Freeway Signing Handbook

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Manual: *Freeway Signing Handbook*

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Purpose

The purpose of this revision was to change information on the proper placement of number panels on Exit Gore Signs in Chapter 3, Section 2 of the manual and to revise and replace graphics in Chapter 5 of the manual to show the proper placement of these signs.

Contents

Text in Chapter 3, Section 2 of the manual was changed as follows:

- Original Text: “The Exit Number panel (for Advance Guide, Exit Direction, and Exit Gore signs) must be aligned to the side of the exit. The Number panel must be aligned to the right edge for a right-side exit and the left edge for a left-side exit.”
- New Text: “The Exit Number panel (for Advance Guide and Exit Direction signs) must be aligned to the side of the exit. The Number panel must be aligned to the right edge for a right-side exit and the left edge for a left-side exit. The Exit Number panel for Exit Gore signs must be centered to the parent sign.”

Graphic files contained in Chapter 5 of the manual were changed to show proper placement of Exit Number panels in relation to Exit Gore signs.

Contact

Address questions concerning information contained in this manual notice to Michael Chacon, Traffic Operations Division (TRF), 512-416-3120.

Archives

Past manual notices are available in a pdf archive.

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Section 1: Overview

Introduction

The *Texas Manual on Uniform Traffic Control Devices* (Texas MUTCD) establishes the basic guidelines for the design and placement of freeway guide signing and frontage road signing. However, the Texas MUTCD permits variation in the design and placement of these signs. TxDOT staff have often had to make independent decisions on the best layout and placement of these signs, leading to variations from one area of the state to another. This *Freeway Signing Handbook* is intended to provide TxDOT staff and design consultants with information beyond that contained in the Texas MUTCD or the TxDOT Traffic Control Standard Sheets so freeway signing can be designed and installed in a more uniform manner. This handbook is intended for use by TxDOT designers and consultants and emphasizes the use of figures to explain various design issues.

Chapter Overview

This chapter describes the different parts of the handbook and how it relates to TxDOT freeway signing activities. The chapter also includes additional information about the scope of the handbook and its relation to existing freeway signing documents.

Section 2: Handbook Information

Purpose of Handbook

The main purposes of this handbook are to:

- provide design personnel with information that will help them improve the statewide consistency and effectiveness of freeway signing layout and placement
- provide freeway guide signing that will help road users find their way in a more effective and efficient manner
- address guide signing situations that are not covered in the Texas MUTCD or other TxDOT documents.

This handbook is intended for application primarily on urban freeway facilities. Some portions of the handbook also apply to freeway signing in rural areas.

Although this handbook illustrates the use and placement of regulatory, warning, and guide signs, it does not establish any warrants or standards for the selection and placement of regulatory, warning, and guide signs.

Status of Handbook

This handbook presents information as guidance for use by design personnel. This handbook does not establish any standards, specifications, or regulations. This handbook carries no legal authority.

In some cases, the information presented in this handbook exceeds the minimum guidelines contained in the Texas MUTCD or other TxDOT documents. This handbook does not supercede or modify the minimum guidelines contained in other TxDOT documents. In situations where the guidelines presented in this handbook cannot be satisfied, designers should try to meet the minimum guidelines contained in other TxDOT documents.

Application of Handbook Guidelines

This handbook is intended to assist designers in the design and placement of freeway signing. It does not establish criteria or warrants for the use of any sign shown in the handbook.

Most of the situations presented in this handbook are intended to represent common situations or provide guidance for the installation of new signs. In some cases, designers may need to install signing that is not consistent with the guidelines in this handbook.

Handbook Content

This handbook describes various aspects of freeway signing, with an emphasis on the design elements of freeway guide signs. The chapters of this handbook address the topics described in the following table.

Chapter Content Descriptions for this Handbook

Chapter	Describes
1	The handbook and its relation to other freeway signing documents.
2	The basic principles of freeway signing.
3	Appropriate use of different types of freeway signs, with the focus on the application of freeway signs.
4	The design (or layout) of Exit Direction and Advance Guide signs. It focuses on the spacing relationships between various elements of a freeway sign legend.
5	The placement of freeway Advance Guide and Exit Direction signs approaching roadway interchanges and freeway-to-freeway interchanges.
6	Signing for freeway frontage roads.

This handbook addresses the following types of signs used on freeways and frontage roads:

- interchange exit signing
- entrance ramp signing from frontage road
- exit ramp signing to frontage road
- frontage road signing at intersections.

Section 3: Relation to Other Documents

References to Other Documents

This handbook combines information contained in numerous other documents to assist in the design of freeway signing. In some cases, information from other documents is repeated in this handbook with appropriate citations to the source of the information. This is typically the case where information from several documents is combined in a section of the handbook. In other cases, this handbook refers the user to a specific document for guidance on sign design issues. This is typically the case where a single document contains the necessary design information.

Whenever practical, the handbook refers the reader to other documents so the handbook will not be out of date when these documents are revised. When information from other documents is repeated in the handbook, the reader should check to make sure the source document has not been revised.

Other TxDOT Documents

This handbook presents guidance information that may support or expand upon information contained in other TxDOT documents. The guidance contained in this handbook does not supersede standards, recommended practices, or requirements established by other TxDOT documents. The following documents also contain information related to the application, design, placement, installation, and maintenance of freeway signing:

Texas Manual on Uniform Traffic Control Devices (Texas MUTCD). The Texas MUTCD establishes practices for the selection, design, placement, operation, and maintenance of traffic control devices. The Texas MUTCD is the document that establishes the legal requirements for the selection, application, design, installation, and maintenance of traffic control devices. Many of the figures in this handbook contain cross-references to the Texas MUTCD to identify the need or application of a specific sign. When a figure contains a cross-reference to the Texas MUTCD, the user should refer to the indicated section of the Texas MUTCD to determine the appropriate application of or need for the sign. **The 2003 edition of the Texas MUTCD (released in January 2003) was used in the preparation of this handbook.** The 2006 Texas MUTCD was published after the completion of this handbook; however, an attempt was made to incorporate changes introduced in the 2006 Texas MUTCD into this handbook.

The Texas MUTCD is available on-line at http://www.txdot.gov/txdot_library/publications/tmutcd.htm .

Traffic Engineering Standard Sheets. The Traffic Engineering Standard Sheets developed by the Traffic Operations Division (TRF) contain additional guidance for the design, placement, and mounting of freeway guide signs. Where appropriate, figures in this handbook reference the standard sheets.

The Traffic Engineering Standard Sheets are available on-line at: http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm .

The following 3 tables list standard sheets pertinent to subjects related to freeway guide signs.

Traffic Engineering Standard Sheets Related to Freeway Signing

Sheet Name	Subject
TSR(1)	Requirements for Overhead and Large Ground Mounted Signs
TSR(2)	Requirements for Attachments and Exit Panels to Guide Signs
TSR(3)	E, D, and I Series Guide Signs
TSR(4)	Requirements for Blue and Brown D Series Guide Signs and Independent Mounted Route Markers
TSR(5)	Requirements for Regulatory and Warning Signs
TSR(6)	Typical Attachment and Arrow Details
WSSFT	Weigh Station (Freeways Trucks Only)
CSSFB	Check Station (Freeways Trucks/Buses)

Freeway Sign Structure Standard Sheets

Sheet Name	Subject
OSB-SE	Selection Examples
OSB-Z1	Sheet 1 of 3 (Bridge Details)
HOSB-Z1	Sheet 1 of 3 (High Level Bridge Details)
HOSB-Z1L	Sheet 1 of 3 (High Level Bridge Details)
OSB-Z2I	Sheet 1 of 3 (Bridge Details)
HOSB-Z2I	Sheet 1 of 3 (High Level Bridge Details)
OSB-Z3	Sheet 1 of 3 (Bridge Details)
HOSB-Z3	Sheet 1 of 3 (High Level Bridge Details)
OSB-Z3I	Sheet 1 of 3 (Bridge Details)
HOSB-Z3I	Sheet 1 of 3 (High Level Bridge Details)
OSB-Z4	Sheet 1 of 3 (Bridge Details)
HOSB-Z4	Sheet 1 of 3 (High Level Bridge Details)
OSB-Z4I	Sheet 1 of 3 (Bridge Details)
HOSB-Z4I	Sheet 1 of 3 (High Level Bridge Details)
OSBT	Sheet 2 of 3 (Bridge Tower Details)
OSBC	Sheet 3 of 3 (Bridge Truss Details)

Freeway Sign Structure Standard Sheets

Sheet Name	Subject
OSBC-SC-Z1	Sheet 2A of 3 (Bridge Truss Details)
OSBC-SC-Z2	Sheet 2A of 3 (Bridge Truss Details)
OSBC-SC-Z3	Sheet 2A of 3 (Bridge Truss Details)
OSBC-SC-Z4	Sheet 2A of 3 (Bridge Truss Details)
OSBS-SC	Sheet 2B of 3 (Single Column and Drilled Shaft Reinforcing)
OSB-FD	Foundation Embedment Selection Charts
OSB-FD-SC	Foundation Embedment Selection Charts
COSS & OSB-SZ	Sheet 1 of 3 (Special Cantilever and Bridge Details)
COSS-SE	Selection Example
COSS-Z1	Sheet 1 of 3 (Cantilever Details)
HCOSS-Z1	Sheet 1 of 3 (High Level Cantilever)
COSS-Z2I	Sheet 1 of 3 (Cantilever Details)
COSS-Z3&Z3I	Sheet 1 of 3 (Cantilever Details)
COSS-Z4&Z4I	Sheet 1 of 3 (Cantilever Details)
COSSD	Sheet 2 of 3 (Support Details)
COSSF	Sheet 3 of 3 (Foundation Details)
COSS-FD	Foundation Embedment Selection Charts
ED(1) thru ED(13)	Electrical Details
SL(MV)-93	Mercury Vapor Sign Light Fixture
SL(1)-95	Sign Lighting (Electrical Details)
SWW(1)	Sign Walkway and Handrail
SB(SWL-1)	Support Bracket Details

Freeway Pavement Marking Standard Sheets

Sheet Name	Subject
FPM(1)-00A	Typical Standard Freeway Pavement Markings — Raised Markers
FPM(2)-00A	Typical Standard Freeway Pavement Markings — Entrance and Exit Ramps
FPM(3)-00A	Typical Standard Freeway Pavement Markings — Lane Drop Exit Ramps

Freeway Pavement Marking Standard Sheets

Sheet Name	Subject
FPM(4)-00A	Typical Standard Freeway Pavement Markings — Lane Drop Exit Ramps

Standard Highway Sign Designs for Texas. The *Standard Highway Sign Designs for Texas* (Texas SHSD) presents the dimensions needed to fabricate individual standard signs. This document primarily addresses signs with a standard layout (such as regulatory and warning signs). Appendix F of the Texas SHSD includes information on the design of large freeway guide signs. That information has been incorporated into this handbook. Revision 4 (December 1998) of the Texas SHSD was used to prepare this handbook. The standard signs shown in the handbook figures are provided for illustrative purposes only. Every effort has been extended to ensure that the appearance of the standard signs in these figures is an accurate representation of the actual sign design. The Texas SHSD should be used to determine the design and layout of standard signs.

The Texas SHSD is available on-line at http://www.txdot.gov/txdot_library/publications/highway_signs.htm .

Signs and Marking Volume of the Traffic Operations Manual. The *Signs and Marking Volume* sets forth TxDOT standard practices and procedures regarding signs, markings, and other traffic control devices. This manual supplements the information contained in the Texas MUTCD. The November 1997 version of the *Signing and Marking Volume* (with the May 2000 revision of Chapter 10) was used to prepare this handbook.

Sign Crew Field Book. The *Sign Crew Field Book* provides field crews with information on the placement and installation of signs on conventional rural highways. The January 2000 version of the *Sign Crew Field Book* was used to prepare this handbook.

Other Non-TxDOT Documents

The following documents provide additional information that may be useful in the application, design, placement, or installation of freeway signs. Users should note that the guidance in these documents may not be consistent with TxDOT practice.

National Manual on Uniform Traffic Control Devices. At the time this handbook was prepared, the 2000 National MUTCD served as the national standard for traffic control devices. It is the basis for the 2003 Texas MUTCD. The Texas MUTCD is the official document for traffic control devices in Texas. There are differences between the National and Texas MUTCD. The 2003 Texas MUTCD was the version used to develop this handbook. However, an attempt was made to incorporate changes that appeared in the 2006 Texas MUTCD into this handbook.

The National MUTCD and related information are available on-line at: http://mutcd.fhwa.dot.gov .

Standard Highway Signs. Shortly after the publication of the 2000 National MUTCD, the FHWA published a new version of the national *Standard Highway Signs* (SHS). Both metric and English

versions of the document are available. The metric version contains more information than the English version. The 2002 English version of the national SHS was used to prepare this handbook.

Both versions are available on-line at: http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm .

Chapter 2: Principles of Freeway Signing

Contents:

Section 1: Overview

Introduction

This chapter describes some of the basic principles associated with freeway signing. These principles provide broad guidance on the use of freeway guide signs and form the basis for many of the processes described in later chapters of this handbook. These principles include:

- the underlying philosophy for providing guidance information on freeways
- driver information needs
- definitions and terminology used to define interchange classifications
- the process used to design and locate freeway guide signs
- various policies related to freeway signing, including:
  - retroreflective sheeting
  - illumination
  - clearance
  - control cities
  - support structures.

Section 2: Freeway Signing Basics

Freeway Characteristics

Two types of guide signing are described in the Texas MUTCD. Guide signing for conventional highways (Chapter 2D) is used on highways without access control. Freeway and expressway signing (Chapter 2E) is used on highways with access control. Freeways are divided highways with full control of access. Expressways are divided highways with partial control of access. In Texas, freeways are much more common than expressways. The signing guidelines in this handbook have been developed specifically for freeways.

There are several characteristics of freeways that distinguish them from conventional roadways. These characteristics are explained in the following table.

Freeway Characteristics

Characteristics	Notes
Full control of access	Freeway users can enter and leave the freeway only through an entrance ramp and exit ramp.
High speeds	In free-flow conditions, freeway speeds are typically in the 50 to 70 mph range.
No intersecting traffic	Freeway users do not encounter Stop signs or traffic signals while on the freeway main lanes.
Multiple lanes	Freeways have at least two lanes in each direction of travel.

The most significant of these characteristics is the first, full control of access, which allows the existence of the other characteristics. Because of these characteristics, freeway signing typically provides a higher level of performance than signs on other types of roadways. The higher performance is typically achieved through the use of larger signs on freeways, but also includes the use of freeway guide sign practices that are different from the guide signing practices on conventional roadways.

Philosophy of Freeway Guide Signs

Freeway guide signs and conventional guide signs are based on different philosophies, as explained below:

Freeway Guide Signs. The major emphasis of freeway signing is on destinations. Control cities and street names provide the primary exiting information for drivers. Route signs and cardinal directions are used in freeway signing, but they are not emphasized to the same extent as control cities and street names. Guidance information, such as the destination (control city, street, or highway), is provided in advance of the exit. Information is shown in Advance Guide signs and repeated in Exit Direction signs.

Conventional Guide Signs. The major emphasis of conventional guide signing is on highway class, number, and cardinal direction. This information is provided at the intersection where the maneuver is performed. Destination information (cities) is provided in advance of the intersection and is not repeated at the intersection.

Information Provided by Freeway Signing

Due to the high-speed and high-volume nature of freeways, freeway signing should strive to provide information in a manner that contributes to quick processing and conveys clear meaning. Key factors to consider include:

- Freeway signing should provide information to meet the needs of the unfamiliar road users.
- Freeway signing provides advance information about approaching decision points in a manner that allows adequate time for response at freeway speeds.
- Freeway signing does not have to identify every possible choice for the driver.
- Freeway signing may direct the road user along a longer distance route to simplify the guidance information associated with reaching the indicated destination.

Information Processing

The concept of **positive guidance** is often used as a guiding principle for providing information to drivers. Positive guidance consists of creating and maintaining a driving environment that has the following characteristics:

- Motorists are provided with the maximum amount of useful visual information.
- Information is presented in such a way that it is prioritized in importance.
- Information is presented uniformly, allowing drivers to develop expectations about the location of information.
- Information is visible under most, if not all, environmental conditions.

If the principles of positive guidance are applied consistently, drivers will subconsciously develop expectations about where to seek information. In applying the concepts of positive guidance, it is important to understand the demands that are placed on the driver during the driving task. The driving task is made up of a number of subtasks that require varying levels of time and cognitive activity. The three most basic subtasks are control, guidance, and navigation. These subtasks are explained in the following table.

Basic Driving Subtasks

Subtask	Explanation
Control	Consists primarily of steering control and speed control.

Basic Driving Subtasks

Subtask	Explanation
Guidance	Consists of maintaining a safe and efficient path relative to all factors in the roadway environment. Some examples of actions included in the guidance subtask are car following, passing, and response to traffic control devices.
Navigation	Portion of the driving task most directly affected by freeway guide signing. Consists of planning a trip from beginning to end and then executing the trip plan. The navigation subtask can be broken down into trip preparation and planning, and direction finding. Trip preparation and planning can consist of anything from drivers using their own mental map of an area to consulting maps or knowledgeable persons in order to plan a trip. Direction finding occurs while drivers are en route and attempting to reach their destinations. This portion of the subtask involves interpreting direction guidance on signs to obtain information about the appropriate path.

Performance of these subtasks allows drivers to maintain their positions in the lane and find their way to their destinations. Drivers perform these subtasks continuously at various cognitive levels, although the amount of attention and cognitive resources allocated to each task may vary depending on the specific conditions present at a given point and time. The following table describes the characteristics of each of these subtasks.

Characteristics of Driving Subtasks

Characteristics	Control Subtask		Guidance Subtask	Navigation Subtask	
	Steering Control	Speed Control		Trip Preparation and Planning	Direction Finding
Priority	High	High	Varies depending on conditions, but usually intermediate between control and navigation	Performed pre-trip, so no demands on driver while en route	Usually lowest of all subtasks, although demands may increase in complex or unfamiliar situations
Driver Level of Effort	Varies depending on geometrics	Varies depending on geometrics and traffic	Higher than control subtask, with more conscious decision-making necessary	Varies depending on driver familiarity with route	Guide signs, Route signs, Street Name signs, landmarks, etc.
Information	Vehicle response characteristics, relative position of vehicle	Vehicle braking and acceleration characteristics, road conditions ahead of driver	Traffic conditions, road geometry, weather conditions, and other information that impacts the road environment	Location or origin and destination, and physical or mental map of alternative routes	Guide signs, Route signs, Street Name signs, landmarks, etc.

Characteristics of Driving Subtasks

Characteristics	Control Subtask		Guidance Subtask	Navigation Subtask	
	Steering Control	**Speed Control**		**Trip Preparation and Planning**	**Direction Finding**
Demand on Drivers	Usually low because subtask is overlearned	Greater than steering since driver must look farther down the road	Varies depending on the driver's previous experiences and prior knowledge	Usually low	Usually low, except in unusual circumstances

Attention and Expectation

Attention is an important component of the driving task. When a subtask has a low demand, it can be performed with little conscious attention, allowing the driver to allocate attention to tasks that require more cognitive resources. When the demands of the driving task require more attention be placed on a particular subtask, it comes at the expense of performing tasks requiring a higher level of attention. This process is known as **load shedding**. For example, a driver on an uncongested freeway can easily perform navigational subtasks. If traffic becomes extremely congested, the navigational subtasks become more difficult to perform because the driver must allocate more attention to the control and guidance subtasks.

Expectation is also very important in the driving task. Drivers need to have a reasonable expectation about how their vehicles will perform, the geometry of the road downstream of their positions, and where to find navigational information. If the expectation of the driver is violated, the performance of the driving task may suffer. This situation is particularly important in freeway guide signing where the unfamiliar driver will rely on guide signs to provide information to perform the navigation subtask.

Limitations on Quantity of Information

Various documents have suggested limits on the amount of information that should be presented to drivers with freeway signs. The Texas MUTCD contains the following guidelines for limiting the amount of legend on freeway guide signs (Sections 2E.09 and 2E.10):

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

- Regulatory signs, such as Speed Limit signs, should not be used in conjunction with overhead guide sign installations.
- No more than three guide signs should be displayed at any one location, either on the overhead structure or its support.
- At overhead locations, more than one sign may be installed to advise road users of a multiple exit condition at an interchange.
- If the roadway ramp or crossing roadway has complex or unusual geometrics, additional signs with confirming messages may be provided to properly guide the road user.

Various researchers have evaluated the amount of information to present to road users in freeway guide signs. Research by the Texas Transportation Institute recommended the guidelines shown in the following table. The table shows that placing five sign panels on a single structure is not a desirable design and should be avoided if possible. As indicated on the previous page, the Texas MUTCD recommends that no more than three guide signs be used at a single location. The maximum amount of information on any sign structure should not exceed 20 units.

Desirable and Maximum Units of Information per Freeway Guide Sign Structure*

	Units of Information per Structure	
Number of Sign Panels	**Desirable**	**Maximum**
2	12	16
3	16	18
4	18	20
5	Undesirable Design	20

* Source: McNees, R.W. and C.J. Messer. Reading Time and Accuracy of Response to Simulated Urban Freeway Guide Signs. in *Transportation Research Record 844*, Transportation Research Board, Washington, D.C, 1982.

For the above table, each of the following items is defined as one unit of information:

- place name (examples: **College Station**, **Rockport**)
- street name (examples: **Main Street**, **First Avenue**)
- route number (examples: **I 10**, **US 59**)
- cardinal direction (examples: **North**, **South**)
- exit number (examples: **245**, **81**)
- command (examples: **Exit**, **Next Right**)
- distance (examples: **½ mile**, **2 miles**)
- lane use arrows (examples:


- junction (example: **Jct.**)
- exit only (example: **Exit Only**)

Figure 2-1 provides an example of how the units of information in several sign panels located on a structure would be counted.

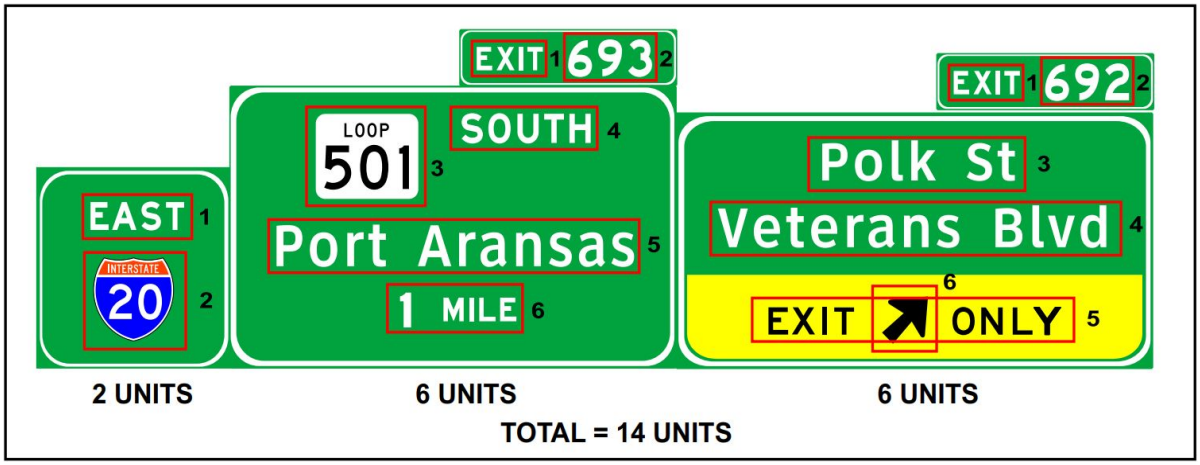


Figure 2-1. Example of sign information units.

Driver Information Overload

National Cooperative Highway Research Program (NCHRP) Project 3-50 produced a report (see below) and a computer program that provides a means of analyzing driver information overload (DIO). Drawing on the results of the project and previous research, the NCHRP determined that, as a general rule, an individual guide sign is likely to cause DIO for some drivers if it contains more than two destinations or route symbols, especially if the word length exceeds seven letters.

Where multiple signs are on a sign structure, DIO can result from any of the following:

- two sign panels with more than two destination names and two route symbols on any one sign
- three guide sign panels with any one sign having more than two destination names
- more than three sign panels, regardless of message content.

DIO is likely to occur at locations where information is dense in terms of proximity of signs and sign message content. More specifically, DIO is likely where spacing between two guide signs, including supplemental signs, is less than 800 ft, where there is one destination on the second sign, and 1200 ft where there are two or three destinations on the second sign.

Report and Program Available. The computer program (CRP-CD-36) developed through NCHRP Project 3-50 is included with the report when the report is ordered from the Transportation Research Board. (Lerner, N.D., R.E. LLaneras, H.W. McGee, Sunil Taori, and G.

Alexander. *Additional Investigations on Driver Information Overload*, NCHRP Report 488, Transportation Research Board, Washington, D.C., 20003)

Section 3: Freeway Signing Terminology

Introduction

This section defines various terms commonly used in freeway signing. In some cases, these terms are used to classify design guidelines that appear in this handbook or documents such as the Texas MUTCD.

Texas MUTCD Interchange Classification Scheme

The 2003 Texas MUTCD classified interchanges as described below. These classifications were used by the Texas MUTCD to recommend letter heights for freeway guide signs and to determine the number of Advance Guide signs that should be used in advance of the exit. However, the next subheading simplifies the 2003 Texas MUTCD interchange classification scheme for designing freeway guide signs. The interchange classifications are as follows:

Major Interchange — There are two types of major interchanges:

- Category A — Interchanges with other expressways or freeways.
- Category B — Interchanges (other than freeway or expressway interchanges) with high-volume multilane highways, principal urban arterials, and major rural routes where the volume of interchanging traffic is heavy or includes many road users unfamiliar with the area.

Intermediate Interchanges — Interchanges with urban and rural routes not in the category of major or minor interchanges.

Minor Interchanges — Interchanges where traffic is local and very light, such as interchanges with land service access roads. Where the sum of exit volumes is estimated to be lower than 100 vehicles per day in the design year, the interchange is classified as minor.

This interchange classification scheme is overly complicated, difficult to apply, and was not included in the 2006 Texas MUTCD. For the purposes of this handbook, the scheme has been simplified as described in the following subheading.

Freeway Signing Handbook Interchange Classification Scheme

The Texas MUTCD classification scheme (described in the preceding subheading) is somewhat difficult to apply to many interchanges, and the differences are not typically significant. For the purposes of this handbook, the interchange descriptions have been simplified to address the following design considerations:

- guide sign letter height
- number of Advance Guide signs.

Guide Sign Letter Height. The letter height guidelines provided in Table 2E-2 of the Texas MUTCD have been simplified so there is only one minimum letter height option. As a result, it is not necessary to distinguish between interchange types to determine the appropriate letter height. Larger letter heights may be appropriate in some situations.

Number of Advance Guide Signs. The Texas MUTCD requires one Advance Guide sign for minor interchanges. Two, and preferably three, Advance Guide signs are used for other interchanges. The following definition of a minor interchange (requiring only one Advance Guide sign) is based on the Texas MUTCD definition of a minor interchange.

Minor Interchange — An interchange where all traffic exiting the freeway at the interchange (for all exits at the interchange from both directions) is estimated to be 100 vehicles per day or less in the design year (typically 20 years into the future).

Section 4: Freeway Sign Design Process

Design of Freeway Guide Signs

This handbook has been developed to assist designers in the process of designing freeway signing. Figure 2-2 illustrates this design process for Advance Guide and Exit Direction signs.

