1 or D3-1a) signs, the legend (and border, if used) shall be white. For Street Name signs that use a white background, the legend (and border, if used) shall be black.

GUIDANCE:

An alternative background color for Street Name signs, if used, should be applied to the Street Name (D3-1 or D3-1a) signs on all roadways under the jurisdiction of a particular highway agency.

In business or commercial areas and on principal arterials, Street Name signs should be placed at least on diagonally opposite corners. In residential areas, at least one Street Name sign should be mounted at each intersection. Signs naming both streets should be installed at each intersection. They should be mounted with their faces parallel to the streets they name.

OPTION:

To optimize visibility, Street Name signs may be mounted overhead. Street Name signs may also be placed above a regulatory or STOP or YIELD sign with no required vertical separation.

GUIDANCE:

In urban or suburban areas, especially where Advance Street Name signs for signalized and other major intersections are not used, the use of overhead Street Name signs should be strongly considered.

OPTION:

At intersection crossroads where the same road has two different street names for each direction of travel, both street names may be displayed on the same sign along with directional arrows.

SUPPORT:

Information regarding the use of street names on supplemental plaques for use with intersection-related warning signs is contained in Section 2C.58.

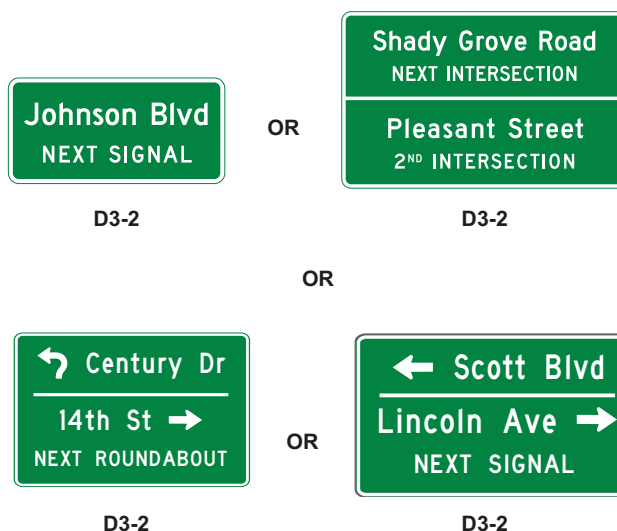
2D.44 Advance Street Name Sign (D3-2)

SUPPORT:

Advance Street Name (D3-2) signs identify an upcoming intersection. Although this is often the next intersection, it could also be several intersections away in cases where the next signalized intersection is referenced.

STANDARD:

Advance Street Name (D3-2) signs, if used, shall supplement rather than be used instead of the Street Name (D3-1) signs at the intersection.



OPTION:

Advance Street Name (D3-2) signs may be installed in advance of signalized or unsignalized intersections to provide road users with advance information to identify the name(s) of the next intersecting street to prepare for crossing traffic and to facilitate timely deceleration and/or lane changing in preparation for a turn.

GUIDANCE:

On arterial highways in rural areas, Advance Street Name signs should be used in advance of all signalized intersections and in advance of all intersections with exclusive turn lanes.

In urban areas, Advance Street Name signs should be used in advance of all signalized intersections on major arterial streets, except where signalized intersections are so closely spaced that advance placement of the signs is impractical.

The heights of the letters on Advance Street Name signs should be the same as those used for Street Name signs (see Section 2D.43).

STANDARD:

If used, Advance Street Name signs shall have a white legend and border on a green background.

If used, Advance Street Name signs shall provide the name(s) of the intersecting street(s) on the top line(s) of the legend and the distance to the intersecting streets or messages such as NEXT SIGNAL, NEXT INTERSECTION, NEXT ROUNDABOUT, or directional arrow(s) on the bottom line of the legend.

Pictographs shall not be displayed on Advance Street Name signs.

OPTION:

Directional arrow(s) may be placed to the right or left of the street name or message such as NEXT SIGNAL, as appropriate, rather than on the bottom line of the legend. Curved-stem arrows may be used on Advance Street Name signs on approaches to circular intersections.

For intersecting crossroads where the same road has a different street name for each direction of travel, the different street names may be displayed on the same Advance Street Name sign along with directional arrows.

In advance of two closely-spaced intersections where it is not practical to install separate Advance Street Name signs, the Advance Street Name sign may include the street names for both intersections along with appropriate supplemental legends for both street names, such as NEXT INTERSECTION, 2ND INTERSECTION, or NEXT LEFT and NEXT RIGHT, or directional arrows.

GUIDANCE:

If two street names are used on the Advance Street Name sign, the street names should be displayed in the following order:

- A. For a single intersection where the same road has a different street name for each direction of travel, the name of the street to the left should be displayed above the name of the street to the right; or
- B. for two closely-spaced intersections, the name of the first street encountered should be displayed above the name of the second street encountered, and the arrow associated with the second street encountered should be an advance arrow, such as the arrow shown on the W16-6P arrow plaque (see Figure 2C-12).

OPTION:

An Advance Street Name (W16-8P or W16-8aP) plaque (see Section 2C.58) with black legend on a yellow background, installed supplemental to an Intersection (W2 series) or Advance Traffic Control (W3 series) warning sign may be used instead of an Advance Street Name guide sign.

Compliance Date: December 22, 2018

2D.45 Signing on Conventional Roads on Approaches to Interchanges

SUPPORT:

Because there are a number of different ramp configurations that are commonly used at interchanges with conventional roads, drivers on the conventional road cannot reliably predict whether they will be required to turn left or right in order to enter the correct ramp to access the freeway or expressway in the desired direction of travel. Consistently applied signing for conventional road approaches to freeway or expressway interchanges is highly desirable.

STANDARD:

On multi-lane conventional roads approaching an interchange, guide signs shall be provided to identify which direction of turn is to be made and/or which specific lane to use for ramp access to each direction of the freeway or expressway.

GUIDANCE:

The signing of conventional roads with one lane of traffic approaching an interchange should consist of a sequence containing the following signs (see Figure 2D-11):

- A. Junction Assembly
- B. Destination sign
- C. Directional Assembly or Entrance Direction sign for the first ramp
- D. Advance Route Turn Assembly or Advance Entrance Direction sign with an advance turn arrow
- E. Directional Assembly or Entrance Direction sign for the second ramp

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