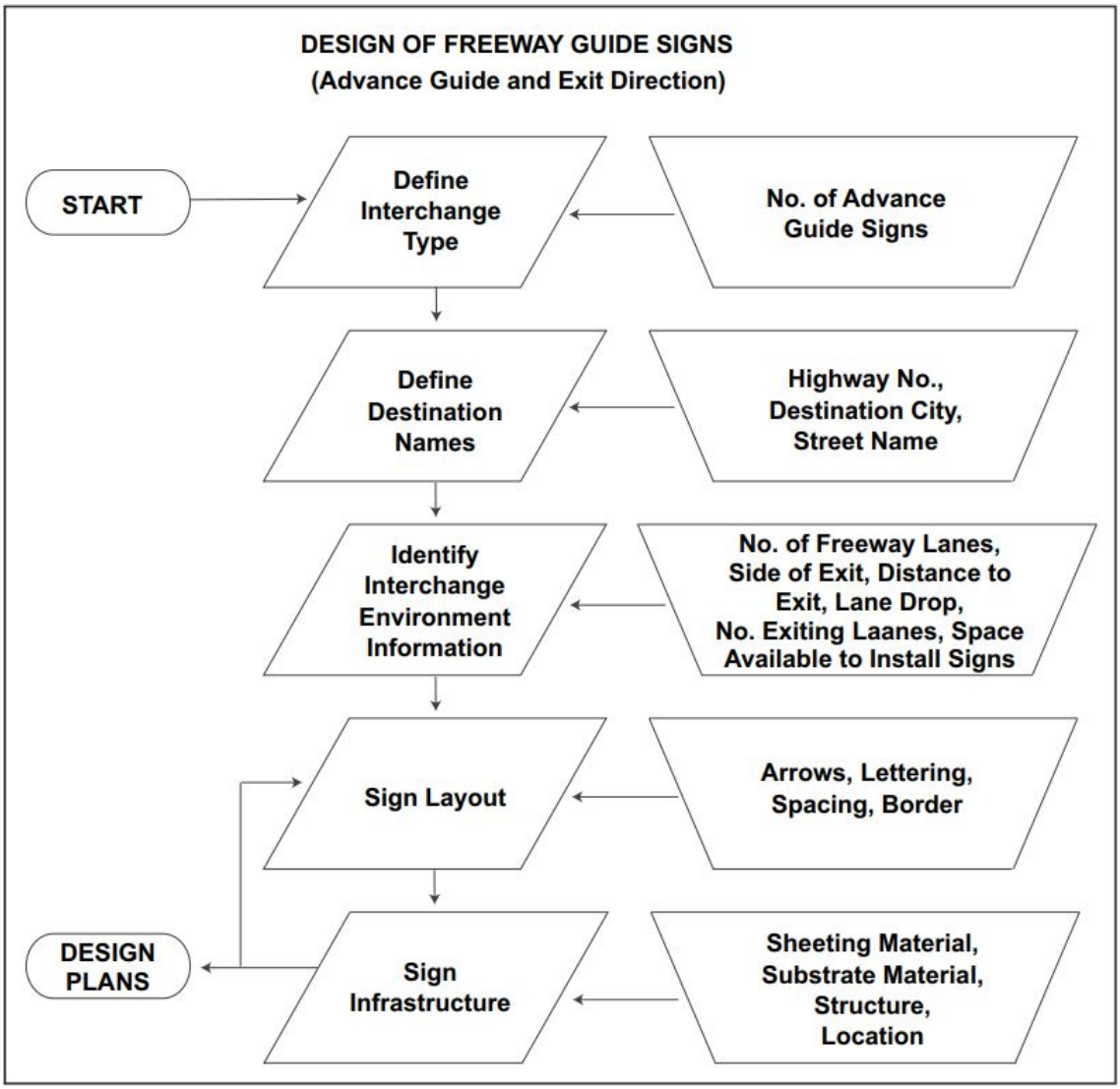


Figure 2-2. Advance Guide and Exit Direction sign design process.

Section 5: Freeway Signing Policies

Retroreflective Sheeting for Freeway Signs

In 2003, TxDOT changed the policy for retroreflective sheeting on freeway signs. The following table describes the types of retroreflective sheeting that should be used on freeway signs.

Retroreflective Sheeting for Freeway Signs

Sign Mounting Type	Legend	Background
Overhead	TxDOT Type D (microprismatic)	TxDOT Type D (microprismatic)
Ground Mounted	TxDOT Type D sheeting (microprismatic)	Type C Encapsulated Beaded

Freeway Sign Illumination

TxDOT policy is to not use overhead sign lighting unless a sign is positioned in a manner such that vehicle headlamps will not provide sufficient illumination to meet driver luminance needs. Appendix A provides a procedure to determine if sign lighting is needed.

Vertical Sign Clearance

There are two issues to consider for vertical signing: the clearance for overhead structures and the vertical clearance for overhead sign supports.

Overhead Bridge Structures. For information on how to measure and sign vertical clearances for overhead bridge structures, see the *Signs and Marking Volume* of the Traffic Operations Manual, Chapter 6, Section 3.

Overhead Sign Supports. Regarding overhead sign supports, the following is from the Texas MUTCD, Section 2A.18:

> Overhead signs shall provide a vertical clearance of not less than 17 ft 6 in to the sign, light fixture, or sign bridge, over the entire width of the pavement and shoulders except where a lesser vertical clearance is used for the design of other structures. The vertical clearance to overhead sign structures or supports shall not be greater than 1 ft in excess of the minimum clearance of other structures.
>
> In special cases it may be necessary to reduce the clearance to overhead signs because of substandard dimensions in tunnels and other major structures such as double-deck bridges.

Overhead sign structures are not required to have clearance signing, even if the minimum clearance is less than 20 ft (see the *Signs and Marking Volume* of the Traffic Operations Manual, Chapter 6, Section 3).

Control Cities

Control cities are key cities located on a freeway route that are used for destinations in freeway interchange signing and in distance signing.

The following table lists the control cities for interstate highways located within Texas. The control cities are identified in Part III — "List of Control Cities for Use in Guide Signs on Interstate Highways," GSGLC-4 (American Association of State Highway and Transportation Officals, Washington, D.C., 20001). Control cities should be used for all interstate highways. Non-interstate freeways should use the interstate control cities where possible and should use cities of similar population or significance where it is not possible to use the interstate control cities. Any given route should have the same control cities in both directions of travel and the control cities must lie on the intersected route. Additional guidelines for destination names are included in Part 2E of the Texas MUTCD.

Control Cities for Interstate Highways in Texas

Interstate Highway Number	Control Cities in Texas (east to west or south to north)
10	Las Cruces, El Paso, Van Horn, San Antonio, Houston, Beaumont, Lake Charles
20	El Paso, Abilene, Fort Worth or Dallas (signed alternatively), Shreveport
27	Lubbock, Amarillo
30	Fort Worth or Dallas (signed alternatively), Texarkana, Little Rock
35	Laredo, San Antonio, Austin, Waco, Dallas or Fort Worth (signed alternatively), Oklahoma City
37	Corpus Christi, San Antonio
40	Tucumcari, Amarillo, Oklahoma City
44	Wichita Falls, Lawton
45	Galveston, Houston, Dallas
NOTE: For Interstates that cross the state border, the list includes the first control city in the adjacent state.	

Sign Support Structures

TxDOT traffic engineering standard sheets include numerous standard sheets for the design of overhead sign structures and the infrastructure related to the overhead structures (such as foundations, lighting, walkways, etc.). The standard sheets may be downloaded from the TxDOT web site at: http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm.

Chapter 3: Application of Freeway Signs

Contents:

Section 1: Overview

Introduction

There are several types of guide signs used on freeways. These include freeway Direction signs, General Service signs, Recreational and Cultural Interest signs, and Miscellaneous Guide signs. This chapter describes the basic applications of the various types of freeway guide signs and identifies TxDOT design guidelines for some types of freeway guide signs, where design guidelines are provided in a separate TxDOT document.

White legends on green, blue, and brown background signs must be designed using the Clearview font (except route signs). Black legends must **not** use the Clearview font, but will use the standard FHWA Highway Series lettering (B, C, D, E, E [modified], or F). Sign illustrations in this chapter use the Clearview font for white on green, blue, and brown signs.

Section 2: Freeway Direction Signs (White on Green)

Introduction

The majority of freeway guide signs are the white-on-green direction signs that road users rely upon to provide most of the navigation information they need. Direction signs can be placed overhead or on the side of the freeway and include the following:

Overhead direction signs include:

- Advance Guide signs
- Exit Direction signs
- Exit Number panels
- Diagrammatic signs
- Interchange Sequence signs
- Pull-Through signs.

Ground-mounted direction signs include:

- Exit Gore signs
- Supplemental Guide signs
- Distance signs.

Overhead Sign Placement

Overhead signs are used when some degree of lane-use control is desired or where space is not available at the roadside. The following table provides sources of information on the placement of overhead signs.

Information on the Placement of Overhead Signs

For information on…	See…
Factors justifying the installation of overhead signs	Texas MUTCD, Section 2A.17
Vertical clearance of overhead signs	Texas MUTCD, Section 2A.18
Design and layout of overhead sign bridge structures	Traffic Engineering Standard Sheets (OSB & Monotube Series)

Advance Guide Signs

Advance Guide signs (see Figure 3-1 for example) provide advance notice of an upcoming interchange and the distance to the interchange.

Figure 3-1. Advance Guide sign.

Advance Guide signs are addressed in Section 2E.30 of the Texas MUTCD. For design and layout of Advance Guide signs, see Chapter 4, Freeway Guide Sign Design of this manual.

Design and Application. Advance Guide signs must include a destination and a distance to the exit. If appropriate, Advance Guide signs must also include a cardinal direction, Route sign, Exit Number panel, and Exit Only panel.

The distance may be omitted when there is an Exit Only panel and the distance to the exit is less than 1 mile.

The word EXIT should be omitted from the distance portion of the sign legend (i.e., Exit 1 Mile) if an Exit Number panel or an Exit Only panel is used.

If the freeway has numbered exits, an Exit Number panel must be used.

The legend in the Advance Guide sign must have the same format as the legend in the downstream Exit Direction sign, and the content should be consistent with the content of the Exit Direction sign.

Distances shown on Advance Guide signs should be shown as fractions and rounded to the nearest ¼ mile.

Number of Signs. If there is adequate space, an Advance Guide sign must be used for each interchange. Recommendations are as follows:

- For minor interchanges, one Advance Guide sign should be used.
- For intermediate and major interchanges, at least two, and preferably three, Advance Guide signs should be used.

If adequate space is not available, Interchange Sequence signs should be used.

Placement. Typical placements for Advance Guide signs are as follows:

- For minor interchanges, ½ mile to 1 mile.
- For intermediate and major interchanges, 2 miles, 1 mile, and ½ mile.

Exit Direction Signs

Exit Direction signs (see Figure 3-2 for example) are used to indicate the location of an exit ramp from the freeway.

Figure 3-2. Exit Direction sign.

Exit Direction signs are addressed in Section 2E.33 of the Texas MUTCD. For design and layout of Exit Direction signs, see Chapter 4, Freeway Guide Sign Design of this manual.

Design and Application. The following information covers the design and application of Exit Direction signs:

An Exit Direction sign should be used wherever traffic can exit from a freeway.

Exit Direction signs must include a destination and upward slanting arrow. If appropriate, Exit Direction signs must also include a cardinal direction, Route sign, Exit Number panel, and Exit Only panel.

Where the exit is a lane drop, a new TxDOT policy specifies that the arrow should be in the yellow Exit Only panel (black arrow) instead of a white arrow in the green portion of the sign.

The legend in the Exit Direction sign should have the same format as the legend in the upstream Advance Guide sign, and the content should be consistent with the content of the Advance Guide sign.

If the freeway has numbered exits, an Exit Number panel must be used.

Diagrammatic signs must not be used at the Exit Direction sign location.

Vertical Placement. The Texas MUTCD provides the following guidance concerning the vertical location of Exit Direction signs:

- The signs must be overhead where a through lane is terminated (lane drop).
- The sign should be overhead where there is less than 300 feet from the beginning of the deceleration lane to the theoretical gore.
- For multilane-exit interchanges, the sign should be located over the exiting lane.

Horizontal Placement. The Texas MUTCD provides the following guidance concerning the horizontal location of the Exit Direction sign:

- Ground-mounted Exit Direction signs should be installed at the beginning of the deceleration lane.
- Overhead Exit Direction signs should be installed at the theoretical gore.

Exit Number Panels

The Exit Number panel provides a means of identifying interchanges. In Texas, interchanges on Interstate highways are numbered using milepost marker (reference post) numbers. Exit numbers are not normally used on non-Interstate freeways in Texas. Figure 3-3 illustrates two types of Exit Number panels.

Figure 3-3. Exit Number panels.

Exit Number panels are addressed in Section 2E.28 of the Texas MUTCD and the *Standard Highway Sign Designs for Texas*.

Design, Application, and Placement. The following information covers the application, design, and placement of Exit Number panels:

The Exit Gore Sign Number panel must contain only the exit number.

The Guide Sign Number panel must contain the word EXIT and the exit number.

The Exit Number panel must be located at the top of the Advance Guide and Exit Direction signs or Exit Gore sign.

The Exit Number panel (for Advance Guide and Exit Direction signs) must be aligned to the side of the exit. The Number panel must be aligned to the right edge for a right-side exit and the left edge for a left-side exit. The Exit Number panel for Exit Gore signs must be centered to the parent sign.

Diagrammatic Signs

Diagrammatic signs are guide signs that show a graphic view of the exit arrangement in relation to the main highway. Diagrammatic signs are not widely used for freeway signing in Texas, although there are some situations where their use may be advantageous.

Diagrammatic signs are addressed in Section 2E.19 of the Texas MUTCD.

Minimum graphic sizes are listed in Table 2E-2.1 of the Texas MUTCD.

Because diagrammatic signs are not widely used in Texas, designers should contact the Traffic Operations Division before including diagrammatic signs in a project.

Interchange Sequence Signs

Interchange Sequence signs (see Figure 3-4 for example) are used instead of Advance Guide signs where the spacing between interchanges is less than 800 feet.

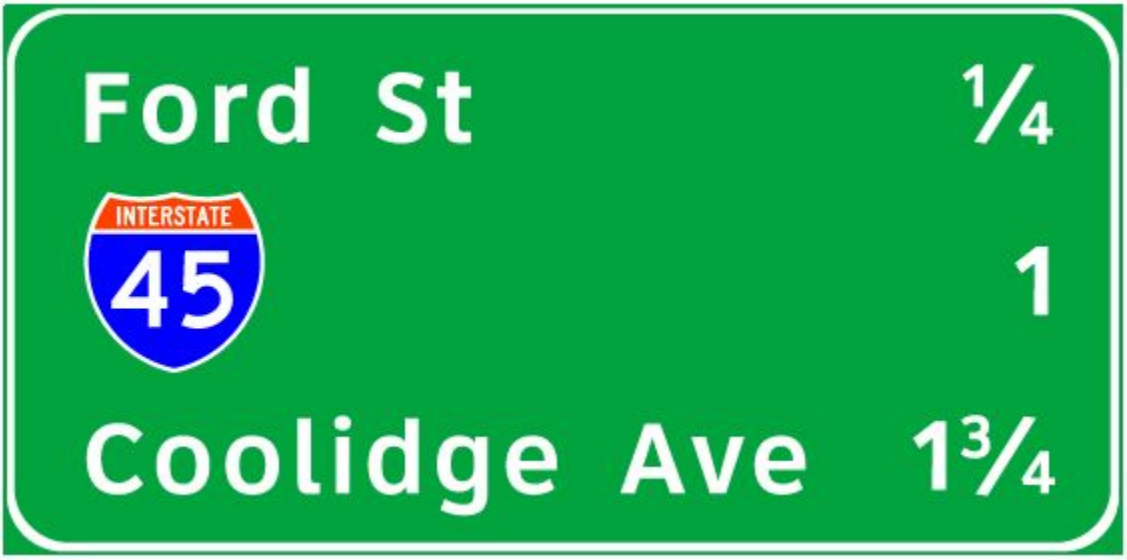


Figure 3-4. Interchange Sequence sign.

Interchange Sequence signs are addressed in Section 2E.37 of the Texas MUTCD. For design and layout of Interchange Sequence signs, see Chapter 4, Freeway Guide Sign Design of this manual.

Application and Placement. Interchange Sequence signs should not be used on a single-interchange basis. When used, Interchange Sequence signs should be used over the entire length of a route.

TxDOT uses Interchange Sequence signs in urban areas with populations of 100,000 or greater.

Design. Minimum letter height requirements (as shown in Table 2E-2.1 of the Texas MUTCD) are as follows:

- Interchange name: 13.3 inches for uppercase.
- Numeral: 13.3 inches.

Distances shown on Interchange Sequence signs should be shown as fractions and rounded to the nearest ¼ mile.

Chapter 9, Section 2, of the *Signs and Markings Volume* of the *Traffic Operations Manual* provides the following additional guidance concerning the design and layout of Interchange Sequence signs:

- An Interchange Sequence sign should not include more than three exits.
- An Interchange Sequence sign must not include destinations, city names, memorial highway names, periods, arrows, or EXIT ONLY messages.

Pull-Through Signs

Pull-Through signs (see Figure 3-5 for example) are overhead Lane-Use signs intended for through traffic. Pull-Through signs are addressed in Section 2E.11 of the Texas MUTCD.

Figure 3-5. Pull-Through sign.

Application. Pull-Through signs should only be used to identify the through lanes when it may not be readily evident to the road user which lanes are the through lanes.

Design. Minimum letter height requirements (as shown in Table 2E-2.1 of the Texas MUTCD) are as follows:

Destination	16 inches for uppercase
Cardinal direction	12 inches
1- or 2-digit shield	36 inches × 36 inches
3-digit shield	45 inches × 36 inches

Pull-Through signs should only include Route signs, cardinal directions, and major destinations (or control city). Down arrows should be used for clarity when the alignment and number of through lanes is not readily evident. When down arrows are used, an arrow should be positioned above each lane to which the Pull-Through sign applies.

Placement. When an overhead sign bridge is provided, a Pull-Through sign should be provided over the appropriate lanes (on same structure as the Exit Direction sign).

Exit Gore Signs

Exit Gore signs (see Figure 3-6 for examples) are used to indicate the place of departure from the main roadway. Exit Gore signs are addressed in Section 2E.34 of the Texas MUTCD.

Figure 3-6. Exit Gore signs.

Design and Application. The Exit Gore sign must contain the word EXIT and an arrow. If the freeway has numbered exits, an Exit Number panel must be used above the Exit Gore sign. The Exit Number panel must be aligned to the side of the exit.

There are two sizes of Exit Gore signs (see Texas SHSD). The larger size should be used for major and intermediate interchanges. The smaller size may be used for minor interchanges.

Any of several arrow designs may be used on the Exit Gore sign, depending upon the sign size and the alignment of the exiting ramp.

- The straight arrow (A-2 or B-1) should be used for a ramp with a primarily tangent alignment.
- The curved arrow (E-3 or E-3a) may be used for a ramp with curved alignment.
- The circular arrow (E-4 or E-4a) may be used for a loop ramp.

Placement. The Exit Gore sign shall be located in the gore between freeway main lanes and the exit ramp.

Supplemental Guide Signs

Supplemental Guide signs (see Figure 3-7 for examples) provide information regarding destinations accessible from an interchange, other than places shown on the standard Advance Guide or Exit Direction signs. Supplemental Guide signs are addressed in Section 2E.32 of the Texas MUTCD.

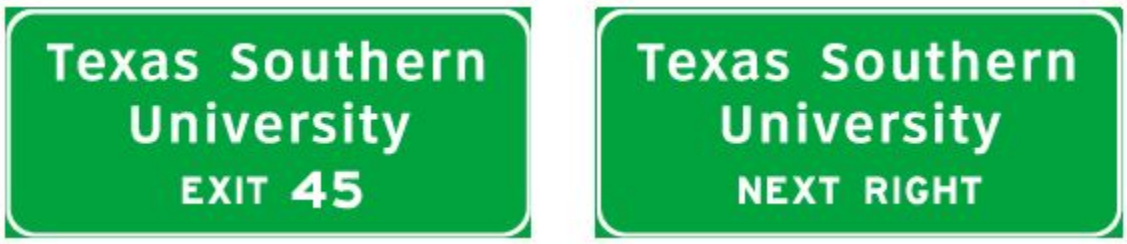


Figure 3-7. Supplemental Guide signs.

Design. Minimum letter and numeral sizes for Supplemental Guide signs (as listed in Table 2E-2.1 of the Texas MUTCD) are as follows:

- Exit number word: 10 inches.
- Exit number numeral and letter: 15 inches.
- Destination: 13.3 inches for uppercase.
- Action message: 10 inches.

The sign should list no more than two destinations.

Destinations should be followed by the interchange number (and suffix), or if interchanges are not numbered, by the legend NEXT RIGHT or SECOND RIGHT or both, as appropriate.

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

Supplemental Guide signs should be installed on an independent guide sign assembly.

Where two or more Advance Guide signs are used, the Supplemental Guide sign should be installed approximately midway between two of the Advance Guide signs. If only one Advance Guide sign is used, the Supplemental Guide sign should follow it by at least 800 ft.

Distance Signs

Distance signs (see Figure 3-8 for example) indicate the distance to significant destinations. Distance signs are addressed in Section 2E.36 of the Texas MUTCD.

Figure 3-8. Distance sign.

Design. Minimum letter and numeral sizes for Distance signs (as listed in Table 2E-2.1 of the Texas MUTCD) are as follows:

- Destination: 8 inches for uppercase.
- Numeral: 8 inches.

A Distance sign usually contains two or three lines. The maximum number of lines is three.

The top line must identify the name and actual distance to the community or destination (or route number or name if there is no community) associated with the next meaningful interchange.

The bottom line must provide the name and distance to a control city (on interstate highways) or an equivalent city (on non-interstate routes).

Placement. If the space between interchanges permits, Distance signs should be located at the end of a three-sign sequence beginning 500 ft beyond the end of the acceleration lane as follows:

1. Route sign: 500 ft beyond the end of the acceleration lane.
2. Speed Limit sign: 1,000 ft beyond Route sign.
3. Distance sign: 1,000 ft beyond Speed Limit sign.

Section 3: General Service Signs (White on Blue)

Introduction

White-on-blue General Service signs provide road users with generic information about facilities and services that are available along the roadway. Several different types of General Service signs are commonly used in freeway corridors. They most commonly include:

- Rest Area signs
- Tourist Information and Welcome Center signs
- Radio-Traffic Information signs
- Specific Services signs.

Types of Facilities

General Service signs can identify several types of facilities that may be provided within the freeway right of way where road users can stop and avail themselves of various services. The following table describes these facilities in order from the most primitive to the least primitive.

Types of Facilities Provided for Motorists within the Right of Way

(listed in order from most primitive to least primitive)	
Facility Type	Description
Parking area	Provides only a place where vehicles can exit the freeway and park so drivers and passengers can stop traveling and take a break. No other services are typically provided at these locations.
Picnic area	Parking facility that also provides picnic tables.
Rest area	Picnic facility that also provides restrooms. In some cases vending machines may also be provided at the rest area.
Tourist information and welcome center	Manned during some portion of the day to provide road users with travel information. They also provide the same services available at rest area facilities.

Rest Area Signs

Rest Area signs (see Figure 3-9 for examples) provide information about then location of rest areas:

Figure 3-9. Rest Area signs.

Rest Area signs are addressed in Section 2E.52 of the Texas MUTCD. The provisions in Section 2D.42 of the Texas MUTCD also apply; however, the signs should be suitable for freeway applications. Additional guidance is provided in Chapter 8, Section 5, of the *Signs and Markings Volume* of the *Traffic Operations Manual*.

Rest areas that include tourist information and welcome centers are addressed in Section 2E.53 of the Texas MUTCD.

Placement. Rest Area Advance signs must be placed 1 or 2 miles in advance of the rest area or at both locations.

Rest Area signs may only be used where parking and restroom facilities are available.

A rest area with parking and picnic tables but no restrooms should be signed PICNIC AREA. Figure 3-10 provides an example of Picnic Area signs.

A rest area with parking but no restrooms should be signed PARKING AREA.

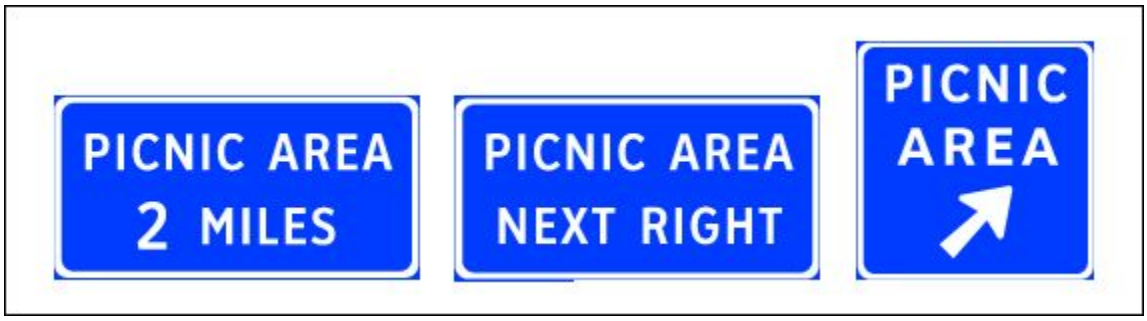


Figure 3-10. Picnic Area signs.

Tourist Information and Welcome Center Signs

Tourist Information and Welcome Center signs (see Figure 3-11 for example), provide information about the location of tourist information and welcome centers.

Figure 3-11. Tourist Information sign.

Tourist Information and Welcome Center signs are addressed in Section 2E.53 of the Texas MUTCD.

Design. Minimum letter and numeral sizes for Tourist Information and Welcome Center signs should be the same as Rest Area signs.

Placement and Application. Section 2E.51 of the Texas MUTCD addresses location requirements for the Advance Guide, Exit Direction, and Exit Gore signs needed for tourist information and welcome centers.

Tourist information and welcome centers are usually built within rest areas. The Texas MUTCD provides the following information for rest areas that also serve as tourist information or welcome centers:

If the initial Advance Guide and Exit Direction signs for the rest area are already in place, Supplemental panels with the legend TOURIST INFO CENTER or WELCOME CENTER should be used. An alternative to the Supplemental panel is the Information Symbol (D9-10) described in Section 2D.45 of the Texas MUTCD. Otherwise, the message on the Advance Guide and Exit Direction signs should include a reference to the rest area and the tourist information and welcome center. The Advance Guide sign should also include the distance to the rest area. The Exit Gore sign should only contain the legend REST AREA.

For tourist information centers located off the freeway facility, the Texas MUTCD states that signing should be provided on the crossroad to guide drivers from the interchange to the tourist information center and back to the interchange.

Radio-Traffic Information Signs

Radio-Traffic Information signs (see 3-12 for example) provide information about radio stations that broadcast traffic-related information.

Figure 3-12. Radio-Weather Information sign.

Radio-Traffic Information signs are addressed in Section 2E.56 of the Texas MUTCD.

Radio-Traffic Information signs are designated as D12-1 signs with specifications given in *Standard Highway Signs*. For freeway applications, the larger letter height (10 inches) should be used.

The Texas MUTCD provides the following information about the location and content of Radio-Traffic Information signs:

- Only the numerical indication of the radio frequency may be used.
- No more than three frequencies may be shown on each sign. In rest area locations, signs may display a greater number of radio frequencies. However, those signs must not be visible from the main lanes.
- The signs must only display radio stations that broadcast driving-condition information affecting the roadway being traveled during adverse traffic conditions at no more than 15-minute intervals.

Specifically not allowed on the broadcasts of the radio stations displayed on the signs are:

- Identification of commercial names.
- Commercial messages.

Signs for stations that provide traffic information on a seasonal basis must be removed or covered during the off season.

Specific Information Logo Signs

Specific Information Logo signs (see Figure 3-13 for example) provide the driver with guidance for specific motorist services available at the approaching interchange. These signs are referred to

as Specific Service signs in the Texas MUTCD and they are commonly known as Logo signs. The services eligible for Specific Information Logo signs are food, gas, lodging, and camping.

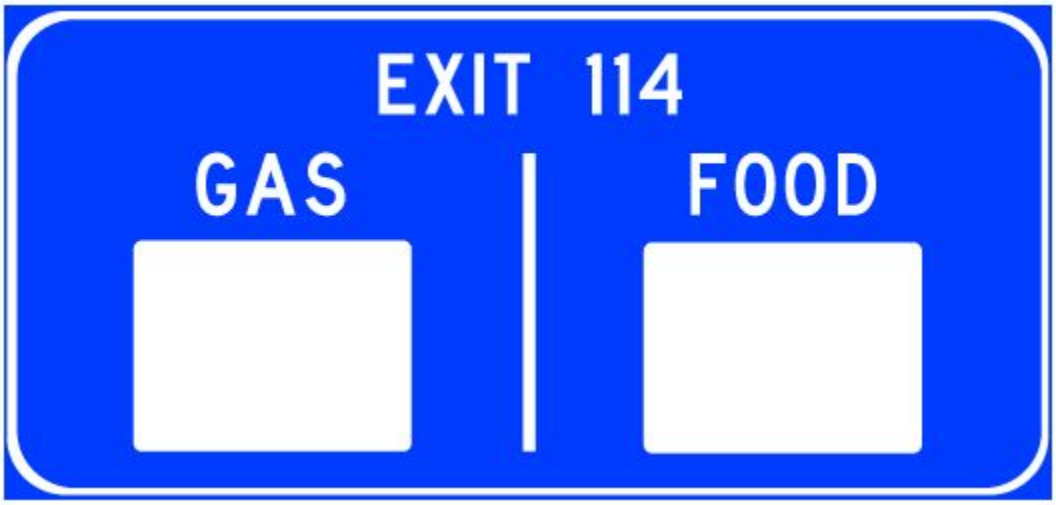


Figure 3-13. Specific Information Logo sign.

Sections 391.091 through 391.098 of the Texas Transportation Code set forth the conditions under which Logo signs and Shopping Mall signs are used. Texas Administrative Code Title 43, Section 25.400, describes the Logo and Shopping Mall sign programs in detail.

Chapter 14 of the *Traffic Operations Manual: Signs and Markings Volume* contains the operational procedures of the Specific Information Logo sign program.

Specific Services signs are addressed in Chapter 2F of the Texas MUTCD.

Traffic Engineering Standard Sheets LOGO(1), LOGO(2), and LOGO(3) address the design and layout of Specific Information Logo signs.

Specific Information Logo signs are installed and maintained by a private company under contract to TxDOT.

Section 4: Recreational and Cultural Interest Area Signs (White on Brown)

Introduction

Recreational and cultural interests are attractions or traffic generators that are open to the general public for the purpose of play, amusement, or relaxation. Where recreational and cultural-interest areas are a significant destination on a numbered highway route, special signs may be posted for such areas (see Figure 3-14 for example). These signs may be used on freeways where there is direct access to these areas.

Figure 3-14. Recreational Area guide signs.

Recreational and Cultural Interest Area signs are addressed in Chapter 2H of the Texas MUTCD.

Design and Application

White-on-brown Supplemental guide signs may be used to direct users to recreational or cultural interest areas.

When a recreational or cultural interest destination is paired with a city or street destination the sign shall be white on green.

Letter style and minimum letter-numeral sizes should be consistent with standard white-on-green Advance Guide, Exit Direction, and supplemental signs.

The background color of the Interchange Exit Number panel must match the background color of the guide sign. A brown panel should not be included within the border of a green or blue sign.

All Exit Gore signs must remain white on green.

Section 5: Miscellaneous Guide Signs (White on Green)

Introduction

In addition to the major types of freeway guide signs discussed in the preceding sections, there are other types of guide signs that are sometimes used on freeways. Many of these signs are not commonly used on Texas freeways. They include:

- Community Interchange Identification signs
- Next X Exits signs
- Next Exit supplemental signs
- Weigh Station signs
- Guide sign Routing plaques.

Next X Exits Signs

Next X Exits signs (see Figure 3-15 for example) provide information about which exits lead to a community

Figure 3-15. Next X Exits sign.

Next X Exits signs are addressed in Section 2E.39 of the Texas MUTCD.

Design and Application. Minimum letter and numeral sizes (as listed in Table 2E-2.1 of the Texas MUTCD) are as follows:

- Place name: 13.3 inches.
- Next X Exits: 10 inches.

The sign legend should identify the region or area followed by the words Next X Exits.

All exits included within the numeral selected should provide a reasonably good and direct route to the central business district.

No exit included within the numeral should result in back-signing or back-tracking to reach the central business district.

The numeral should not exceed 4 exits. When numerals get larger than 4, the value of the sign for guiding traffic is reduced.

Next Exit Supplemental Signs

The Next Exit supplemental sign (see Figure 3-16 for example) provides road users with information about the distance they will have to travel before they will have another opportunity to exit the freeway.

Figure 3-16. Next Exit supplemental sign.

Next Exit supplemental signs are addressed in Section 2E.31 of the Texas MUTCD.

Design and Application. Minimum letter and numeral sizes are listed in Table 2E-2.1 of the Texas MUTCD — words and number: 8 inches.

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

If used, the sign is placed below the Advance Guide sign nearest the interchange.

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

Weigh Station Signs

Weigh Station signs provide information about the location of weigh stations.

Weigh Station signs are addressed in Section 2E.58 of the Texas MUTCD.

Traffic Engineering Standard Sheet WSSFT addresses the design and layout of Weigh Station signs for freeway applications. This sheet includes sign dimensions, letter heights, and alphabet (font) style.

Guide Sign Routing Plaques

Guide Sign Routing plaques (see Figure 3-17 for examples) provide supplemental information on travel routes for selected destinations or types of vehicles.

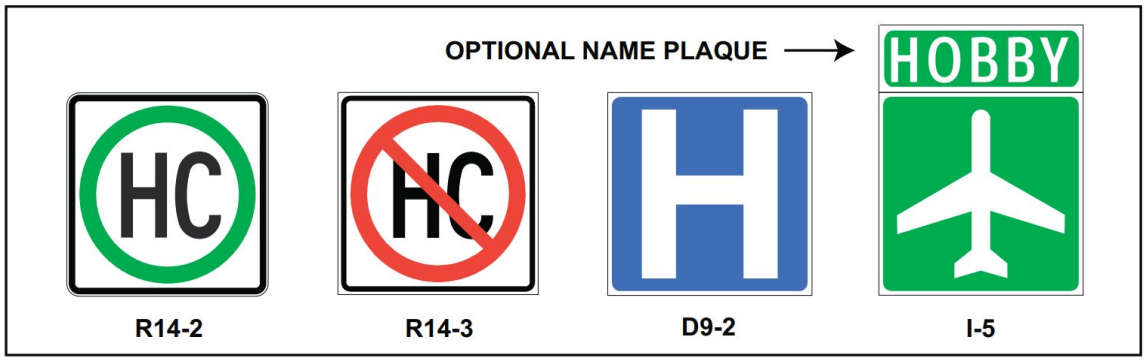


Figure 3-17. Guide Sign Routing plaques.

Traffic Engineering Standard Sheet TSR(2) addresses the design and layout of Guide Sign Routing plaques.

Placement. Figure 3-18 shows the placement for Guide Sign Routing plaques.

Plaques should be horizontally centered at the top of the parent guide sign.

If the parent guide sign includes an Exit Number panel, the plaque (or plaques) should be centered between the Exit Number panel and the opposite sign edge. A spacing of 6 inches between the edge of the sign and the Exit Number panel is desired.

If there is not enough space to place a routing plaque in between the Exit Number panel and the sign edge, the plaque may be placed above the Exit Number panel.

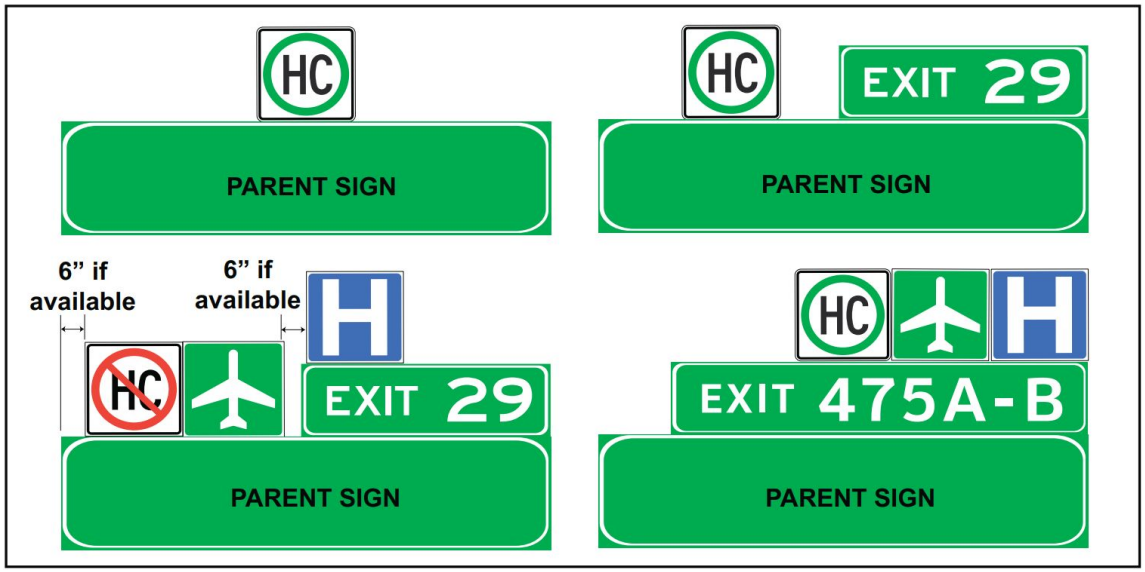


Figure 3-18. Overhead freeway guide sign and routing plaque typical assemblies.

Chapter 4: Freeway Guide Sign Design

Contents:

Section 1: Overview

The *Texas Manual on Uniform Traffic Control Devices* (Texas MUTCD), TxDOT's Traffic Engineering Standard Sheets, *Standard Highway Sign Designs for Texas*, and *Traffic Operations Manual: Signs and Markings Volume* contain information on how to design freeway guide signs in Texas. However, in many cases, detailed guidance on how to design and lay out a guide sign is scattered among these documents. The purpose of this chapter is to provide guidance and references for the basic design and layout of freeway guide signs.

Basic freeway guide signs are standardized with specific design details given in the *Standard Highway Sign Designs for Texas*. These signs include Exit Gore signs, Exit and Guide Sign Number panels, Rest Area and Picnic Area signs, Left Exit and Exit Only panels, and various other freeway signs. However, Advance Guide and Exit Direction signs need to be designed separately because of the variability in message, sign size, and location.

This chapter contains details on the types of freeway guide sign design elements, including abbreviations, Route signs, arrows, and sign panels. This information is followed by general guidance regarding sign lettering and sign layout.

Information provided in this chapter primarily comes from the Texas MUTCD, Traffic Engineering Standard Sheets, *Standard Highway Sign Designs for Texas*, *Traffic Operations Manual: Signs and Markings Volume*, and the National Manual on Uniform Traffic Control Devices (National MUTCD). Specific design guidance is illustrated or referenced to the appropriate documents for additional information.

Section 2: Guide Sign Elements

Introduction

Freeway guide signs contain various design elements that inform drivers of a particular route or destination. This section provides design guidance on these elements, which include abbreviations, Route signs, arrows, and advisory sign panels.

Abbreviations

Abbreviations should be avoided whenever possible; however, abbreviations can be useful when completing destination messages on signs of limited size. When used, abbreviations should be only those that are commonly recognized and understood by motorists. The table below provides a list of the common abbreviations for freeway guide signs.

The words NORTH, SOUTH, EAST, and WEST must not be abbreviated when used with Route signs to indicate cardinal directions. The abbreviations for these words are intended for use with a destination name (place or street).

Periods are neither required nor suggested unless noted in the following table. In general, periods may be used when a cardinal direction is abbreviated as part of a destination name or when "United States" is abbreviated, other than for a U.S. numbered route.

Acceptable Abbreviations for Freeway Guide Signs

Word(s)	Abbreviations
Air Force	(**See**: United States Air Force)
Air Force Base	AFB
Agency	Agcy
Alternate	ALT **or** Alt
Arkansas (the state)	Ark **(preferred)**, AR, **or** Ar
Army	(**See**: United States Army)
Association	Assoc
Avenue	Ave
Beltway	Bltwy **(shield preferred)**
Boulevard	Blvd
Branch	**Not recommended**
Business	**Not recommended**

Acceptable Abbreviations for Freeway Guide Signs

Word(s)	Abbreviations
Bypass	**Not recommended**
Causeway	Cswy
Center	Ctr
Circle	Cir
Compressed Natural Gas	CNG
Coast Guard	(**See:** United States Coast Guard)
Community College	CC
Construction	Const
Convention	Conv
County	Co
Court (street name only)	Ct
Cove	**Not recommended**
Creek	**Not recommended**
Crossing	Xing
Department	Dept
Division	Div
Downtown	**Not recommended**
Drive	Dr
East	E
Expressway	Expwy
Farm Road	FM **(shield preferred)**
Farm to Market Road	FM **(shield preferred)**
Fort	Ft
Freeway	Frwy **or** Fwy
Gardens	**Not recommended**
Hazardous Materials	HAZMAT
Heights	**Not recommended**

Acceptable Abbreviations for Freeway Guide Signs

Word(s)	Abbreviations
High Occupancy Vehicle	HOV
Highway	Hwy
Hospital	**Not recommended**
Information	Info
Institute	Inst
Interchange	Intchg
International	Intl
Interstate	IH **(shield preferred)**
Junction	JCT **or** Jct
Junior College	JC
Lane	Ln
Left	**Not recommended**
Loop	**Not recommended — use shield**
Louisiana (the state)	La **(preferred) or** LA
Marine Corps	(**See:** United States Marine Corps)
Maximum	Max
Metropolitan	Metro
Mexico	**Not recommended or** Mex
Miles Per Hour	MPH
Minimum	Min
Mount	Mt
Mountain	Mtn
National Guard	**Not recommended**
Naval Air Station	NAS
New Mexico (the state)	NM
North	N
Oklahoma	Okla **(preferred)**, OK, **or** Ok

Acceptable Abbreviations for Freeway Guide Signs

Word(s)	Abbreviations
Park	**Not recommended**
Park Road	PR **(shield preferred)**
Parkway	Pkwy
Place	Pl
Point	Pt
Port	**Not recommended**
Railroad	RR
Ranch Road	RM **(shield preferred)**
Ranch to Market Road	RM **(shield preferred)**
Right	Rt
Road	Rd
Route	Rte
South	S
Spring or Springs	**Not recommended**
Spur	**Not recommended — use shield**
Square	Sq
State	**Not recommended**
State Highway	SH **(shield preferred)**
Saint	St
Street	St
Summit	Smt
Temporary	Temp
Terrace	Ter
Texas	Tx **(preferred) or** TX
Through	Thru **or** THRU
Toll Road	**Not recommended**
Tourist	**Not recommended**

Acceptable Abbreviations for Freeway Guide Signs

Word(s)	Abbreviations
Trail	Tr
Trucks	**Not recommended**
Turnpike	**Not recommended**
University	Univ
United States	US **or** U.S.
United States Air Force	USAF **or** US Air Force
United States Army	US Army
United States Coast Guard	USCG **or** US Coast Guard
United States Marine Corps	USMC **or** US Marine Corps
United States Navy	USN **or** US Navy
Weight	Wt
West	W

Route Signs

Route signs identify the class and number of the highway facility of interest. Route signs can be mounted independently or within a freeway guide sign. Figure 4-1 illustrates the differences between the two types of Route signs. Independently mounted Route signs are mounted on a post and typically used on route confirmation assemblies. Examples of the appearance of independently mounted Route signs are shown in Figure 4-2. Guide-sign mounted Route signs are attached to a larger guide sign. Figure 4-3 shows the appearance of Guide-sign mounted Route signs.

General guidance on Route sign size and placement is presented later in this chapter. Dimensional data for Route signs (guide sign and independent use) are given in the *Standard Highway Sign Designs for Texas*.

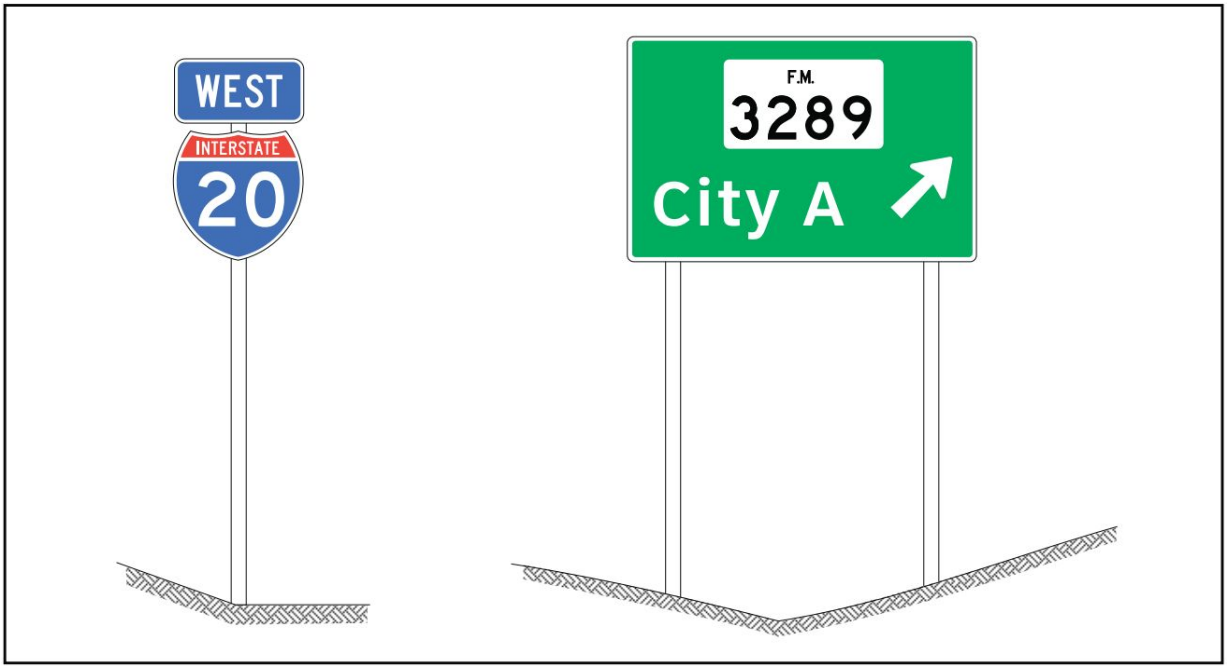


Figure 4-1. Types of Route sign mounts.

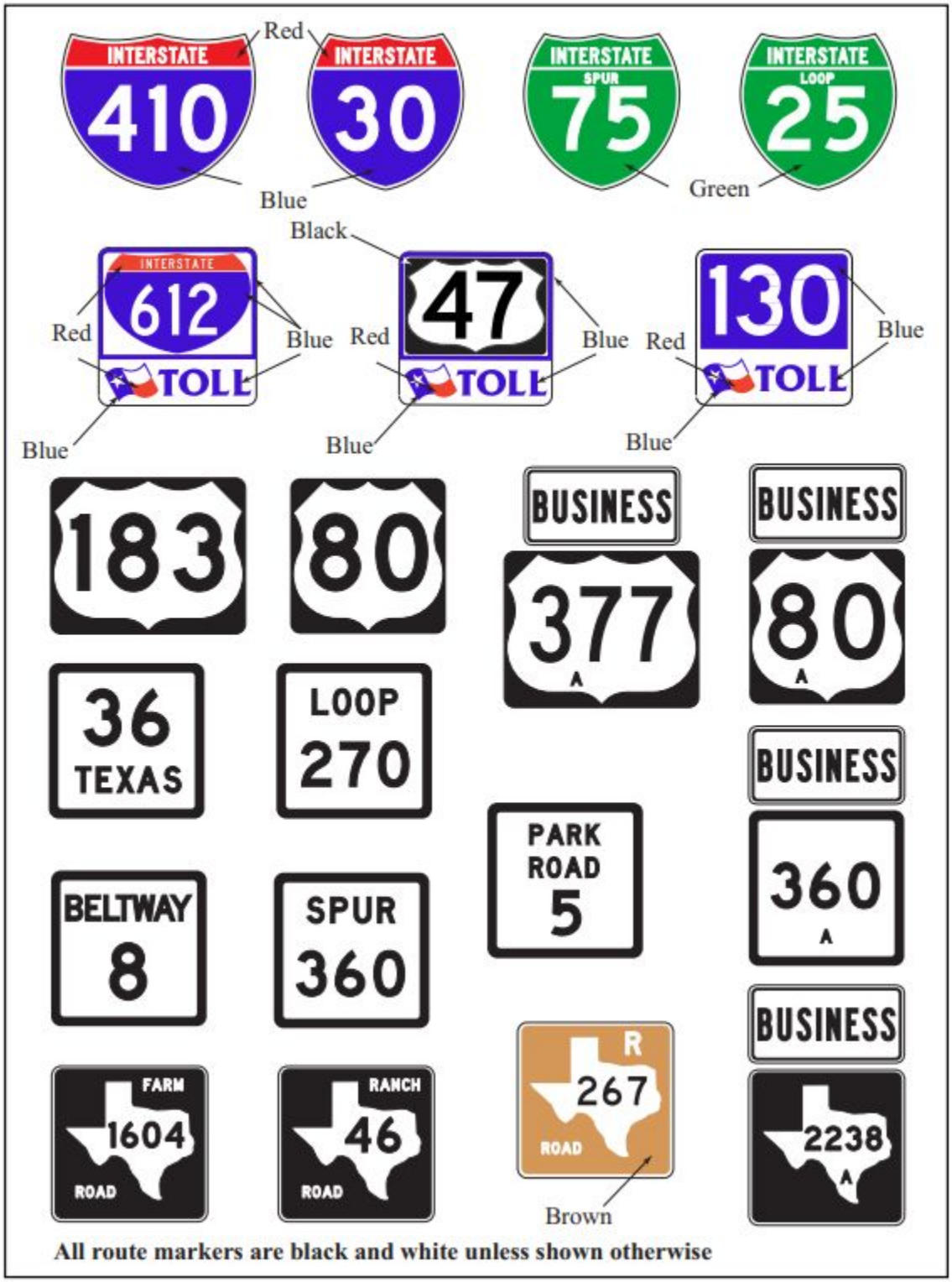


Figure 4-2. Independent ground-mounted Route signs. All route markers are black and white, unless shown otherwise.

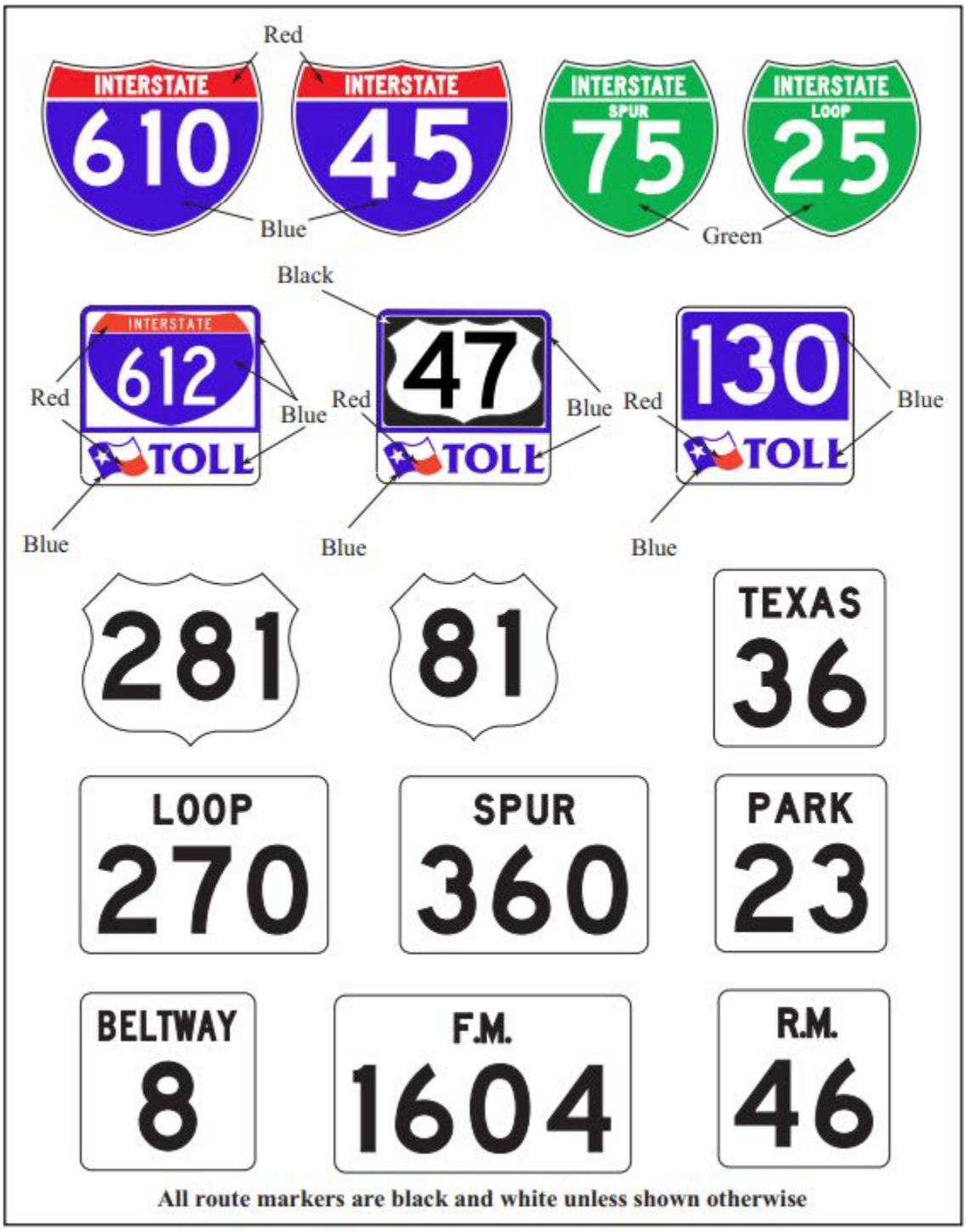


Figure 4-3. Guide-sign mounted Route signs. All route markers are black and white, unless shown otherwise.

Arrows

Arrows are used on freeway guide signs to indicate the direction toward designated routes or destinations. Variations of the "Up" arrow are all rotations of either of two arrow types (Type A and B) and are dependent on the type of guide sign and location of the arrow on the sign. The "Down" arrow (Type C) is a separate arrow type and has a set size for all applications. Figure 4-4 shows the three basic types of arrows.

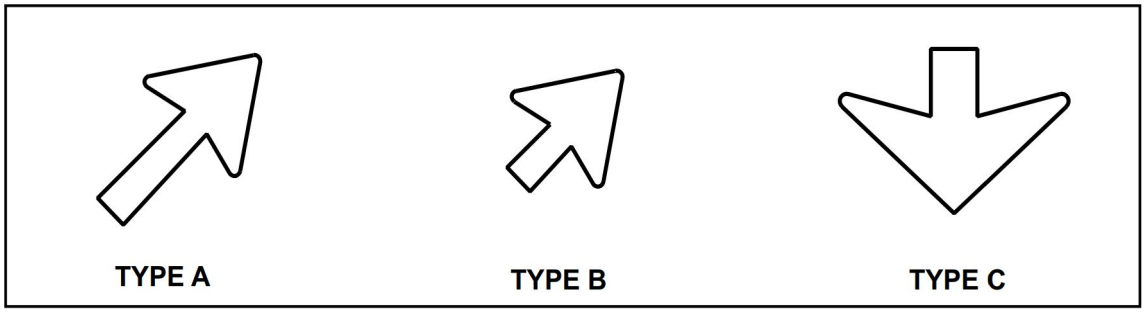


Figure 4-4. Arrows used on freeway guide signs.

Type A arrows are primarily used on Exit Direction signs (Figure 4-5). The Type A arrow is white and has a longer shaft than a Type B arrow. Type A arrow dimension details are provided in the *Standard Highway Sign Designs for Texas*.

On Exit Direction signs, both overhead and ground mounted, the Type A arrow must be upward slanting and should be pointed at 45 degrees from the horizontal to convey a clear comprehension of the direction to be taken. The arrow must also be placed at the right side of the sign for right exits, and at the left side of the sign for left exits. Specific arrow placement on a Guide sign panel is discussed later in this chapter.

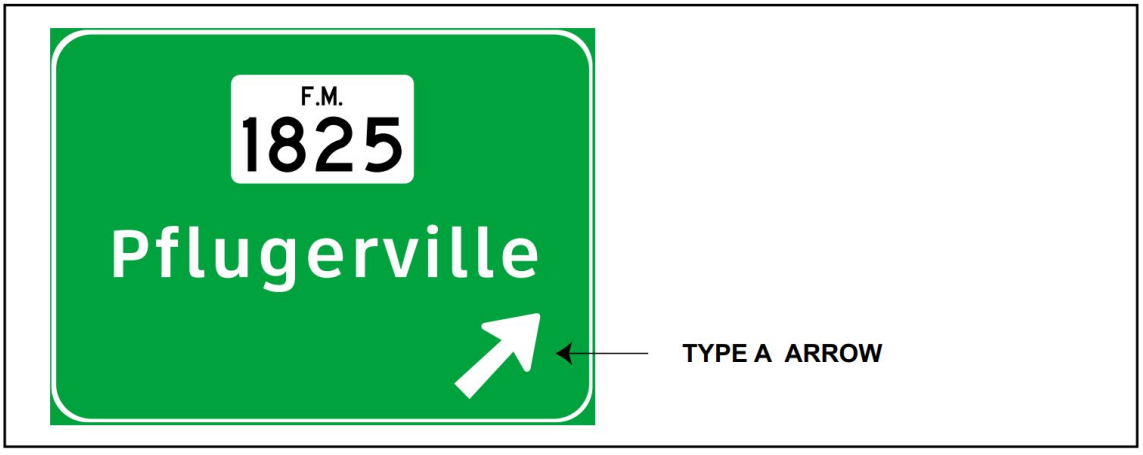


Figure 4-5. Type A arrow used on an Exit Direction sign.

Type B arrows are primarily used on Exit Direction signs for multi-lane exits (Figure 4-6). Depending on its use and the sign panel color, the Type B arrow can be white or black. It has a shorter shaft than a Type A arrow. Specific standards for the arrows used on multi-lane Exit

Direction signs are given in the *Standard Highway Sign Designs for Texas*. Type B arrows may also be used on single-lane Exit Direction signs.

Figure 4-6. Type B arrows used on an Exit Only panel.

Type C arrows are downward pointing arrows that are used only on overhead guide signs to indicate the use of specific lanes for traffic bound for a destination or route that can be reached only by being in the lanes so designated (Figure 4-7). The Type C arrow is white and has one specified size. Downward pointing arrows must not be used unless an arrow can be pointed to each lane that can be used to reach the destination or route shown on the sign. The Type C arrow dimension detail is provided in the *Standard Highway Sign Designs for Texas.*

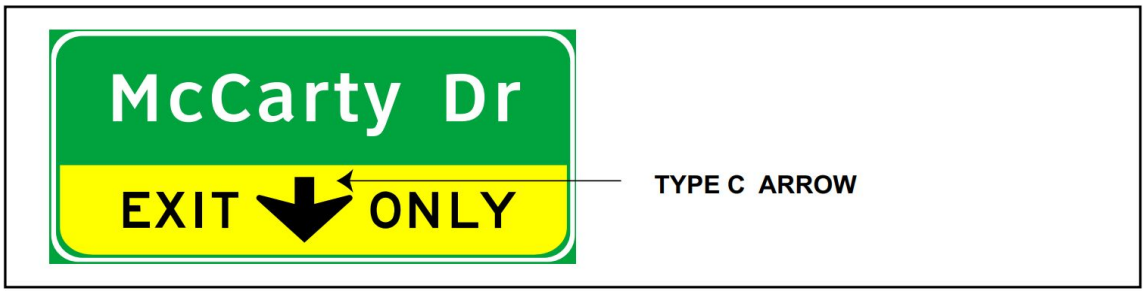


Figure 4-7. Type C arrow used on an Exit Only panel.

The number of arrows on a sign structure as a whole must be equal to the number of lanes underneath the sign structure, unless there is an optional lane. When there is an optional lane, the number of arrows on the sign structure may be the same as the number of lanes immediately downstream of the structure, if the structure is located within the lane-increase transition.

Advisory Sign Panels

In some cases, it may be necessary or desirable to include an advisory or warning message as part of a guide sign panel. Figure 4-8 shows two examples of Advisory sign panels. Situations possibly warranting the uses of Advisory or Warning sign panels include:

- **lane drop (Exit Only) at an exit** — Exit Only signing is a common freeway guide signing practice that is described in the Texas MUTCD

- **advisory speed for a ramp —** used where the advisory speed for an exit or connecting ramp is significantly lower than driver expectancy for the exit or ramp
- a lane ending on the left side of the freeway (not a lane drop at an exit)
- extremely low clearance situations.

Other types of warning messages may be appropriate to include as part of a guide sign panel. TxDOT staff should consult with the TxDOT Traffic Operations Division for assistance when a warning or advisory message is being considered for a guide sign panel.

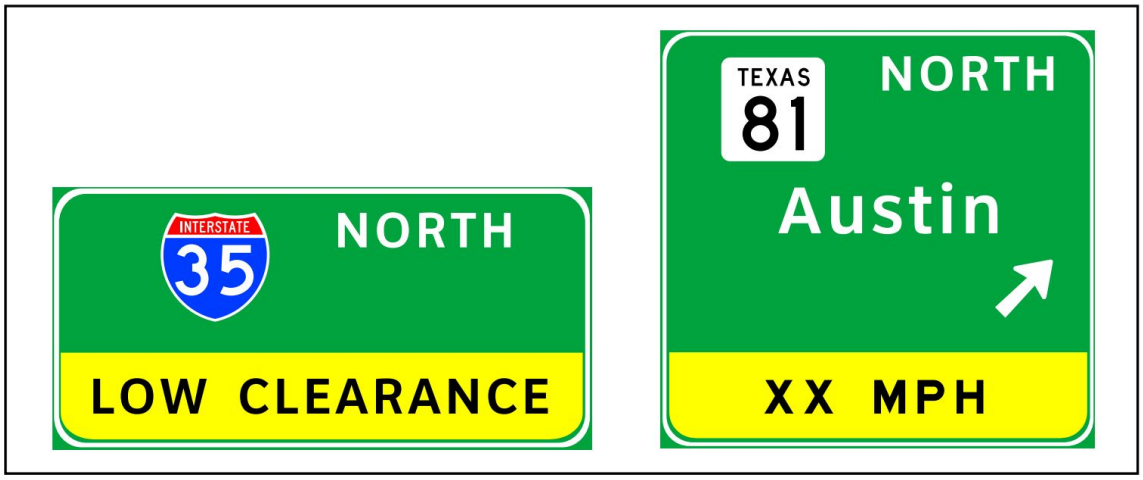


Figure 4-8. Examples of Advisory/Warning panels.

Section 3: Guide Sign Lettering

Letter Style

Sign lettering for word messages on freeway guide signs is uppercase, with the exception of destinations (names of places, streets, and highways). All destinations on guide signs must be composed of lowercase letters with initial uppercase letters. Since the 1950s, the Highway Series alphabet has been used as the letter style for freeway guide signs. The Series E (Modified) alphabet is the letter style that is most commonly associated with freeway signs. In the late 1990s and early 2000s, TxDOT began researching the performance of a different alphabet for freeway guide signs. This alphabet (or font) is known as Clearview, and it is available in several different stroke widths. In 2003, TxDOT decided to implement Clearview as the standard font for all freeway guide signs (white on green, white on blue, and white on brown). All of the guide signs illustrated in this handbook use Clearview for the white part of the sign legend.

Clearview is available in several different stroke widths. Clearview 5WR is used for the white legend in Exit Direction and Advance Guide signs. Other styles of Clearview are used in other types of white on green signs. Figure 4-9 illustrates the letters and numbers for Clearview 5WR.

Several unique features to the Clearview font make it different from the traditional highway alphabet:

- The loop height (or x-height) of the lowercase letters is greater than the 75 percent associated with the highway alphabet.
- The letter height is not independently specified for lowercase letters.
- The lowercase ascender letters (b, d, f, h, k, l, and t) are taller than an uppercase letter of the same height.
- The fractions are taller than an uppercase letter of the same height.

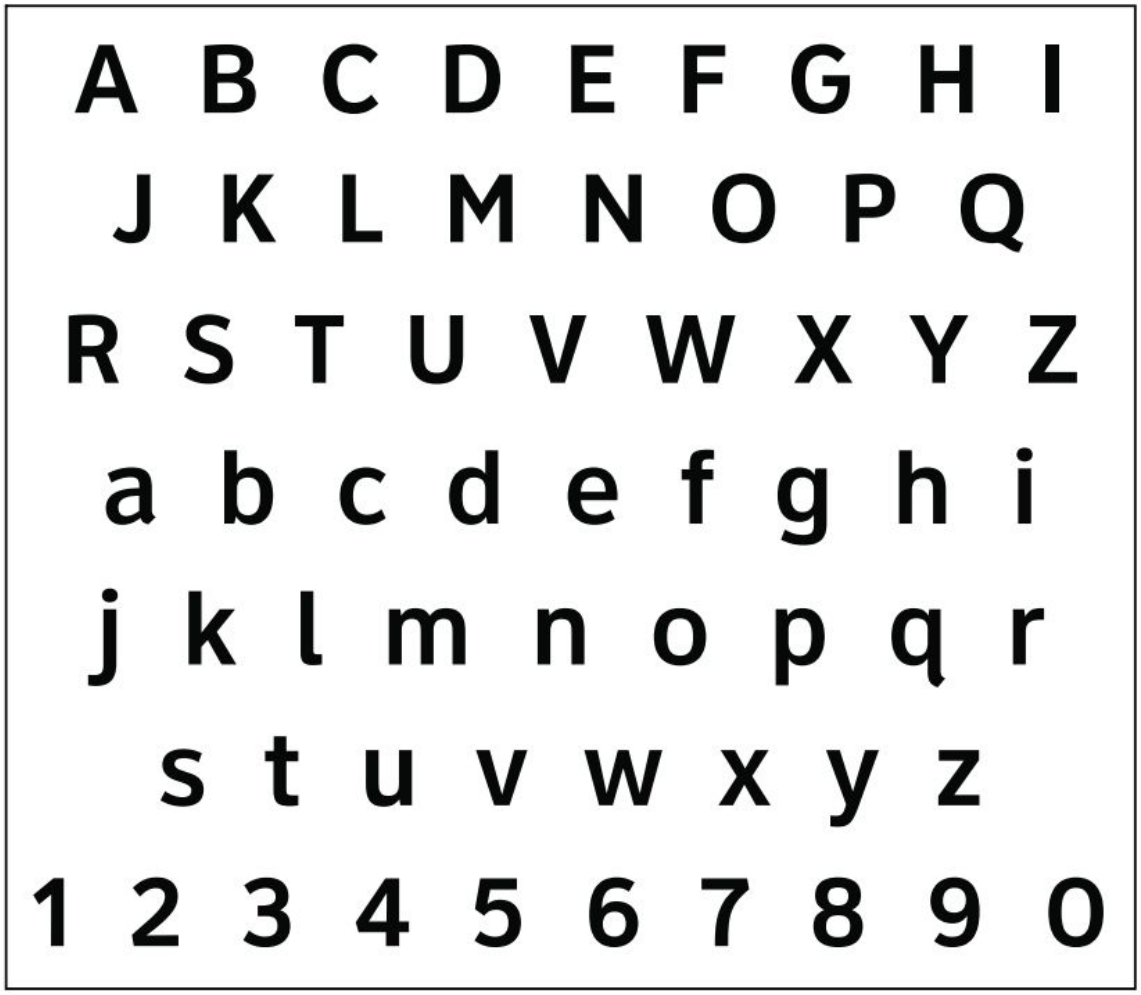


Figure 4-9. Clearview 5WR font for white legend on freeway guide signs.

Letter Size

The Texas MUTCD provides guidance as to the letter height on guide signs. For freeway guide signs, the message dimensions and letter size must be determined first, and the outside dimensions second. Lettering size on freeway signs is dependent on the type of interchange or sign, and must be the same for both rural and urban conditions.

Letter and numeral sizes for freeway guide signs according to interchange classification and component of sign legend are given in the Texas MUTCD. The minimum and desirable sizes for sign elements on Advance Guide and Exit Direction signs are shown in the following table. The minimum sizes for sign elements on other types of freeway signs are provided in Chapter 3.

Minimum Letter and Number Sizes for Advance Guide and Exit Direction Signs

Type of Sign and Sign Elements		Minimum Height (inches)	Letter Style
Exit Panel			
	Word	10	CV 4W
	Numeral and Letter	15	CV 4W
Interstate Route Sign			
	Numeral[1]	18	D
	Shield (1-2 Digit)	36 × 36	—
	Shield (3 Digit)	45 × 36	—
U.S. or State Route Sign, Business, Loop, or Spur Interstate Route Sign			
	Numeral[1]	18	D
	Shield (1-2 Digit)	36 × 36	—
	Shield (3 Digit)	45 × 36	—
Or Alternative (Ex: U.S. 56)			
	Initials	12	CV 5WR
	Numerals	15	CV 5WR
Cardinal Direction			
	Word[2]	12	CV 5WR
"BUSINESS"			
	Word	10	CV 5WR
Name of Place, Street, or Highway			
	Word	16	CV 5WR
Distance Message			
	Numeral	15	CV 5WR
	Fraction	10	CV 5WR
	Word	10	CV 5WR

NOTES:

1. In a few cases numerals cannot be accommodated within the space available. For these cases, the standard series D numeral may be reduced to C, or as a second choice to the next smaller height commonly available.

2. It is Texas practice that the entire cardinal direction word be the same letter size.

Examples of letter style and minimum letter and numeral sizes on an Advance Guide sign are shown in Figure 4-10.

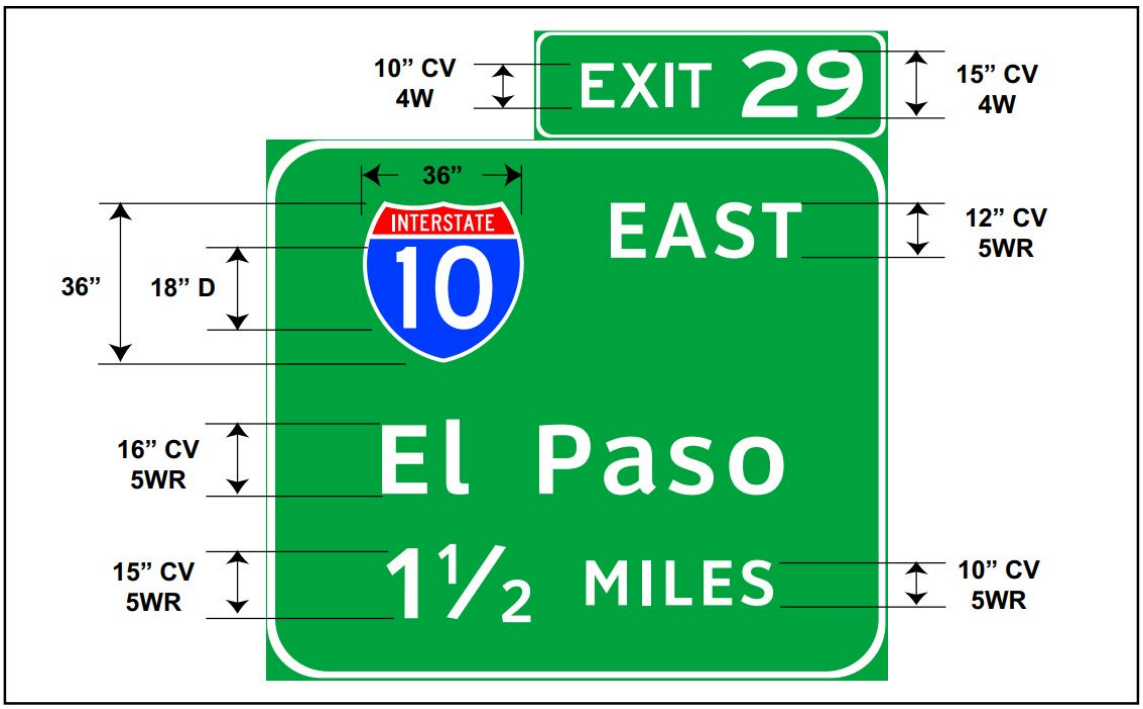


Figure 4-10. Letter style and minimum letter and numeral sizes on an Advance Guide sign.

Letter Spacing

The amount of space between letters and numerals in a word message varies with the shape, size, and style of letters. The Clearview 5WR alphabet has been developed with extensive letter spacing combinations to optimize the legibility of individual letter combinations. The letter spacing built into the Clearview font should be used for the design and fabrication of freeway guide signs.

Section 4: Guide Sign Layout

Introduction

This section provides general guidelines on the layout of freeway guide signs. Many of these guidelines are provided in the Texas MUTCD, *Standard Highway Sign Designs for Texas*, Traffic Engineering Standard Sheets, and the *Traffic Operations Manual: Signs and Markings Volume*. Others are derived from accepted TxDOT practice. Figure 4-11 illustrates the design components covered in this section.

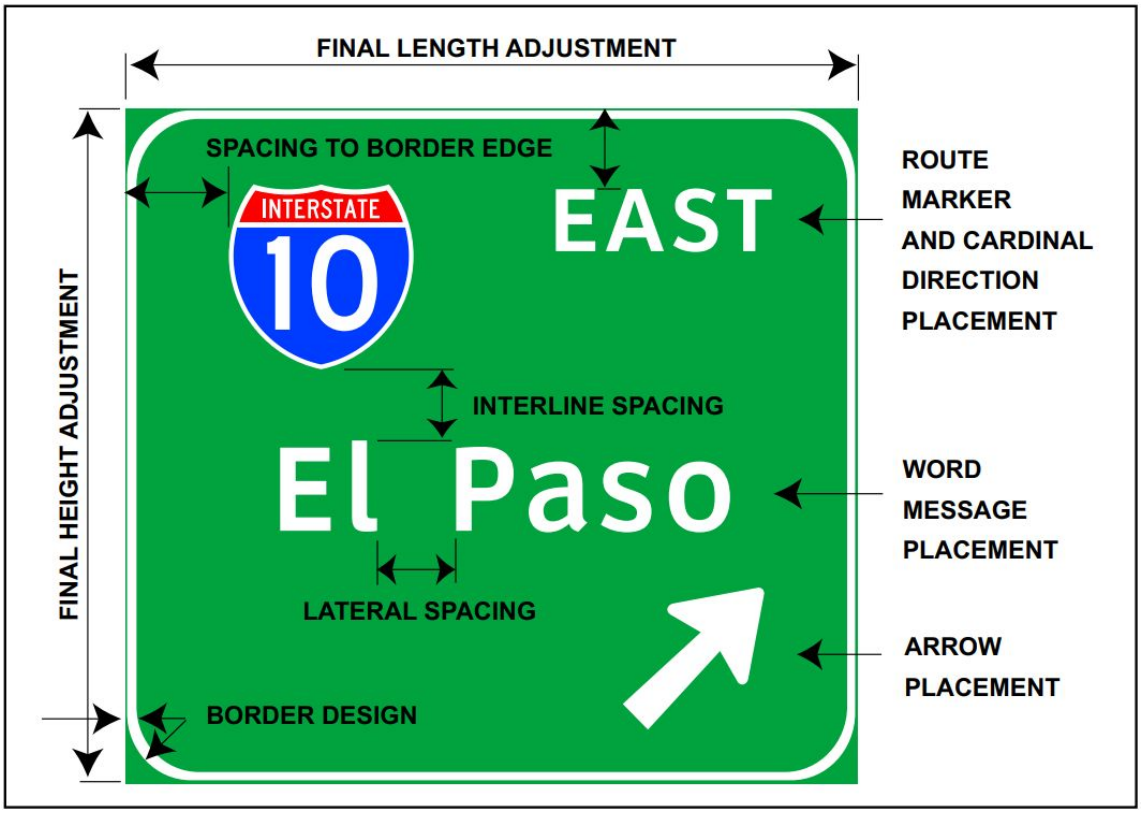


Figure 4-11. Design components covered in Section 4 – Guide Sign Layout.

This section primarily addresses the sign layout of Advance Guide and Exit Direction signs. Signs with standardized messages, such as Exit Gore signs and Guide Sign Number panels, are fixed to standard sizes given in the *Standard Highway Sign Designs for Texas*. These standards also include specifications on letter style, letter size, lateral spacing, placement, and border design.

Border Design

The message on the sign controls the overall size of the sign. Once the message content has been spaced on the sign, a border should be added to all edges of the sign. **The layout guidance given**

in this section is spaced to the inside edge of the border. The Final Length and Height Adjustment, including the border, are discussed in the segment at the end of this section.

With a few exceptions, the Texas MUTCD requires all signs to have a border of the same color as the legend. The border widths should be of similar proportions but not exceed the stroke width of the major lettering of the sign. Depending on the signing document, guidance on border widths may vary. The following table provides general guidance regarding border widths based on sign panel area.

Border Width for Freeway Guide Signs

Total Sign Panel Area (square feet)	Border Width (inches)
< 60	1.0
≥ 60	2.0

The corners of all sign borders must be rounded, and where practicable, the corners of the sign panels should also be rounded to fit the border. It is not practical to round the corners on sign panels made with extruded aluminum blanks. On guide signs, the corner radii of sign borders should be approximately one-eighth the lesser side dimension, except the radii should not exceed 12 inches on any sign. The area outside the corner radius may need to be trimmed, except for signs made from extruded aluminum panels. The following table shows general guidance regarding corner radii based on sign height.

Corner Radii for Freeway Guide Signs

Sign Height (feet)	Corner Radii (inches)
< 6	9
≥ 6	12

Lateral Spacing

The lateral spacing between two-word messages in a single line of copy should be equal to the uppercase letter or capital letter in the given line of text (Figure 4-12).

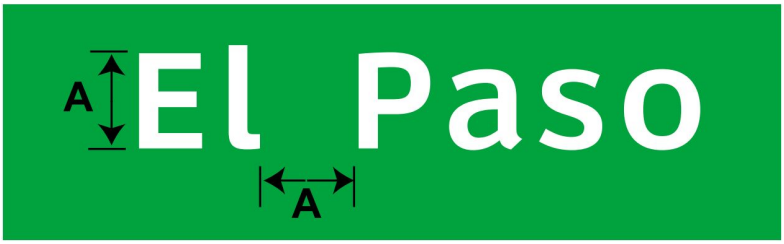


Figure 4-12. Lateral spacing between two-word messages.

The lateral spacing between a word and an arrow (upward or downward) should be equal to 1.5 times the uppercase letter or capital letter in the given line of copy (Figure 4-13).

Figure 4-13. Lateral spacing between a word and an arrow.

The lateral spacing between a word and a Route sign should be equal to the largest letter height in the given line of copy. The largest letter height may come from the Route sign numeral or the text message (Figure 4-14).

Figure 4-14. Lateral spacing between a word and a Route sign.

The lateral spacing between a word and a mileage numeral should be one times the uppercase letter height in a given line of copy (Figure 4-15).

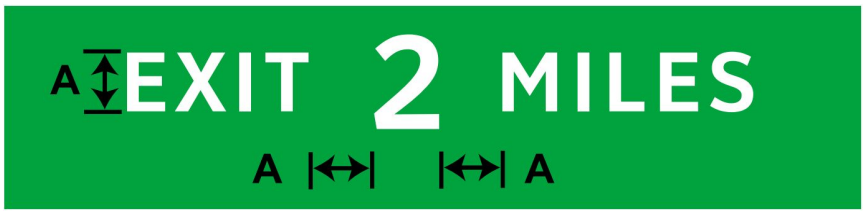


Figure 4-15. Lateral spacing between a word and a mileage numeral.

If two or more Route signs are in the same line of copy, the spacing between individual signs should be equal to the height of the largest numeral within the Route signs (Figure 4-16).

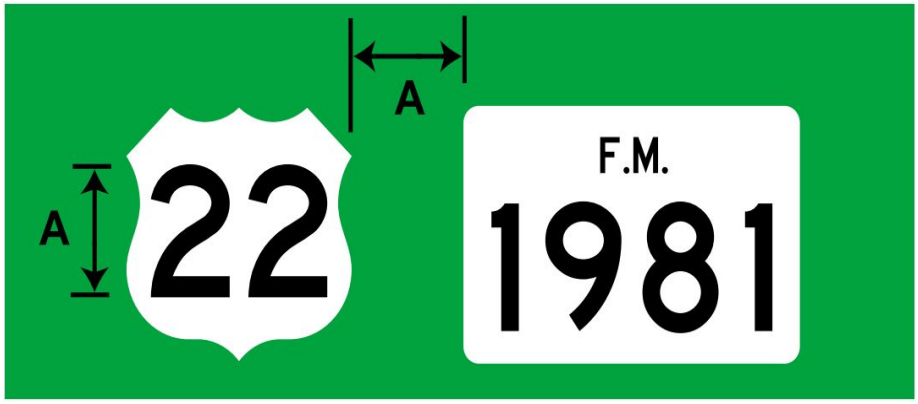


Figure 4-16. Lateral spacing between Route signs.

Lateral spacing of arrows and text messages in exit only and left exit panels may differ and are standardized in the Traffic Engineering Standard Sheets.

Interline Spacing

The interline spacing between capitalized or uppercase words should be approximately three-fourths (¾) the average capital or uppercase letter height in adjacent lines of text (Figure 4-17). For message text that includes a mileage numeral, the interline spacing should be determined with the numeral height and spaced between the common line of text (Figure 4-17). In no case may the interline spacing be less that one-half (½) the average.

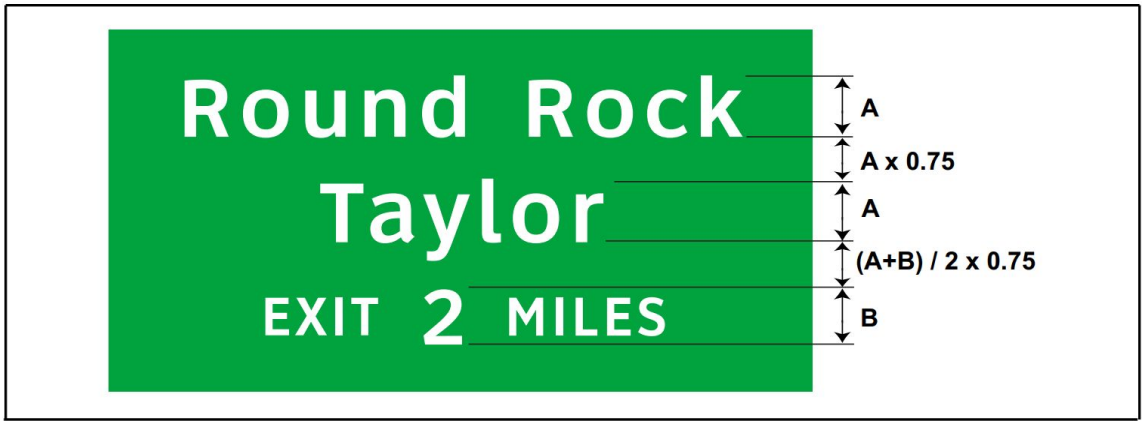


Figure 4-17. Interline spacing between word messages.

The interline spacing between a Route sign and the line of copy below should be equal to three-fourths (¾) the average height of the numeral in the Route sign and the largest letter, numeral, or arrow in the line of copy (Figure 4-18). The interline spacing should then be between the lowest point on the Route sign and the top of the line of text.

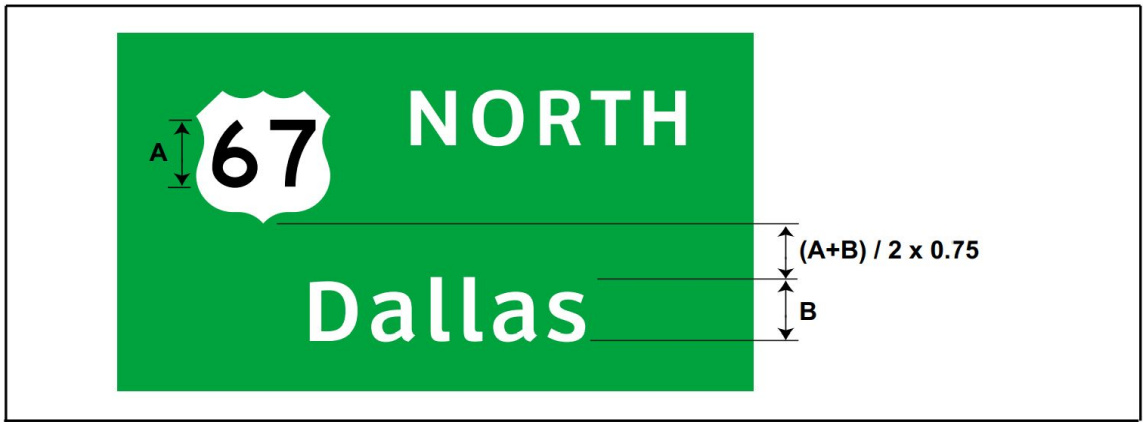


Figure 4-18. Interline spacing between a Route sign and a word message.

The interline spacing between a line of text and an upward sloping arrow should be equal to three-fourths (¾) the height of the uppercase letters in the line above the arrow (Figure 4-19).

Figure 4-19. Interline spacing between a word message and an arrow.

The interline spacing between a Route sign and an upward sloping arrow should be equal to three-fourths (¾) the height of the numerals inside the Route sign (Figure 4-20).

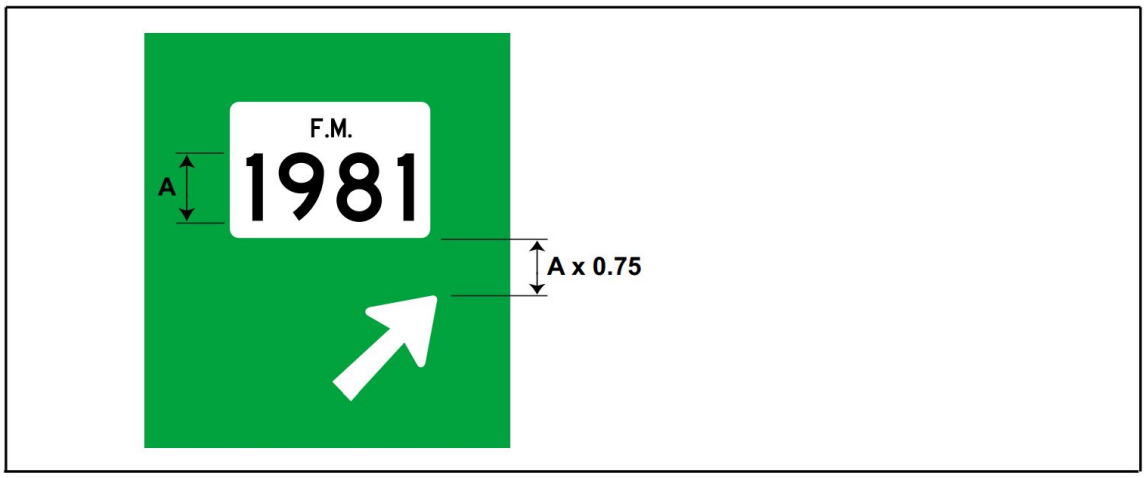


Figure 4-20. Interline spacing between a Route sign and an arrow.

Word Message Placement

The placement of word messages is dependent on the type of freeway guide sign. For most guide signs, word messages are centered on the vertical axis of the sign (Figure 4-21).

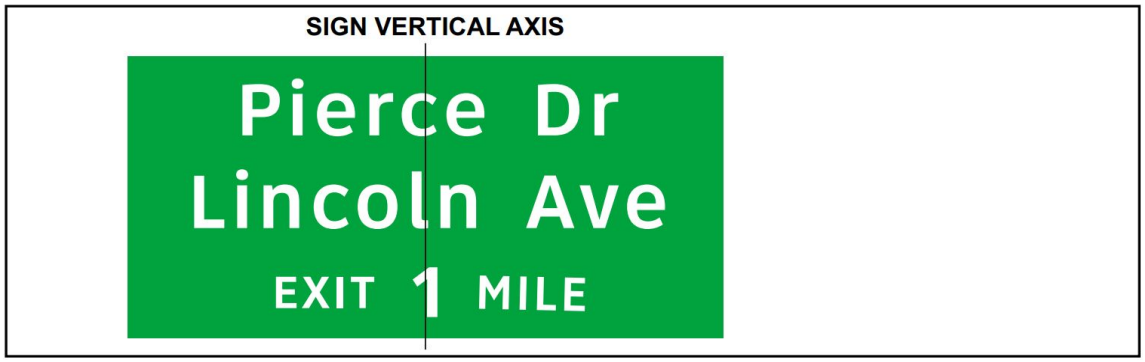


Figure 4-21. Word message placement on an Advance Guide sign.

The placement of word messages on an Exit Direction sign depends on the location of the arrow. If the arrow is the only character in the bottom line of copy (preferred), the word messages should be centered on the vertical axis of the sign (Figure 4-22).

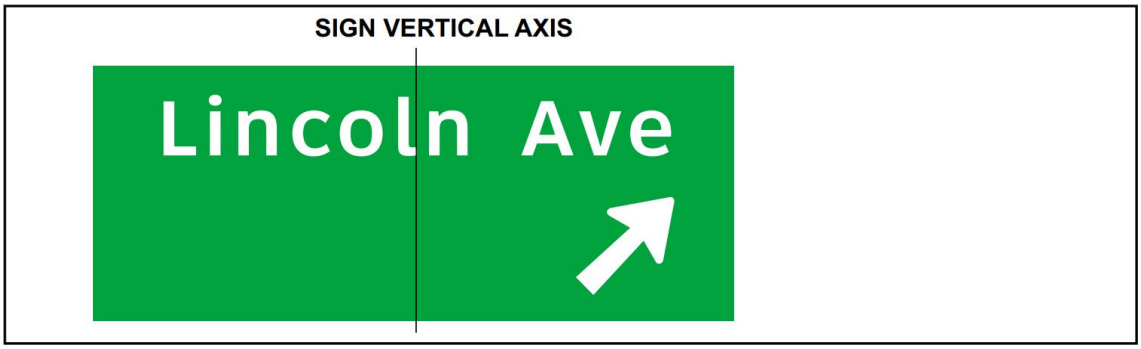


Figure 4-22. Word message placement on an Exit Direction sign.

If the word message and the arrow are the only line of copy on the sign, the word message and arrow should be correctly spaced laterally and centered on the sign (Figure 4-23).

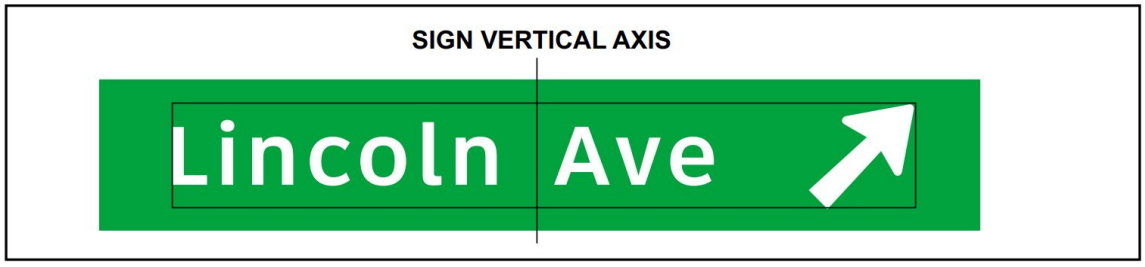


Figure 4-23. Word message placement on an Exit Direction sign with the word message and arrow on the same line of copy.

If the arrow is located on the right or left side of the sign, the longest word message should be correctly spaced laterally with the arrow and centered on the vertical axis of the sign. The smaller lines of copy should then be centered with the longest word message (Figure 4-24). Route sign and arrow placement for Exit Direction signs is discussed later in this chapter.

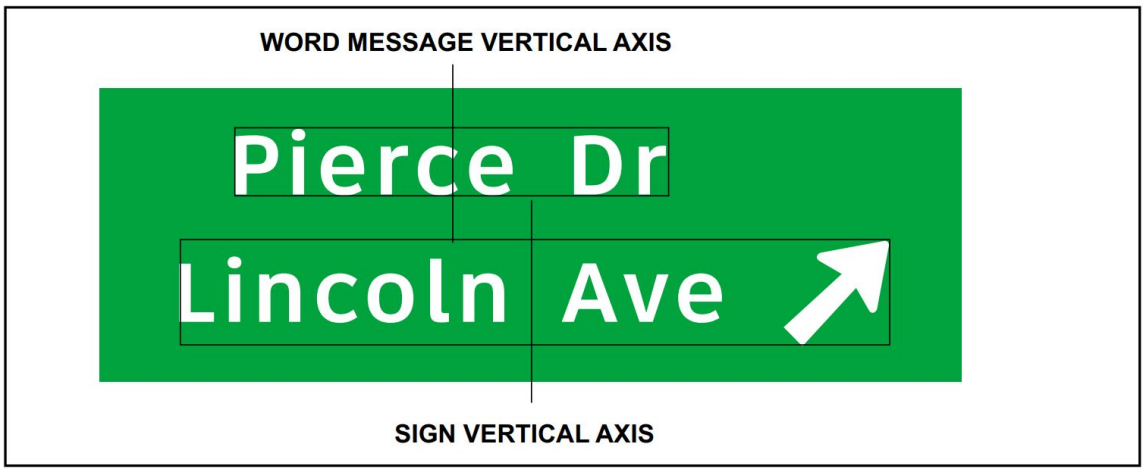


Figure 4-24. Word message placement on an Exit Direction sign with two word messages and an arrow on the last line of copy.

The placement of word messages on interchange sequence series and distance signs is based on lateral border spacing and has equal edge-spacing left and right for all message lines, regardless of message length. The lateral spacing between two words should be equal to the uppercase letter or capital letter in the given line of text. For the longest word message and associated mileage numeral, the lateral spacing between the word message and the mileage numeral should be equal to 1.5 times the uppercase or capital letter height in the given line of text, and the whole line should be centered on the sign. The remaining word messages should be left justified with the longest word message and the associated mileage numerals should be right justified (Figure 4-25).

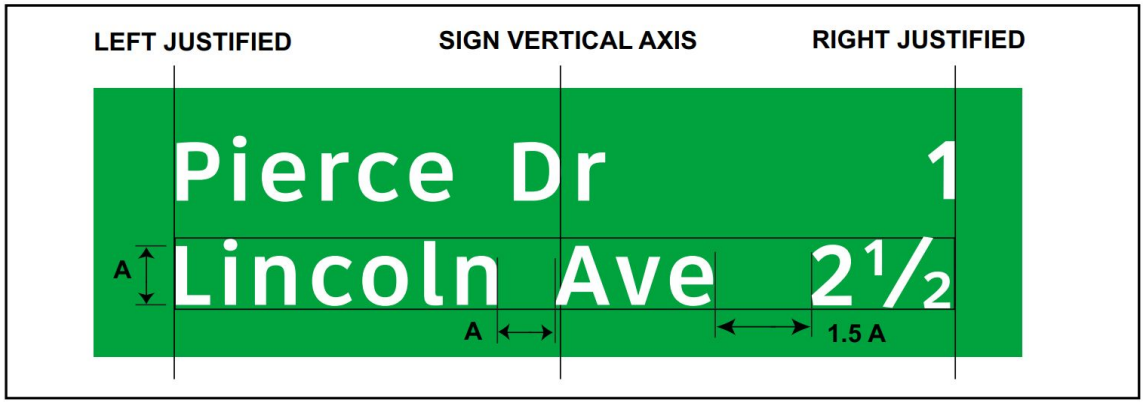


Figure 4-25. Word message placement on an Interchange Sequence sign.

Route Sign and Cardinal Direction Placement

Route signs should be located either above or beside a word message. When placed above a word message, the Route sign should be centered with the word message on the vertical axis of the sign (Figure 4-26).

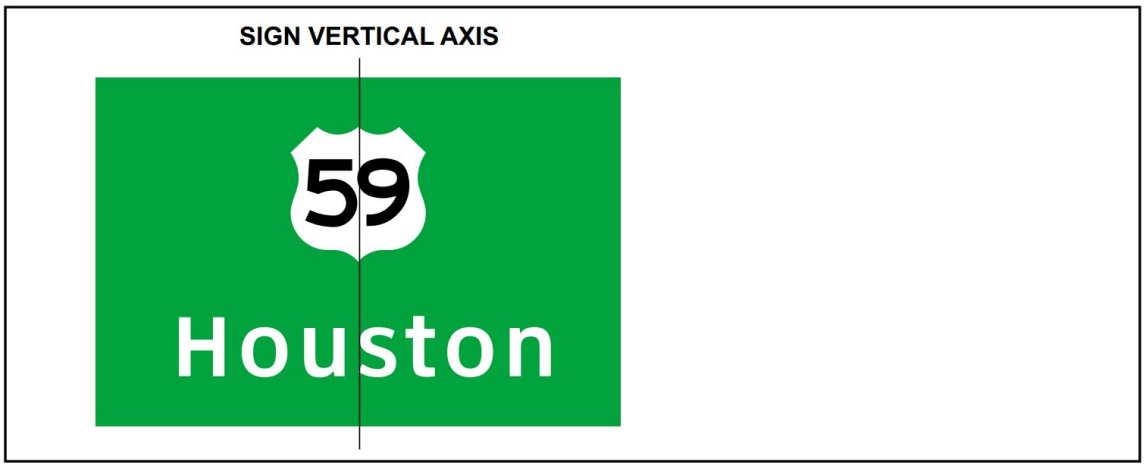


Figure 4-26. Route sign placement.

Cardinal directions and words or abbreviations such as BUSINESS, ALT, JCT, and TO may be placed either above or beside the Route sign. The preferred placement is to the side of the Route sign, unless there are two Route signs on the same panel. When placed to the side of a Route sign, the top of the message should be on the same horizontal line as the top of the Route sign (Figure 4-27). Cardinal directions or the word BUSINESS should be located to the right of the Route sign.

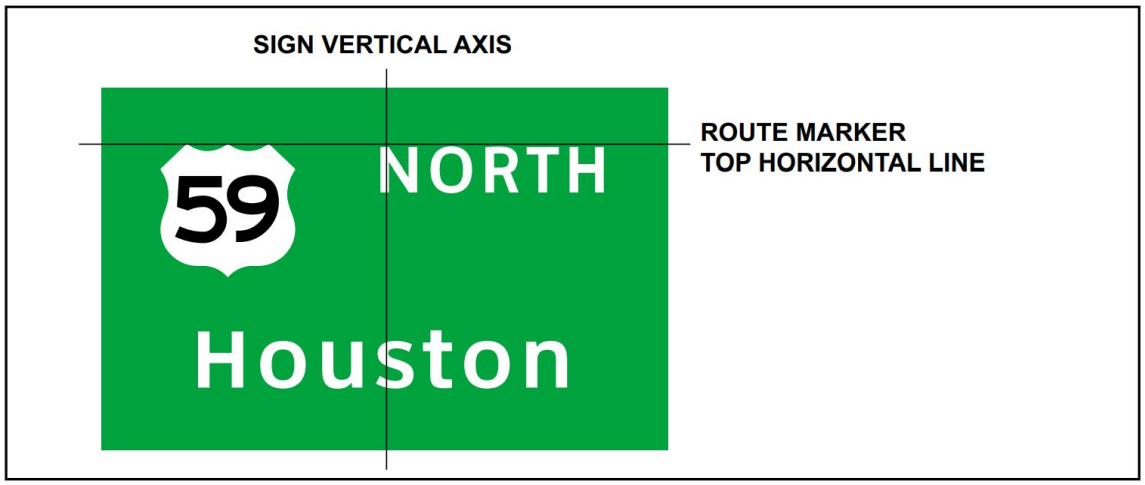


Figure 4-27. Route sign and cardinal direction placement.

The JCT and TO should be located to the left of the Route sign (Figure 4-28).

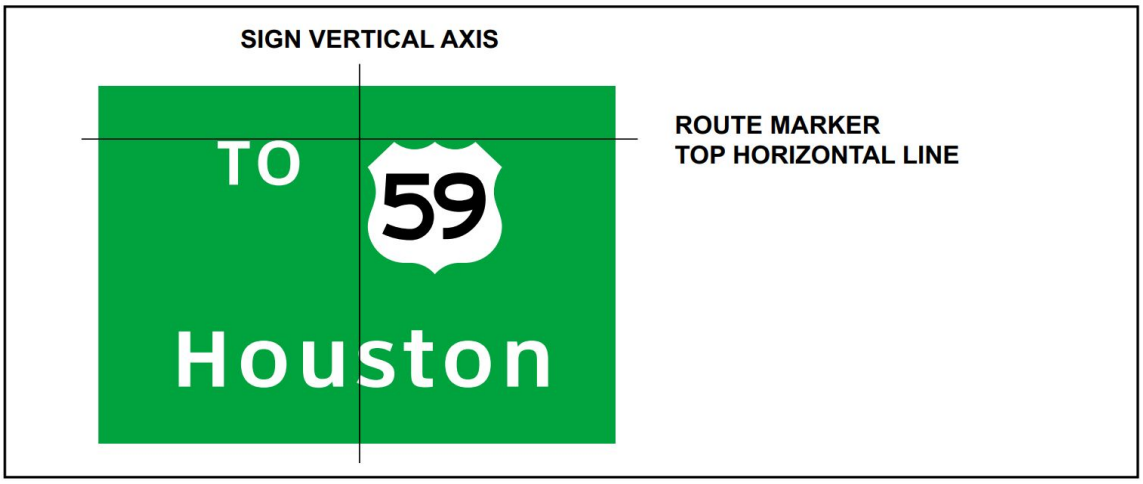


Figure 4-28. Route sign and TO placement.

When a cardinal direction is placed above the Route sign, the message should be centered about the vertical axis of the shield (Figure 4-29).

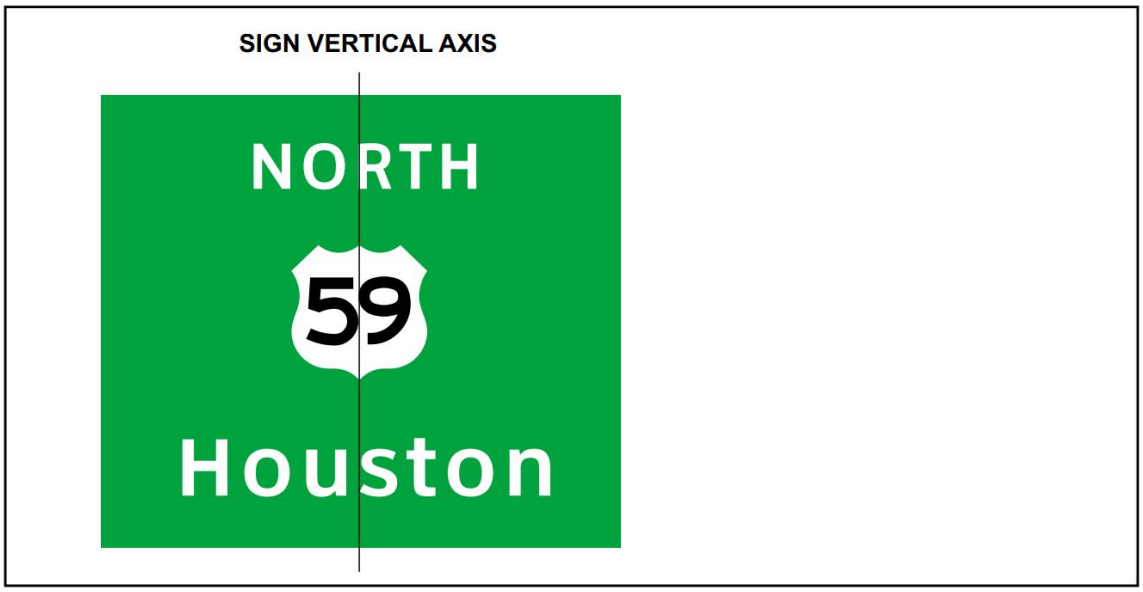


Figure 4-29. Cardinal direction placement when located above Route sign.

For two Route signs on a sign, the cardinal direction and other words should be located above and centered on the Route sign (Figure 4-30). If the width of the cardinal direction line of copy is greater than that of the Route signs, the cardinal direction line of copy should be centered accordingly, and the Route signs should be centered to the respective cardinal directions.

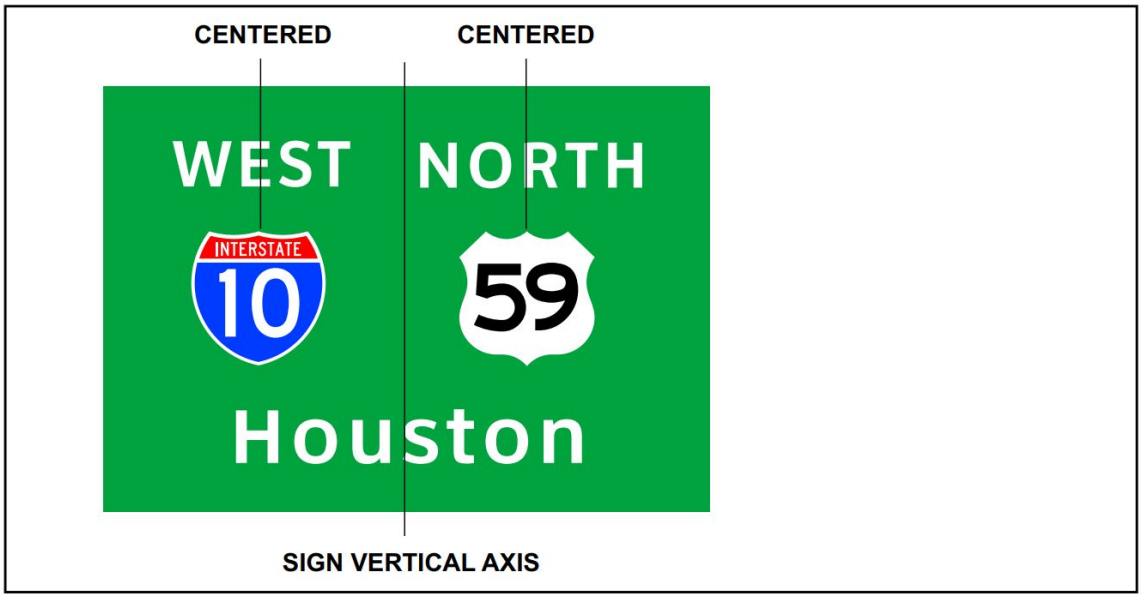


Figure 4-30. Placement of two Route signs and cardinal directions.

If two Route signs with the same cardinal direction are on a sign, a cardinal direction should be associated with each Route sign (Figure 4-31).

Figure 4-31. Placement of two Route signs with the same cardinal direction.

If the arrow is the only character in the bottom line of copy, the Route sign should be centered on the vertical axis of the sign (Figure 4-32).

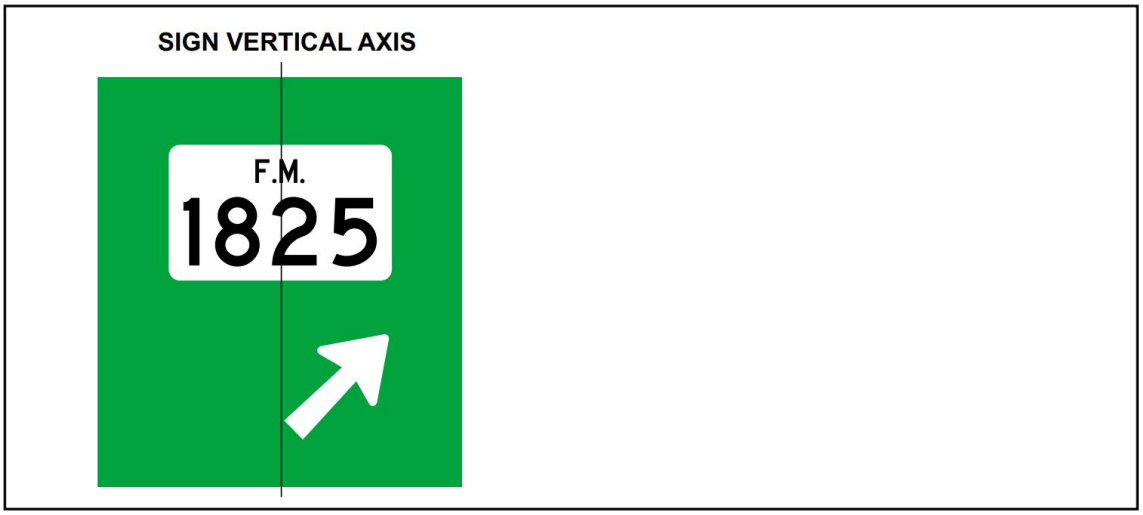


Figure 4-32. Route sign placement above an arrow on the last line of copy.

If the arrow is located on the word message below the Route sign, the word message and arrow should be correctly spaced and centered on the vertical axis of the sign. The Route sign should also be centered on the sign (Figure 4-33). Arrow placement on Exit Direction signs is discussed later in this section.

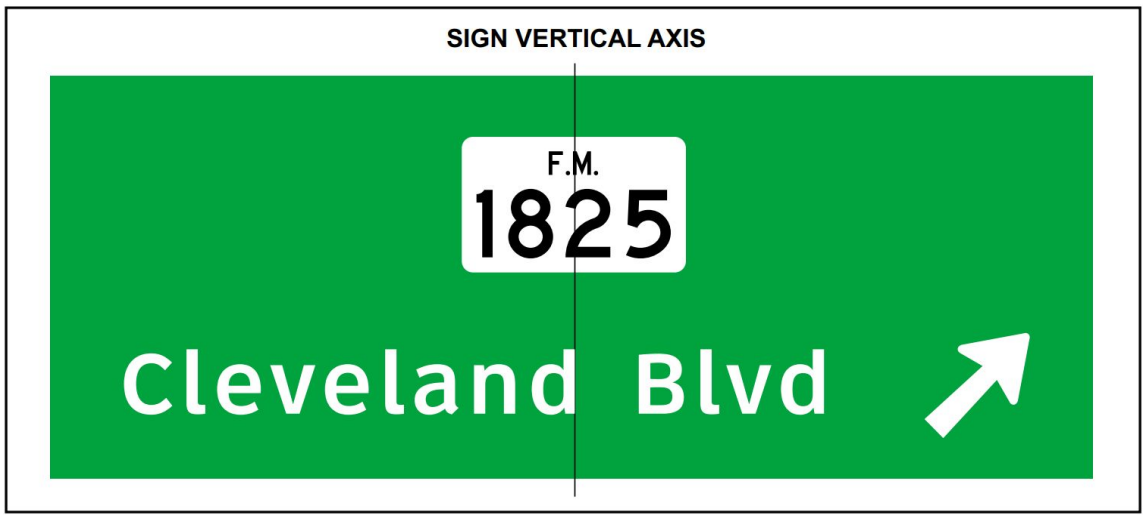


Figure 4-33. Route sign placement above a word message and an arrow on the last line of copy.

Route signs should be used for all numbered routes on interchange sequence series signs. Minimum shield heights should be 36 inches for Interstate routes, and 24 inches for U.S. and state routes.

The placement of Route signs on interchange sequence is based on lateral border spacing and has equal edge-spacing left and right for all message lines, regardless of message length. Sequence signs must list street names left most, followed by Route signs, cardinal directions, and distances. The longest destination message and mileage numeral should be correctly spaced laterally and be

centered on the sign. The remaining word messages should be left justified with the longest destination message, and the associated mileage numerals should be right justified (Figure 4-34).

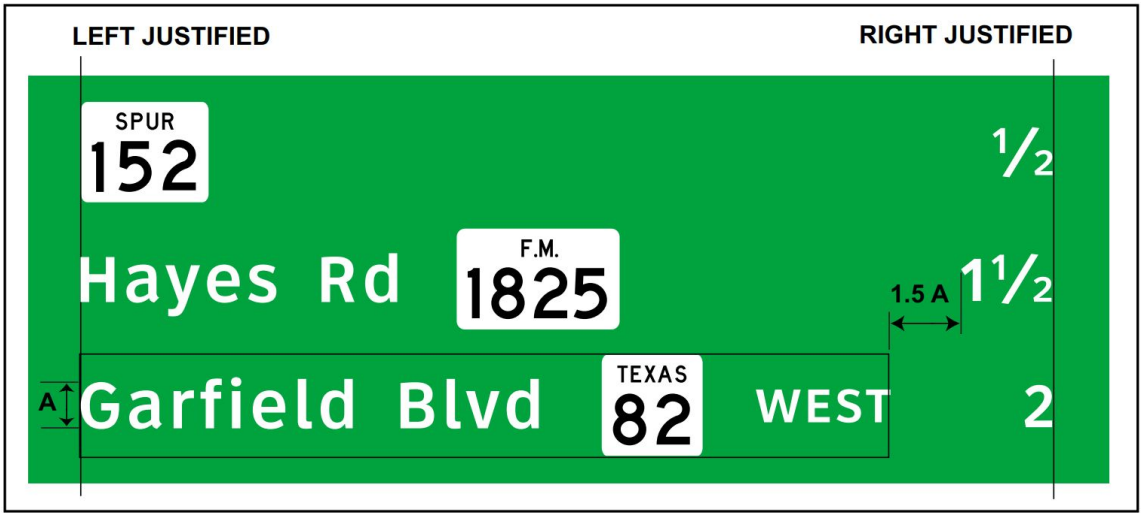


Figure 4-34. Route sign placement on an interchange sequence sign.

Arrow Placement

Arrows are used on guide signs to indicate directions toward designated routes and destinations. As discussed earlier in this chapter, the type of arrow used on a particular guide sign is dependent on the type of guide sign. Standard arrow specifications are shown in the Standard Highway Sign Designs for Texas.

On Exit Direction signs, both overhead and ground mounted, the "Up" arrow must be upward slanting and be located on the appropriate side of the sign. The arrow placement angle should point upward at 45 degrees from the horizontal representing the alignment of the exit roadway.

For Exit Direction signs with a one-word message destination, the arrow should be placed on the next line of copy and right justified on the above destination message (Figure 4-35).

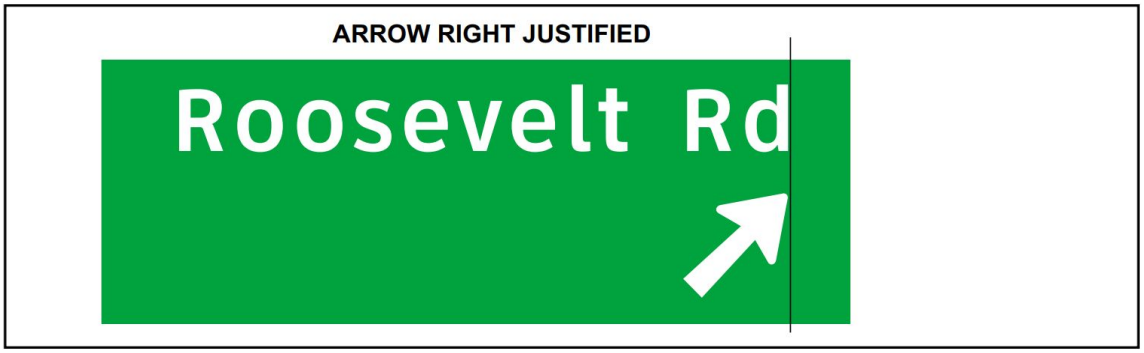


Figure 4-35. Preferred arrow placement with one word message.

In some cases, the width of an Exit Direction sign may be restricted due to the location, placement, and proximity of other freeway guide signs. In these cases, the roadway designation or type abbreviations (i.e., Rd, Blvd, St) may be placed on the second line of copy with the arrow and left justified with the above word message (Figure 4-36). The minimum spacing between the word and the arrow should be at least 1.5 times the uppercase letter height of the word.

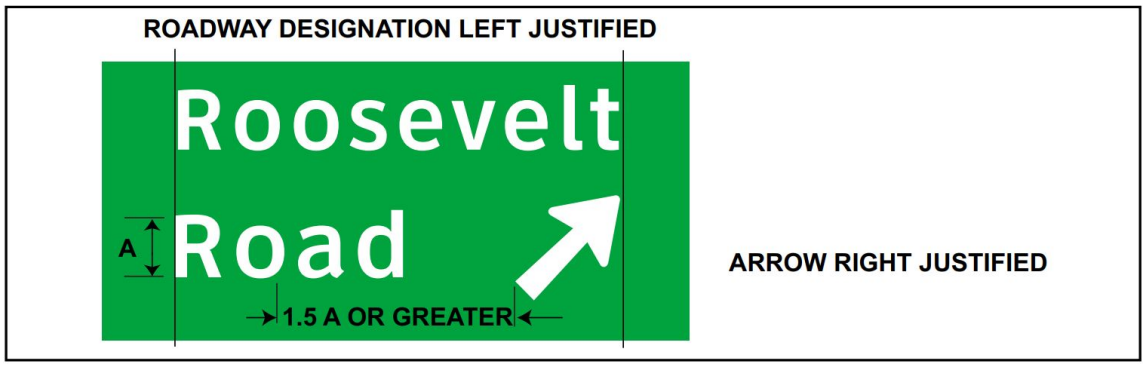


Figure 4-36. Arrow placement with roadway designation on the last line of copy.

If the arrow must be placed on the same line of copy as the destination message, the message and arrow should be laterally spaced and centered on the vertical axis of the sign. The arrow should then be centered vertically on the horizontal axis of the message (Figure 4-37).

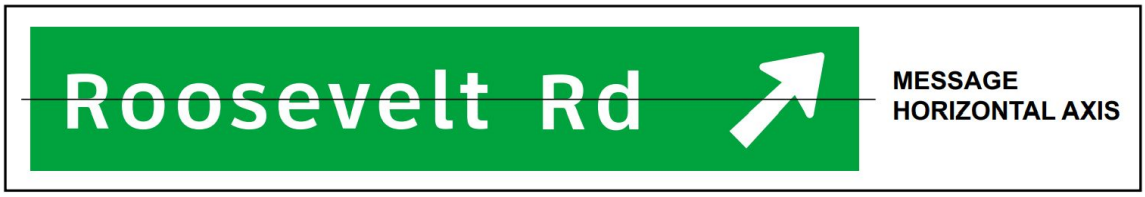


Figure 4-37. Arrow placement with word message on the same line of copy.

For Exit Direction signs with a Route sign as the single destination message, the arrow should be placed on the next line of copy and right justified with the Route sign (Figure 4-38).

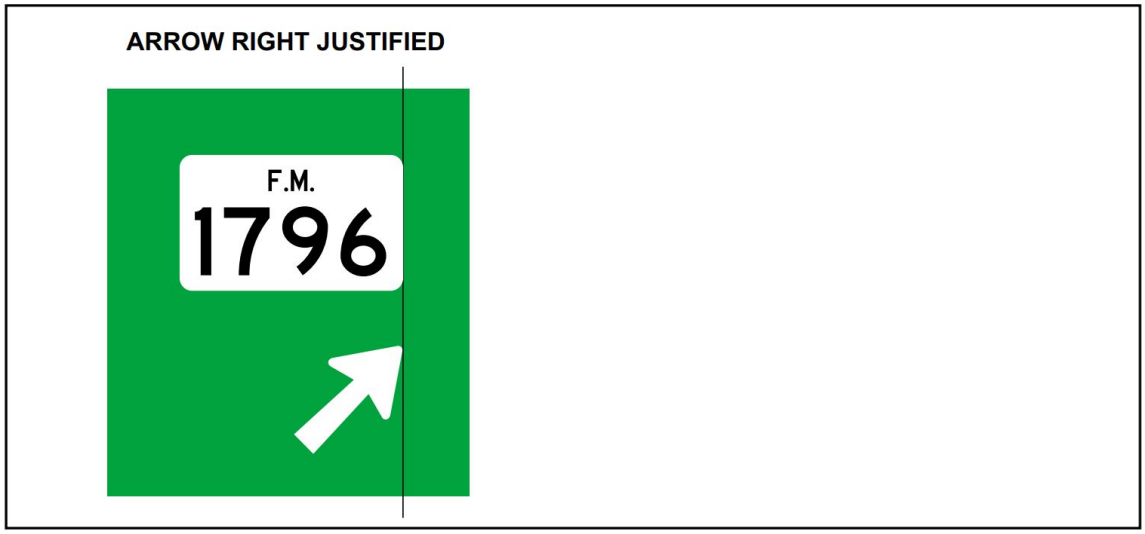


Figure 4-38. Arrow placement with Route sign.

For left-exit Exit Direction signs with one destination message, the arrow should be slanted at 45 degrees from the horizontal to the left, located on the last line of copy, and left justified with the destination message (Figure 4-39).

Figure 4-39. Arrow placement with one word message for a left exit.

If there are restrictions on the width of the sign, and the roadway designation or type (street, road, etc.) must be located on a separate line of copy, the roadway designation should be left justified on the top word message. The arrow should be placed on its own line of copy and left justified with the word messages (Figure 4-40).

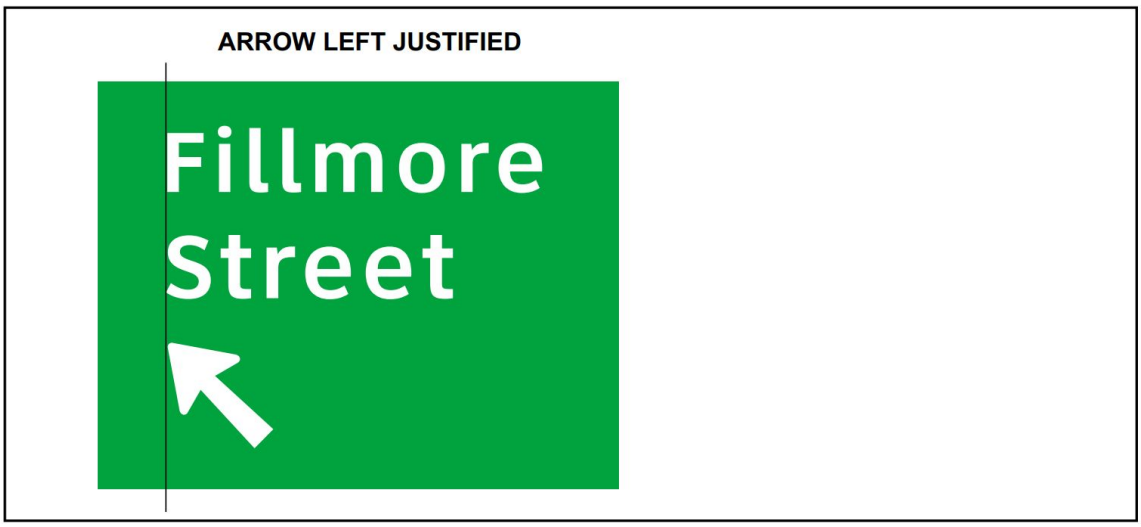


Figure 4-40. Arrow placement with roadway designation on the second line of copy.

For an Exit Direction sign with two lines of copy, the arrow should be placed on the next line of copy and right justified with the longest destination message (Figure 4-41).

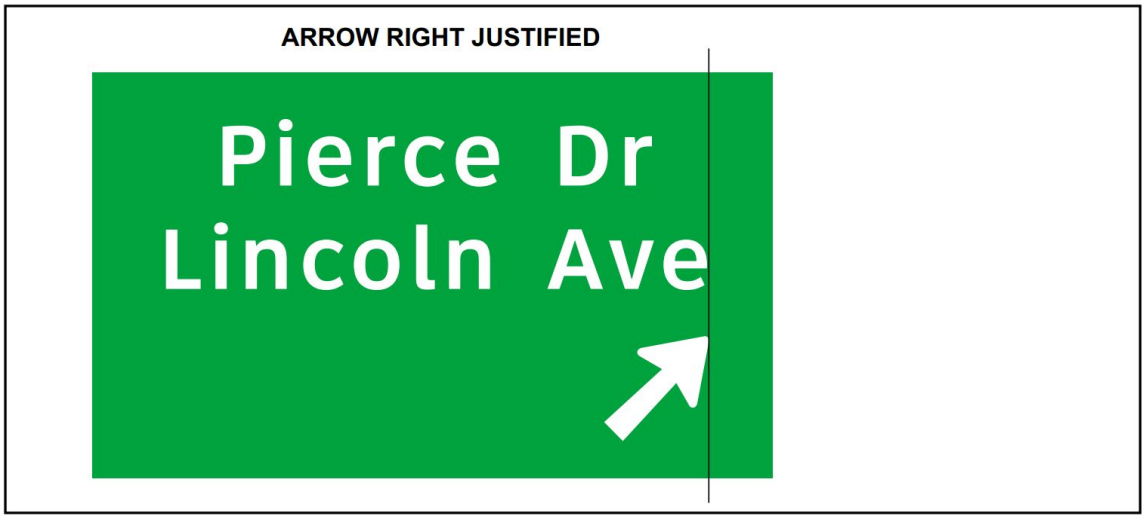


Figure 4-41. Preferred arrow placement with two word messages.

If the arrow is placed to the right of a two word message destination, the longest word message and arrow should be laterally spaced to determine the width of the sign. The arrow should then be centered on the last line of copy or centered on the sign horizontal axis (Figure 4-42 and Figure 4-43).

Figure 4-42. Arrow placement with two word messages, longest word message on the last line of copy, and arrow located to the right of the messages.

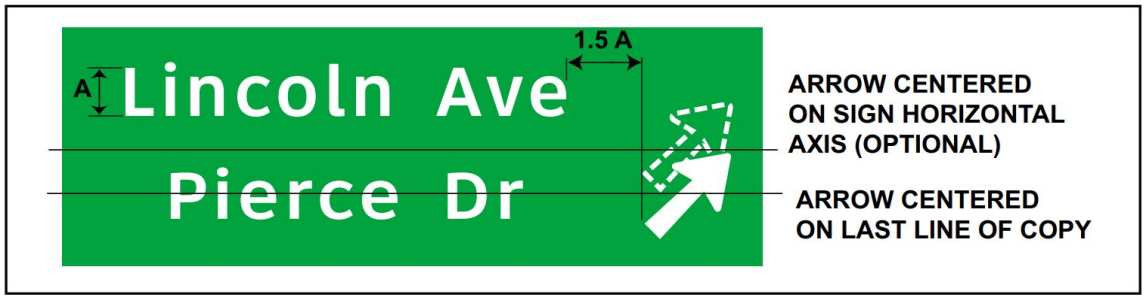


Figure 4-43. Arrow placement with two word messages, longest word message on the top line of copy, and arrow located to the right of the messages

On overhead signs where it is desired to indicate a lane to be followed, the arrow should point downward toward the center of that lane (Figure 4-44). Downward arrows should not be used unless an arrow can be pointed to each lane that can be used to reach the destination shown on the sign. It is preferred that the arrow be centered horizontally on the sign (Figure 4-44); however, the arrow does not have to be centered on the sign as long as it can point to the travel lane (Figure 4-45)

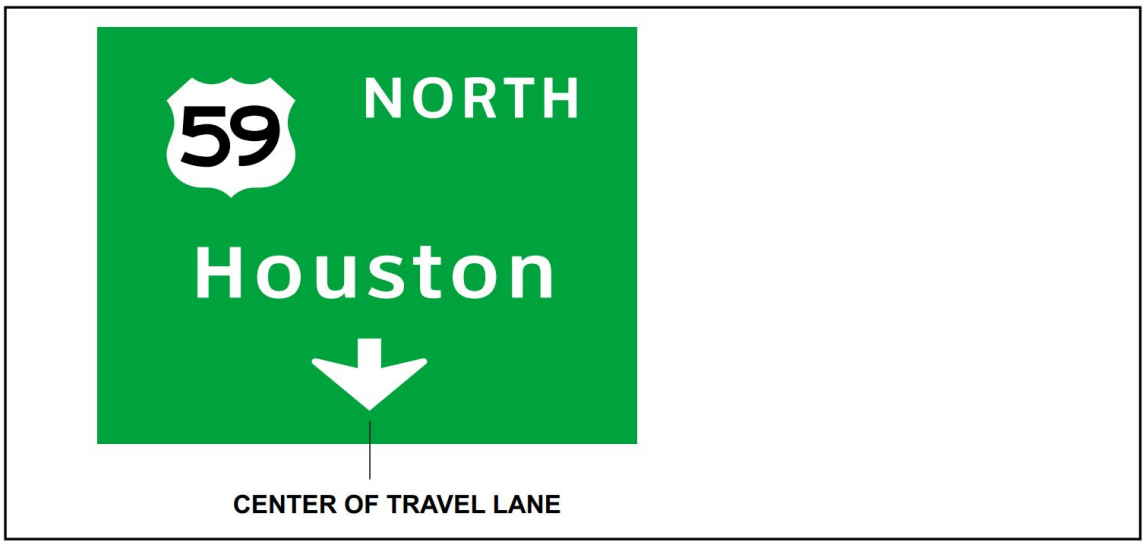


Figure 4-44. Downward arrow placement when sign is located in the center of the travel lane.

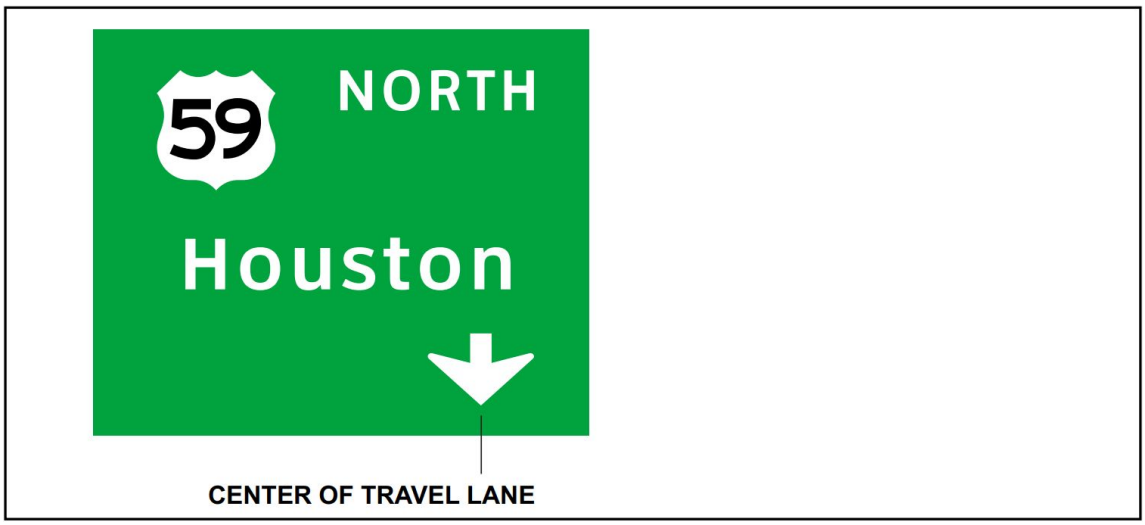


Figure 4-45. Downward arrow placement when sign is not located in the center of the travel lane.

Sign design and arrow placement details associated with Exit Only panel signs are presented in the *Standard Highway Sign Designs for Texas*.

Spacing to Border Edge

The spacing from the lower edge of the top border to the nearest line of copy should be approximately equal to, but in no case less than, one-half the average of the letter or numeral height in the first line of copy (Figure 4-46).

Figure 4-46. Spacing from top border to the nearest line of copy.

The spacing from the upper edge of the bottom border to the nearest line of copy should be approximately equal to the average of the letter or numeral height in the last line of copy. If the last line copy contains a mileage numeral, the bottom border spacing should be between the upper edge of the bottom border and the lower edge of the common line of text (Figure 4-47).

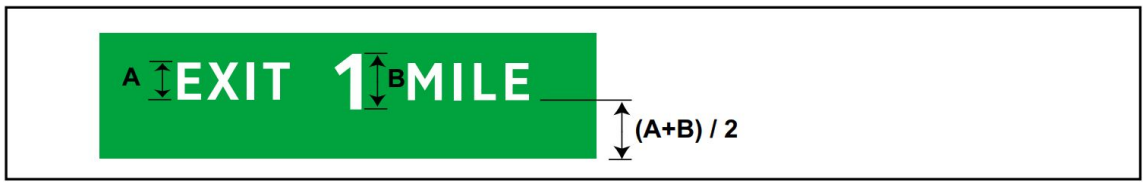


Figure 4-47. Spacing from the bottom border to the nearest line of copy.

If an arrow is the only element in the last line, spacing between the lowest point of the arrow and the upper edge of the bottom border must be the same as the spacing at the top of the sign (Figure 4-48).

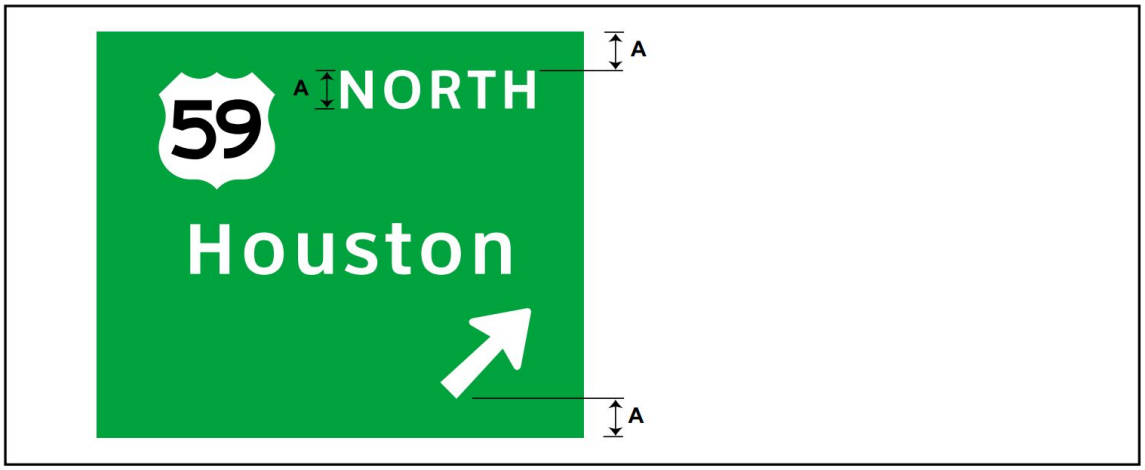


Figure 4-48. Spacing between the bottom and top border when the arrow is the only element in the last line of copy.

The lateral spacing to the vertical borders must be the same as the height of the largest letter used on the sign. The lateral spacing must be applied to the longest line of copy, and each of the remaining lines of copy must be centered within the sign borders (Figure 4 49).

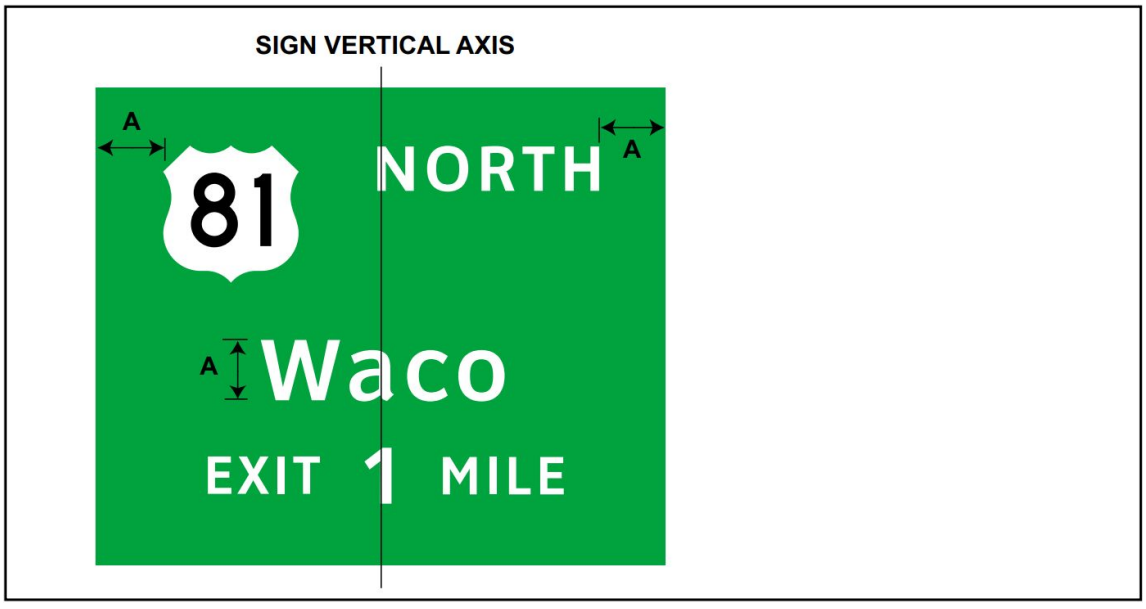


Figure 4-49. Lateral spacing to the vertical borders.

Horizontal and Vertical Separator Lines

Horizontal and vertical separator lines are used to separate street names, designations, destinations, and lane assignment on certain types of signs. The separator lines should be fabricated from the identical sign border material as the parent sign, and should not be wider than the sign border width (typically 2 inches).

Partial horizontal lines are used to separate street names sharing an exit on an Interchange Sequence Series sign. The horizontal line should be placed in between the appropriate lines of copy. The vertical spacing between a line of copy and the horizontal line should be equal to the largest character (letter or numeral) in the line of copy (Figure 4-50). The partial horizontal line should extend one-third of the sign width (including border) from both sides of the sign (Figure 4-50).

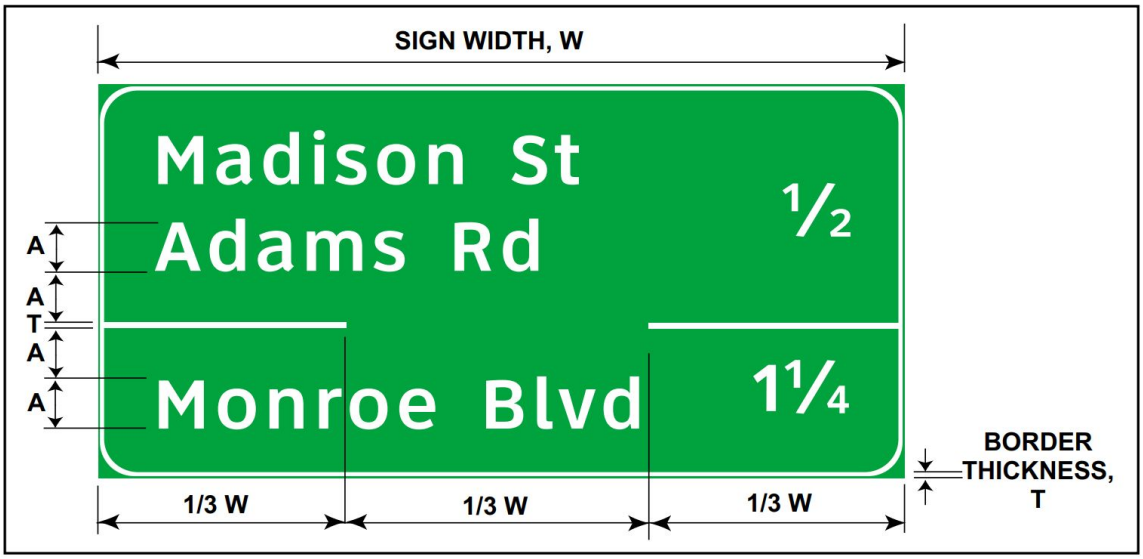


Figure 4-50. Spacing and placement of partial horizontal separator line.

Horizontal lines may also be used to separate a suburban or rural designation on a community interchanges identification sign (Figure 4-51). For this case, the horizontal line should extend the entire width of the sign. The vertical spacing between a line of copy and the horizontal lines should be equal to the largest character (letter or numeral) in the line of copy.

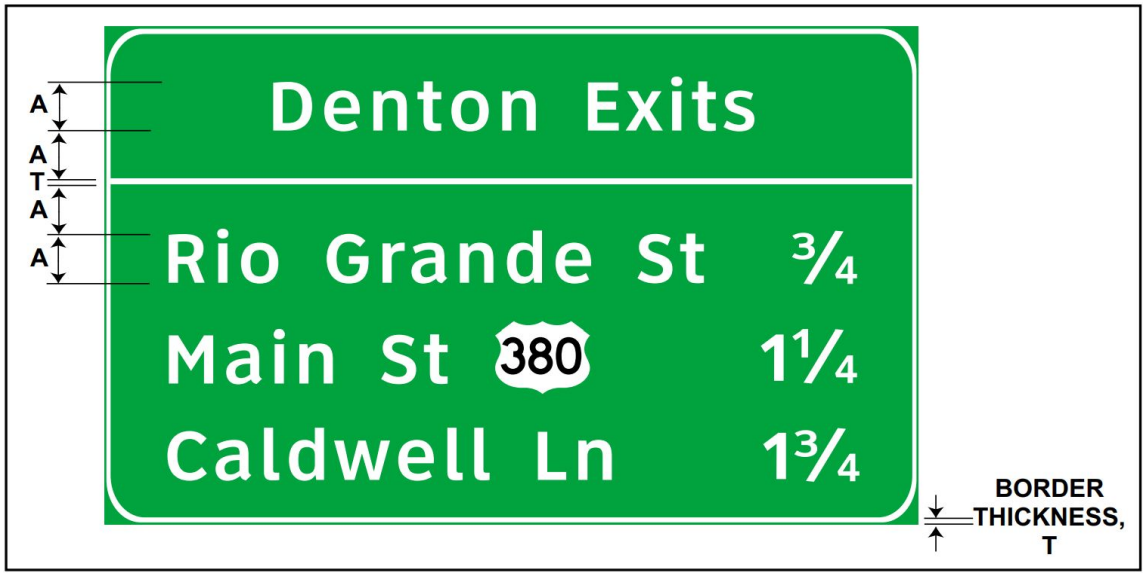


Figure 4-51. Spacing and placement of a full horizontal separator line.

Vertical separator lines are used to separate lane assignment on ramps downstream of multi-lane exits. They are used on single panel, overhead Advance Guide and Exit Direction signs to separate destinations, highways, or cardinal directions. The lateral spacing to the vertical line edge should be equal to the height of the largest letter used on the sign (Figure 4-52). If the lane assignment shares the same destination information, the vertical line should extend from the top of the sign to the bottom edge of the last destination line of copy.

Figure 4-52. Spacing and placement of partial vertical separator line.

Final Length and Height Adjustment

The length of the message, lettering size, and letter spacing usually determine sign size; however, several other factors can influence a sign's dimensions. For example, the size of overhead signs may be limited by the amount of available space, particularly if the sign must be mounted over a

specific lane. The size of available materials for constructing the sign may also act to limit the shape of the sign. The designer must weigh these factors in order to determine the final size of the sign; however, all previous guidelines should be adhered to.

A border should be added to all edges of the sign (typically 2 inches). Final overall sign length and height should then be adjusted from calculated measurement to the nearest multiple of 6 inches. Adjustment of overall length and height should be equally divided between the border and the nearest line of copy (Figure 4-53). As previously mentioned, the corners of all sign borders should be rounded with a corner radius (typically 12 inches).

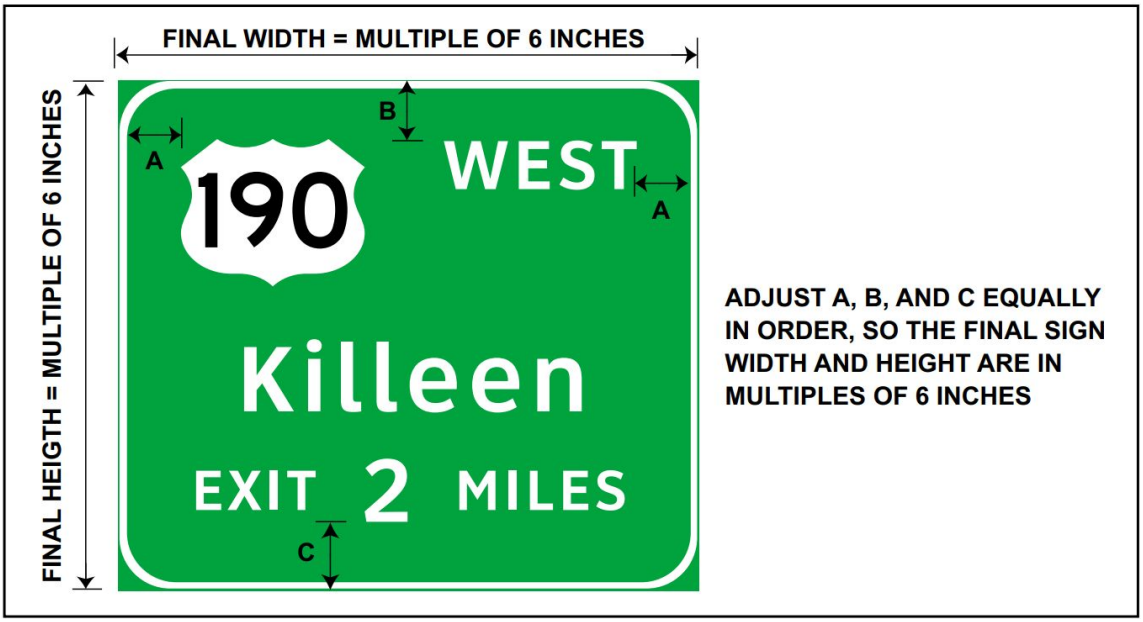


Figure 4-53. Final length and height adjustment of a freeway guide sign.

Section 5: Diagrammatic Signs

Diagrammatic Sign Design

The use of diagrammatic signs is presented in the Texas MUTCD in Section 2E.19. The design and layout of diagrammatic signs are presented in the Appendix of the *Standard Highway Sign Designs for Texas* and in the "Design Guidelines" chapter of the *Standard Highway Signs*.

Chapter 5: Freeway Guide Signing

Contents:

Section 1: Overview

The figures in this chapter illustrate the placement of Advance Guide and Exit Direction signs for various types of roadway and freeway interchanges. Included is a section on the use of arrows in Advance Guide and Exit Direction signs for freeway interchanges and a section on guide signing when an entrance ramp is located close to an exit ramp. One section also addresses sign placement for a lane drop that does not occur at an exit ramp and signing for the end of a freeway.

Section 2: Roadway Interchange Signing

Right-Lane Exits

Figure 5-1 through Figure 5-5 illustrate freeway guide signing for interchanges where exit lanes are on the right side of the freeway. Each of the figures includes Advance Guide, Exit Direction, and Exit Gore signs.

Left-Lane Exits

Figure 5-6 and Figure 5-7 illustrate freeway guide signing for interchanges where the exit lane is on the left side of the freeway. Each of the figures includes Advance Guide, Exit Direction, and Exit Gore signs.

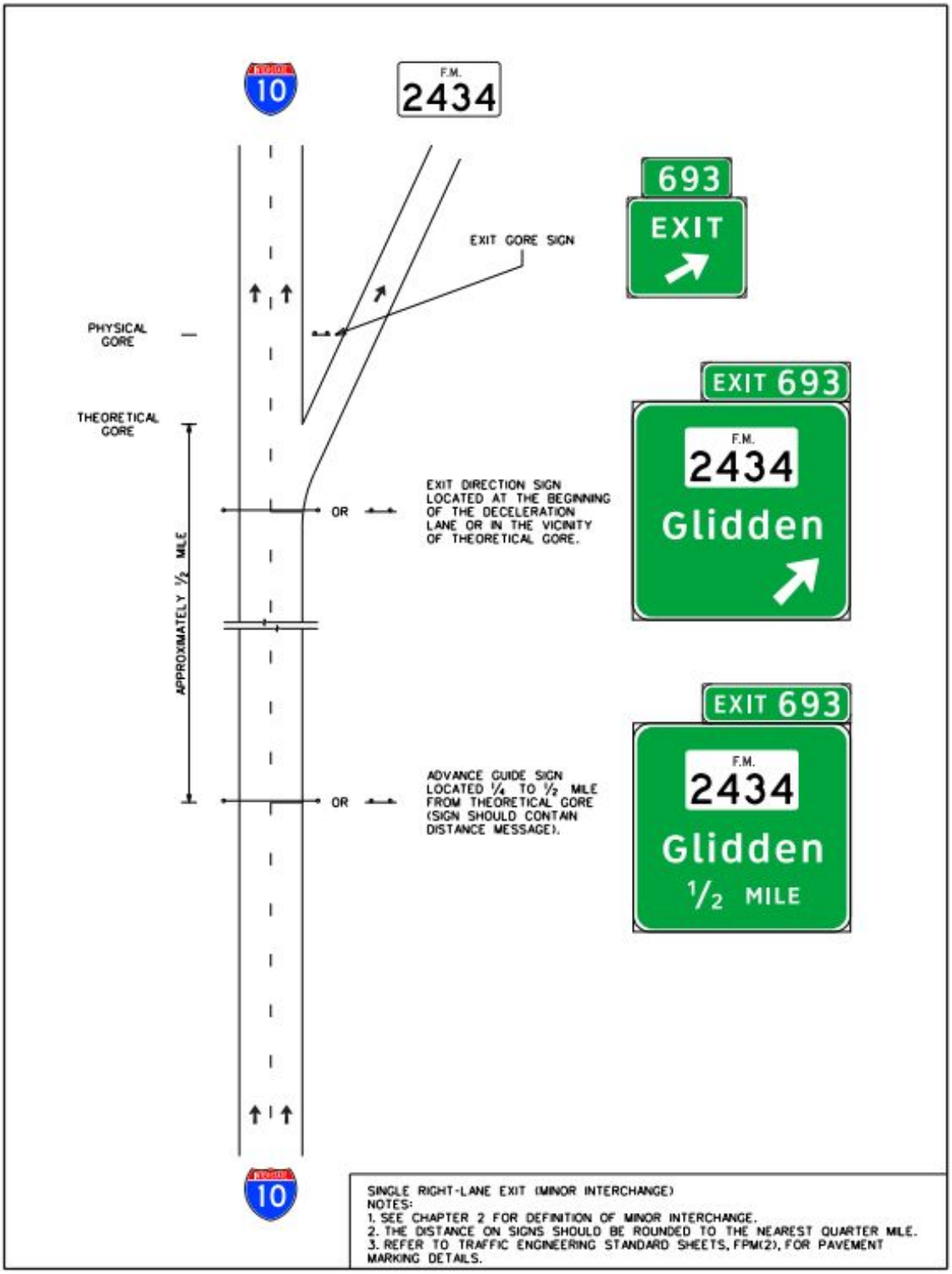


Figure 5-1. Signing for a single right-lane exit for a minor interchange.

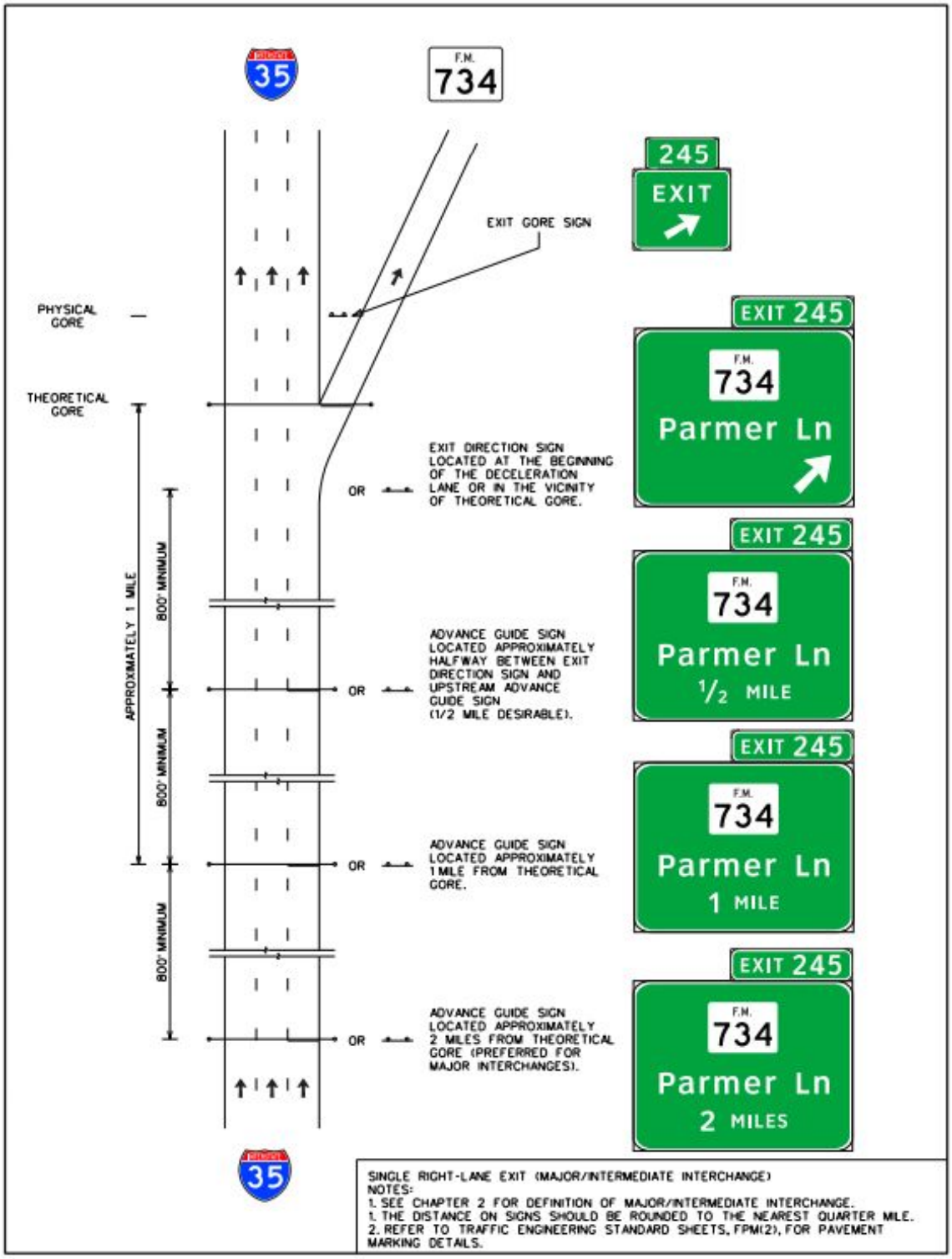


Figure 5-2. Signing for a single right-lane exit for a major or intermediate interchange.

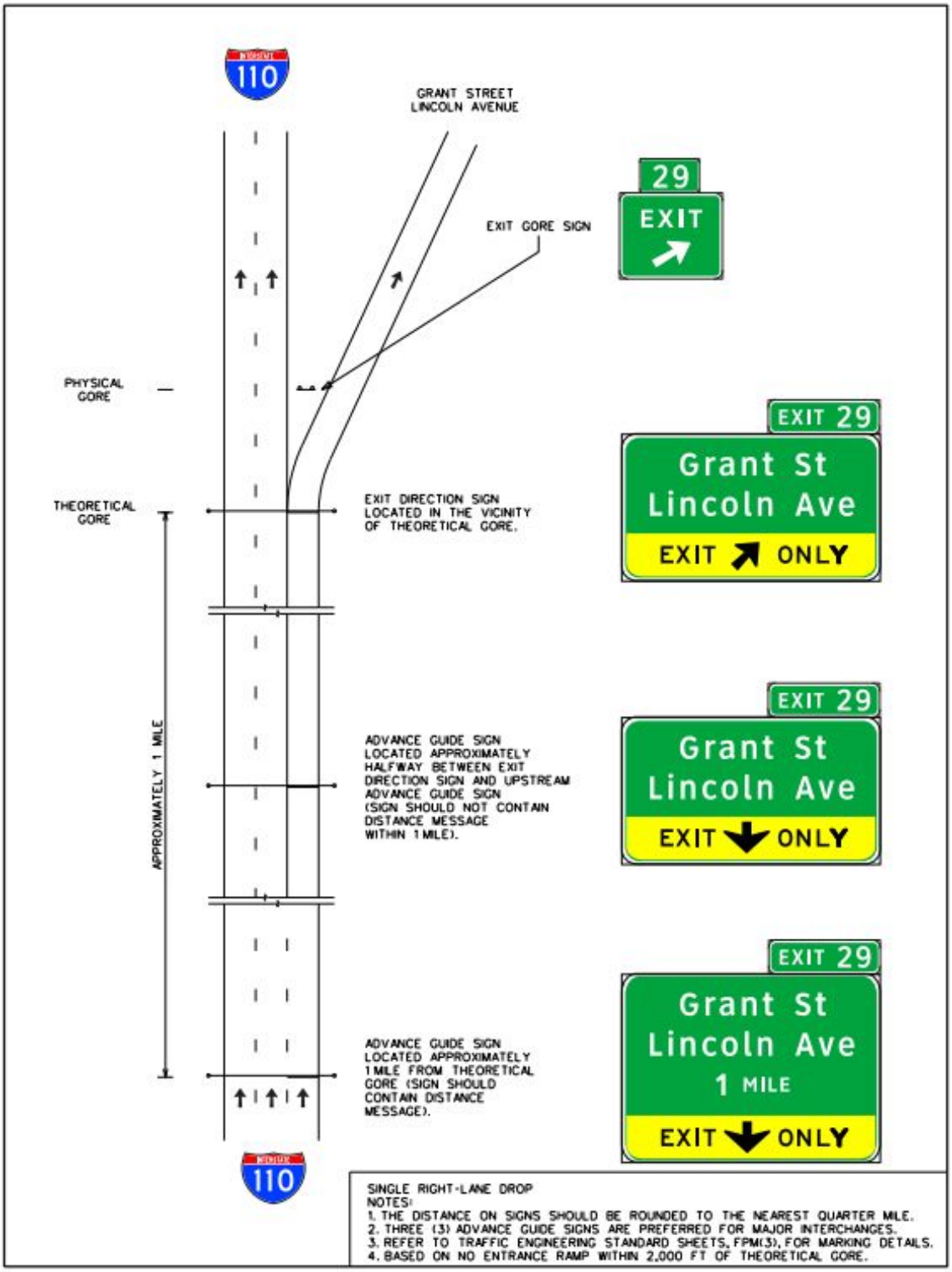


Figure 5-3. Signing for a single right-lane drop.

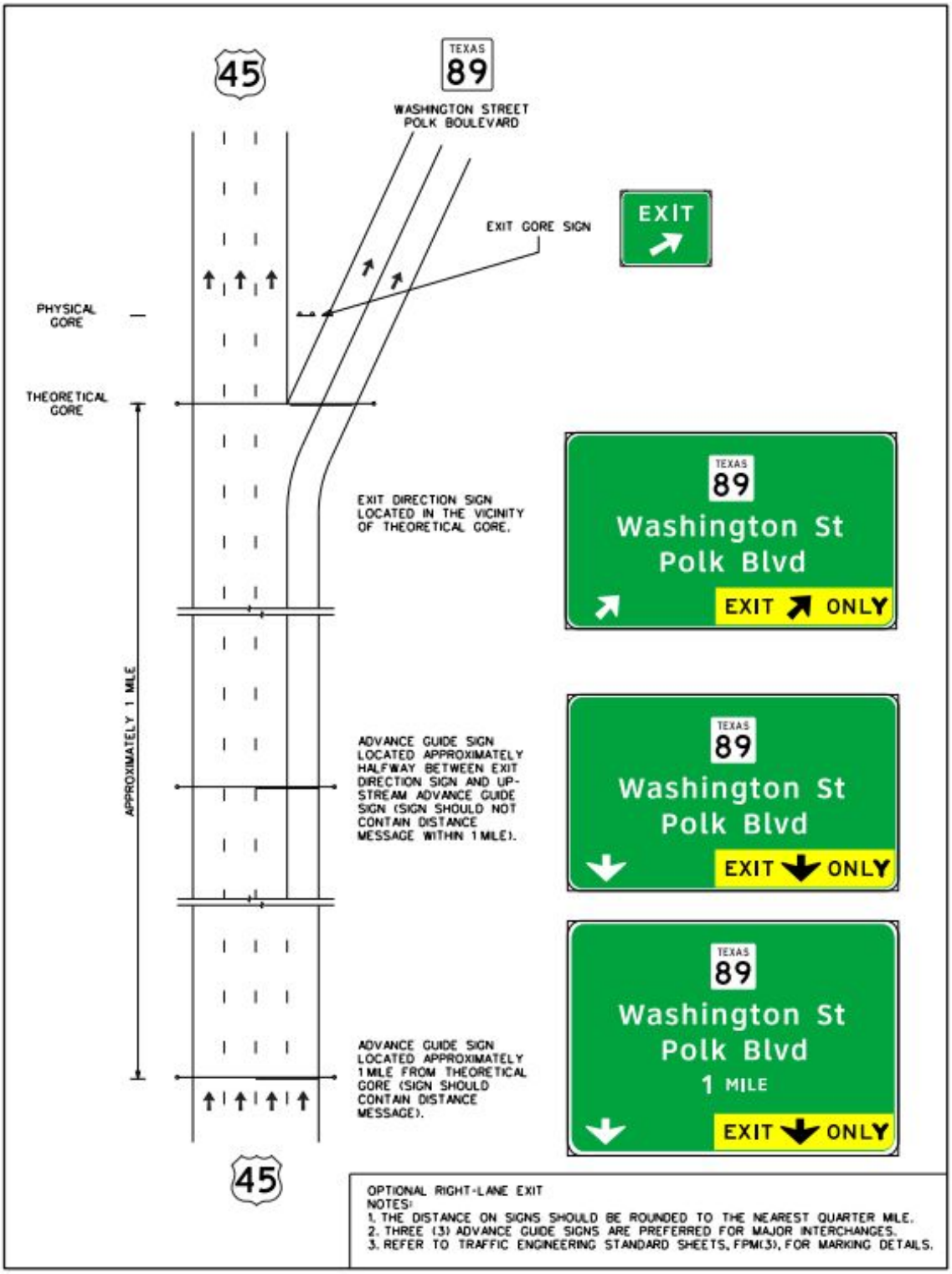


Figure 5-4. Signing for an optional right-lane exit.

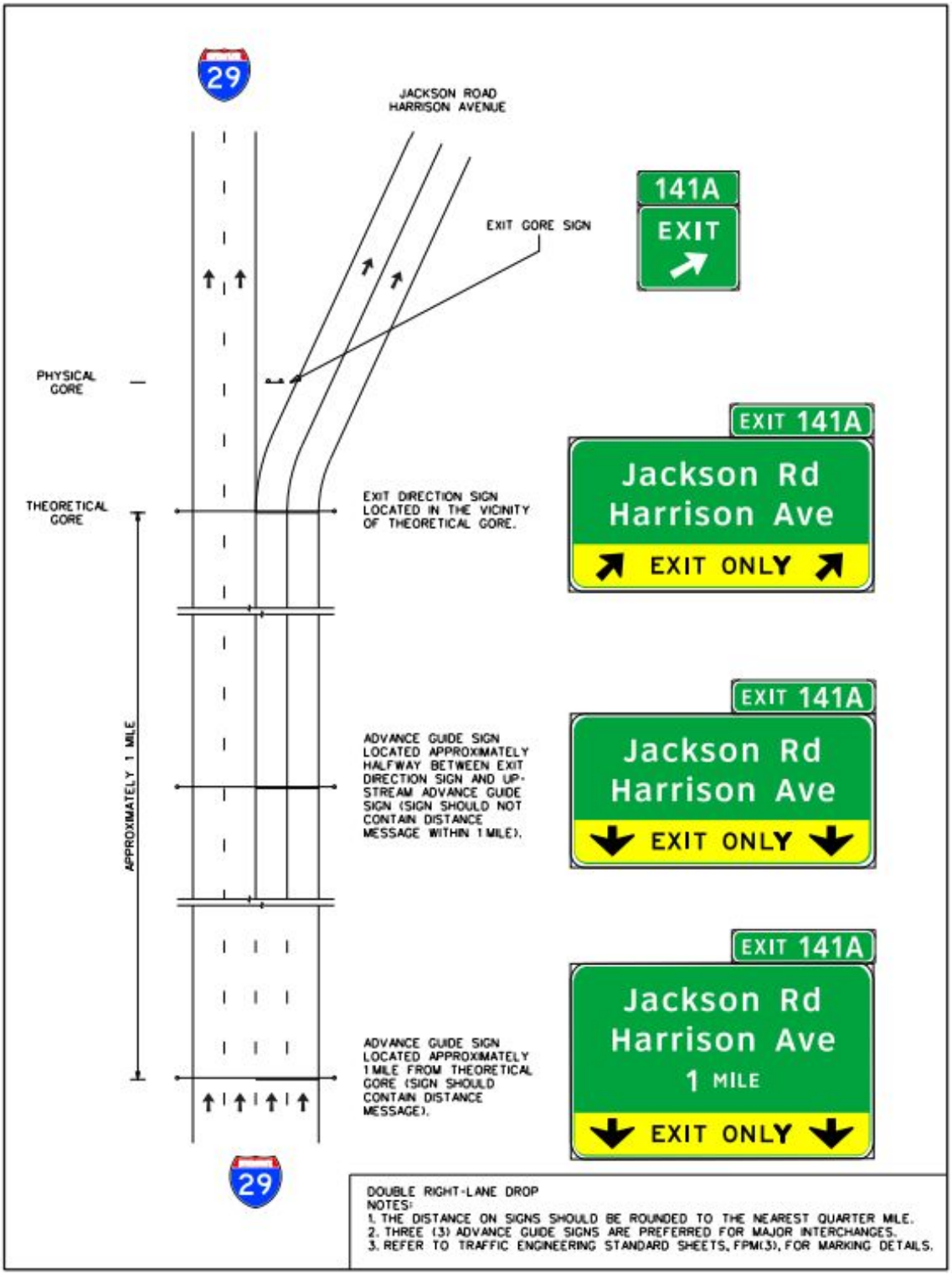


Figure 5-5. Signing for a double right-lane drop.

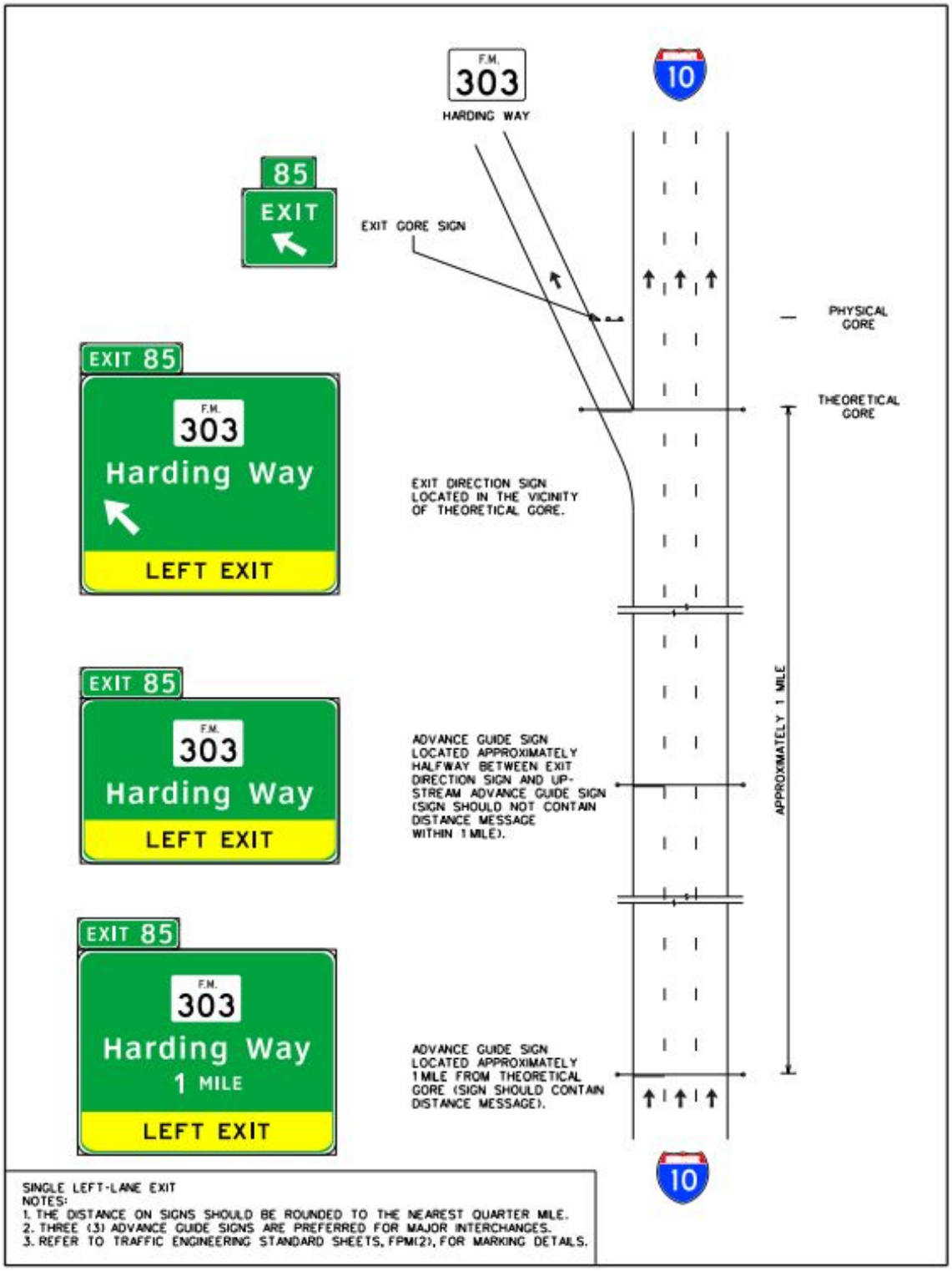


Figure 5-6. Signing for a single left-lane exit.

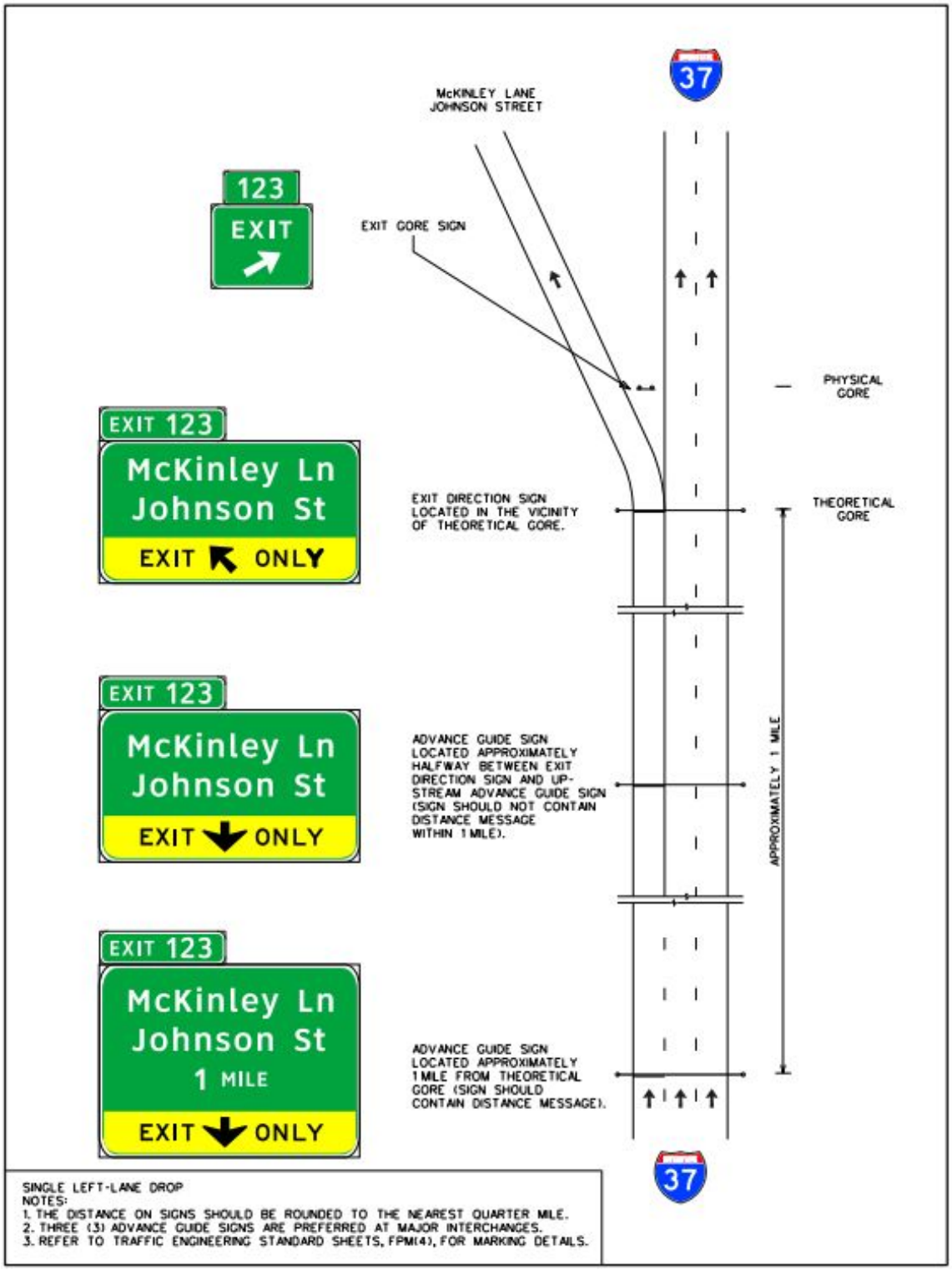


Figure 5-7. Signing for a single left-lane drop.

Section 3: Lane Geometry and Arrow Orientation

Introduction

This section covers guide sign arrow orientation based on route direction and various freeway lane geometries. The guidance in this section is primarily for freeway-to-freeway interchanges, which are discussed in the next section; however, the guidance may be used for other types of interchanges if additional lane assignment is necessary.

Route Arrangement and Lane Geometry

Figure 5-8 illustrates the three basic types of route arrangements that can exist at a freeway-to-freeway interchange. These include:

- The freeway continues to the left and traffic exits to the right to a different freeway. This arrangement is most consistent with driver expectancy.
- The freeway continues to the right and traffic exits to the left to a different freeway. This is a left exit condition.
- The freeway ends at another freeway. Traffic exits the ending freeway to travel in either direction on the other freeway.

For each route arrangement, three types of lane geometries are possible. These include:

- The left branch is on a tangent alignment, and the right branch is curved.
- Both the left and right branches are on a curved alignment.
- The right branch is on a tangent alignment, and the left branch is curved.

Figure 5-8 illustrates nine combinations of route arrangements that are possible when an optional lane serves both the continuing and exiting routes. Similar combinations are possible when no optional lane is present.

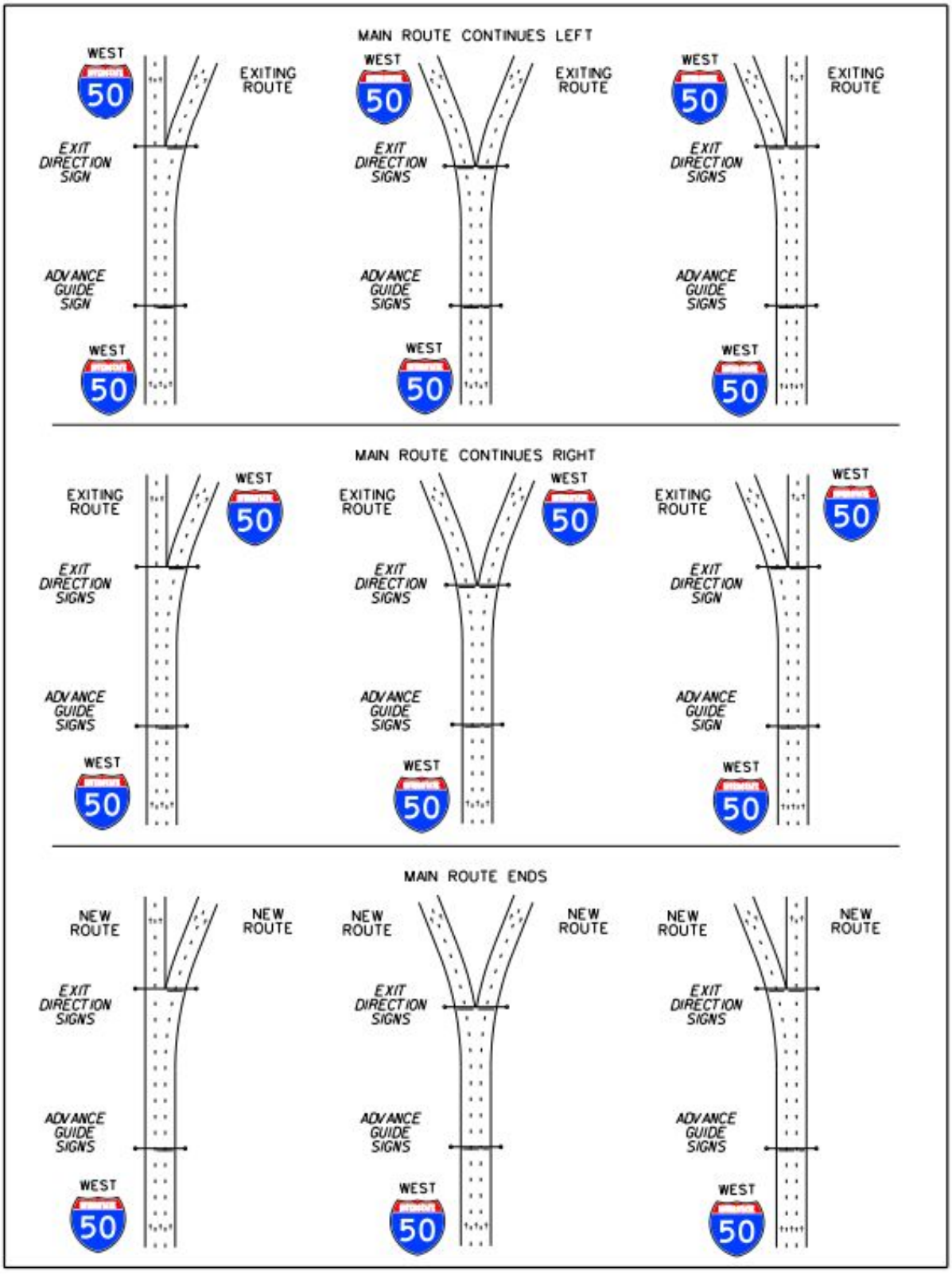


Figure 5-8. Route direction and lane geometry at an interchange.

Arrow Orientation

When lane assignment is desired, all exiting lanes at that location should be marked with down arrows and/or upward slanting arrows on overhead Advance Guide and Exit Direction signs.

Advance Guide signs, either with or without Exit Only panels, are located upstream of the gore and should have only one downward arrow per travel lane. In some cases, two destinations can be reached from one lane (an optional lane), and only one downward arrow should be placed for that lane on the Advance Guide signs. This arrow should be placed on the through Interstate Highway route. If the route ends at the split, or if both destinations are non-Interstate Highway routes, the downward arrow on the Advance Guide signs for the optional lane should be placed for the destination with the higher traffic volume or the route that favors a through movement.

Exit Direction signs, either with or without Exit Only panels, are located at the gore location and may have downward and/or upward slanting arrows depending on the lane geometry of the freeway lanes. The following general rules apply to the use of arrows on Exit Direction signs for freeway-to-freeway interchanges:

- If a Pull-Through sign is used at the gore for the continuing route, the type of arrow is determined as follows:

If the continuing route is…	Then…
on a tangent alignment in the vicinity of the gore	down arrows are used.
not on tangent alignment in the vicinity of the gore	upward slanting arrows are used.

- Upward slanting arrows are used for the exiting route.
- Upward slanting arrows are used for both directions when a route ends at another freeway.

The number of arrows on the sign structure must be equal to the number of lanes underneath the sign structure, unless there is an optional lane. When there is an optional lane, the number of arrows on the sign structure may be the same as the number of lanes immediately downstream of the structure, if the structure is located within the lane-increase transition.

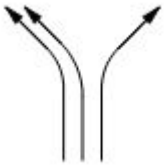
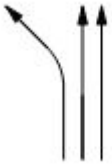
Pull-Through Signs

Although shown in the illustrations in this section, Pull-Through signs may not be necessary at all freeway-to-freeway interchanges.

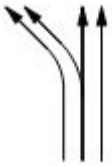
Arrow Placement for Route Continuing to the Left

The following table illustrates Advance Guide and Exit Direction sign arrow orientation when the freeway route continues to the left. The examples are based on three approach lanes, but additional lanes may be present on the right or left sides.

Advance Guide and Exit Direction Sign Arrow Orientation for Route Continuing Left

Lane Geometry	Sign Type	Left Route Signing	Right Route Signing
	Exit Direction Sign	Sign and/or Arrows Not Necessary[1]	
	Advance Guide Signs	Sign and/or Arrows Not Necessary[1]	
	Exit Direction Sign		
	Advance Guide Signs		
	Exit Direction Sign		
	Advance Guide Signs		
	Exit Direction Sign	Sign and/or Arrows Not Necessary[1]	
	Advance Guide Signs	Sign and/or Arrows Not Necessary[1]	

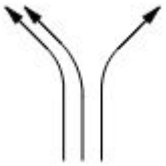
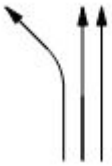
Advance Guide and Exit Direction Sign Arrow Orientation for Route Continuing Left

Lane Geometry	Sign Type	Left Route Signing	Right Route Signing
	Exit Direction Sign		
	Advance Guide Signs[2]		
	Exit Direction Sign		
	Advance Guide Signs[2]		
[1]Typical right-lane exit where arrows are not necessary for the through route.			
[2]Two arrows on the Advance Guide signs favor the through Interstate Highway. If the route ends at the split, or if both destinations are non-Interstate Highway routes, the downward arrow on the Advance Guide signs for the optional lane should be placed for the destination with heaviest traffic volume movement (see Figure 5-8).			

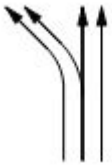
Arrow Placement for Route Continuing to the Right

The following table illustrates Advance Guide and Exit Direction sign arrow orientation when the freeway route continues to the right. The examples are based on three approach lanes, but additional lanes may be present on the right or left sides.

Advance Guide and Exit Direction Sign Arrow Orientation for Route Continuing Right

Lane Geometry	Sign Type	Left Route Signing	Right Route Signing
	Exit Direction Sign		
	Advance Guide Signs		
	Exit Direction Sign		
	Advance Guide Signs		
	Exit Direction Sign		Sign and/or Arrows Not Necessary
	Advance Guide Signs		Sign and/or Arrows Not Necessary[1]
	Exit Direction Sign		
	Advance Guide Signs[2]		

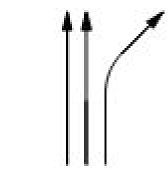
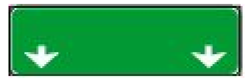
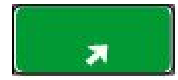
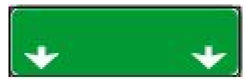
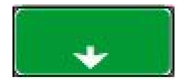
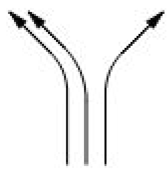
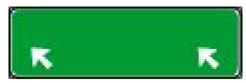
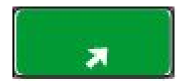
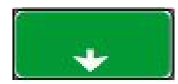
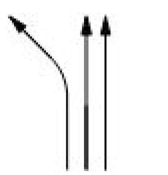
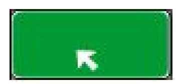
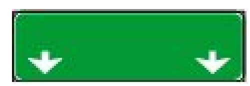
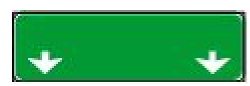
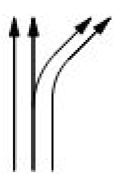
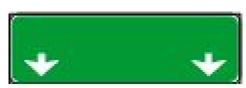
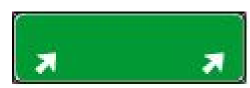
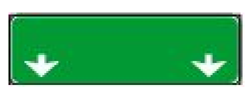
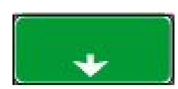
Advance Guide and Exit Direction Sign Arrow Orientation for Route Continuing Right

Lane Geometry	Sign Type	Left Route Signing	Right Route Signing
	Exit Direction Sign		
	Advance Guide Signs[2]		
	Exit Direction Sign		Sign and/or Arrows Not Necessary[1]
	Advance Guide Signs		Sign and/or Arrows Not Necessary[1]
[1]Typical left-lane exit where arrows are not necessary for the through route.			
[2]Two arrows on the Advance Guide signs favor the through Interstate Highway. If the route ends at the split, or if both destinations are non-Interstate Highway routes, the downward arrow on the Advance Guide signs for the optional lane should be placed for the destination with heaviest traffic volume movement (see Figure 5-8).			

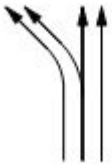
Arrow Placement for Route Ending

The following table illustrates Advance Guide and Exit Direction sign arrow orientation for when the freeway route ends and exits to another freeway. The examples are based on three approach lanes, but additional lanes may be present on the right or left sides.

Advance Guide and Exit Direction Sign Arrow Orientation for Route Ending

Lane Geometry	Sign Type	Left Route Signing	Right Route Signing
	Exit Direction Sign		
	Advance Guide Signs		
	Exit Direction Sign		
	Advance Guide Signs		
	Exit Direction Sign		
	Advance Guide Signs		
	Exit Direction Sign		
	Advance Guide Signs1		

Advance Guide and Exit Direction Sign Arrow Orientation for Route Ending

Lane Geometry	Sign Type	Left Route Signing	Right Route Signing
	Exit Direction Sign		
	Advance Guide Signs[1]		
	Exit Direction Sign		
	Advance Guide Signs[1]		

[1]Two arrows on the Advance Guide signs favor the through Interstate Highway. If the route ends at the split, or if both destinations are non-Interstate Highway routes, the downward arrow on the Advance Guide signs for the optional lane should be placed for the destination with heaviest traffic volume movement (see Figure 5-8).

Section 4: Freeway-to-Freeway Interchange Signing

Single Exit Directional Interchange

Figure 5-9 illustrates a directional interchange where all traffic exits the freeway at a single location. Signing for typical approaches to a single-exit directional interchange is illustrated in Figure 5-10 through Figure 5-13.

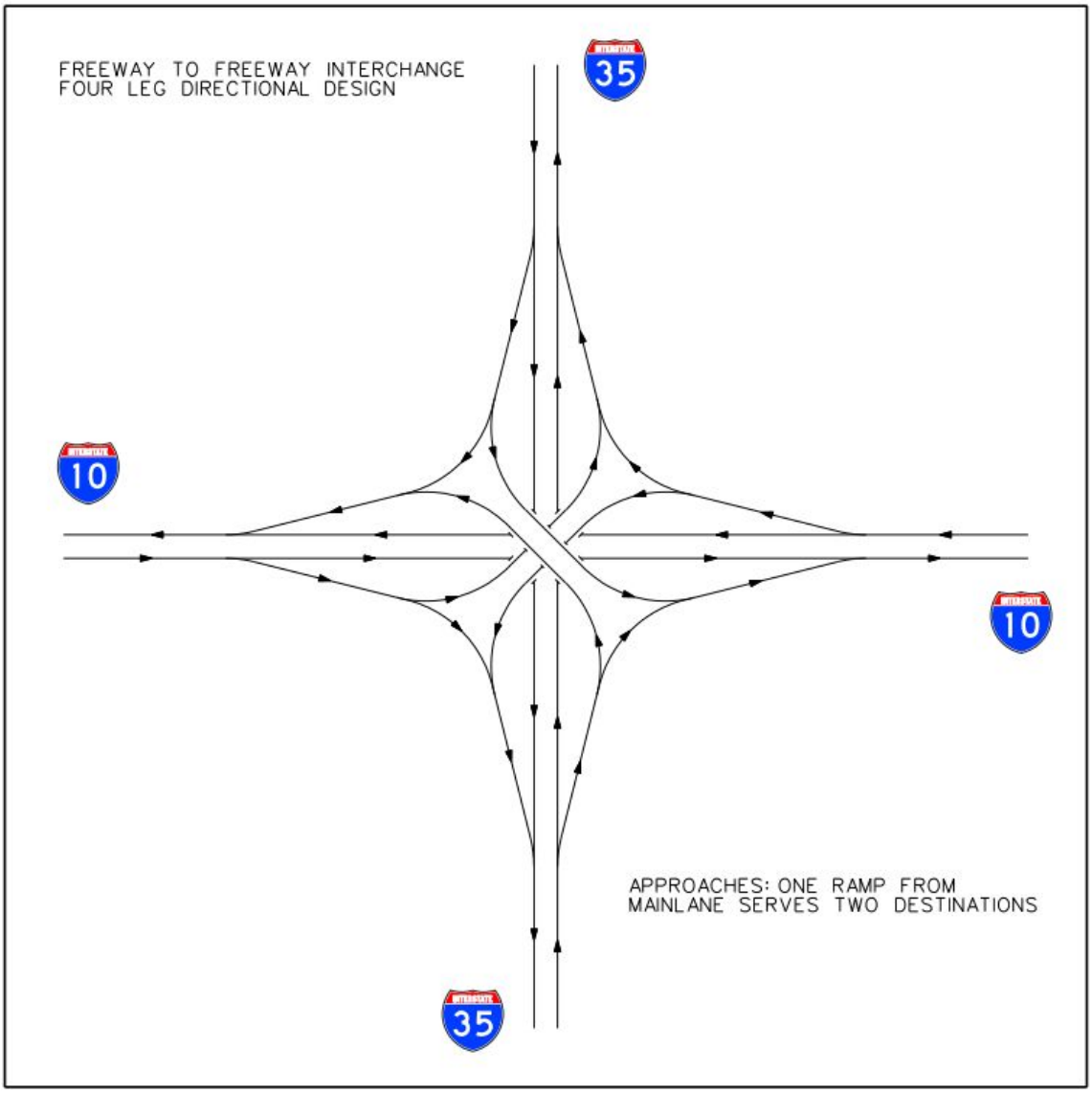


Figure 5-9. Four-leg directional interchange with one ramp from freeway main lanes serving two destinations.

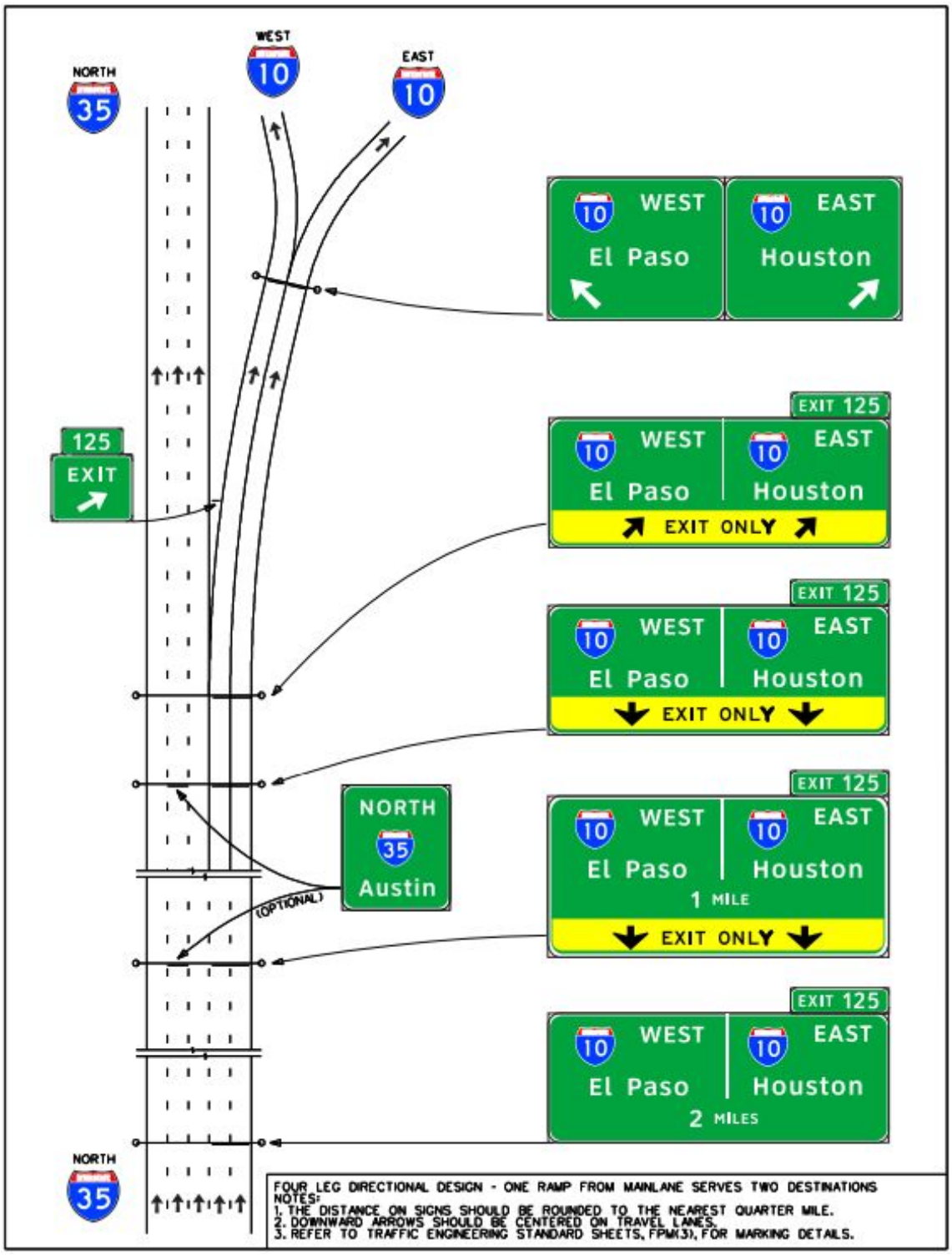


Figure 5-10. Signing for a four-leg directional interchange – one ramp from the freeway main lanes serves two destinations, double lane drop, and one-lane connectors to the left and right.

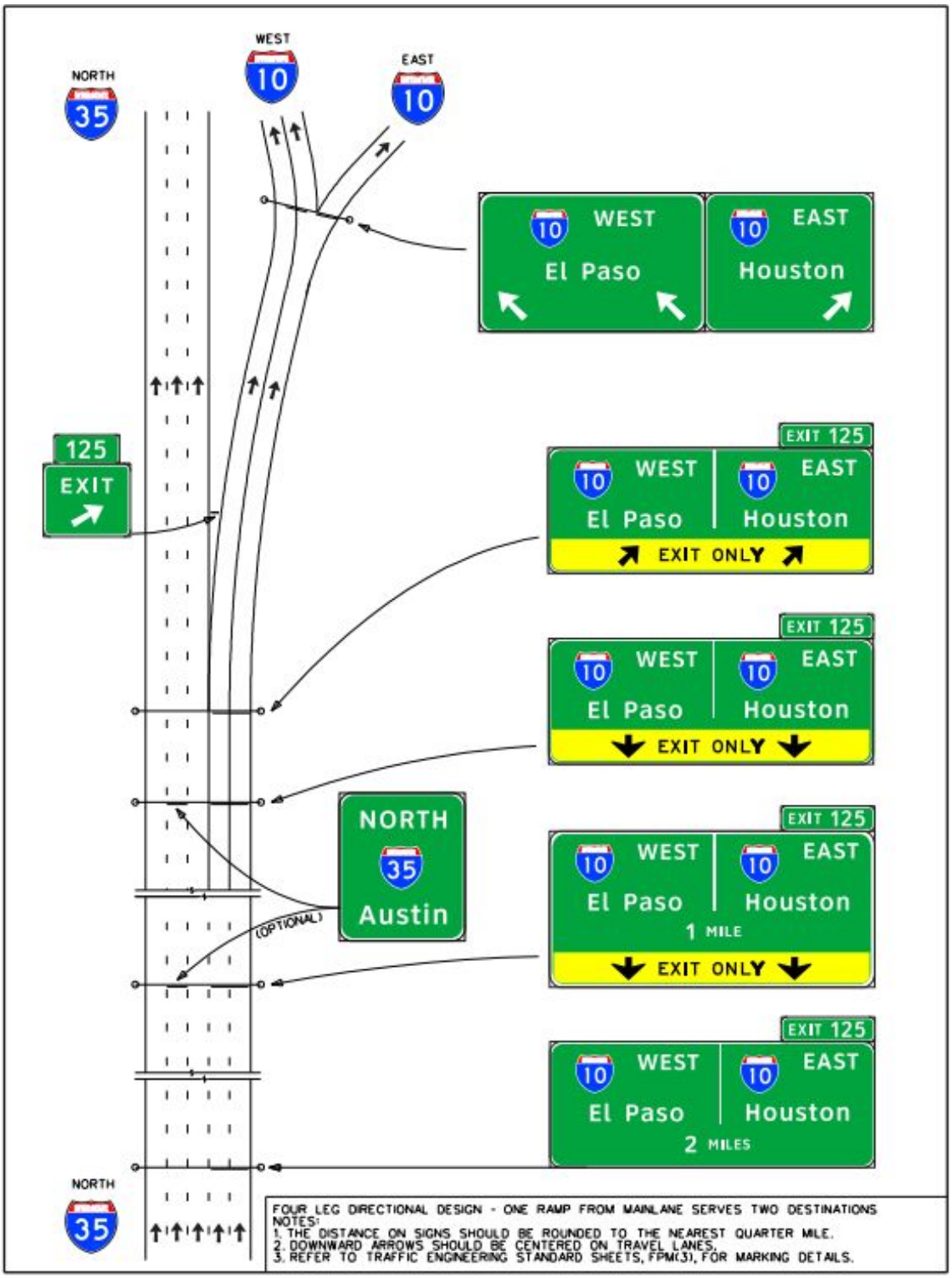


Figure 5-11. Signing for a four-leg directional interchange – one ramp from the freeway main lanes serves two destinations, double lane drop, two-lane connector to the left, and one-lane connector to the right.

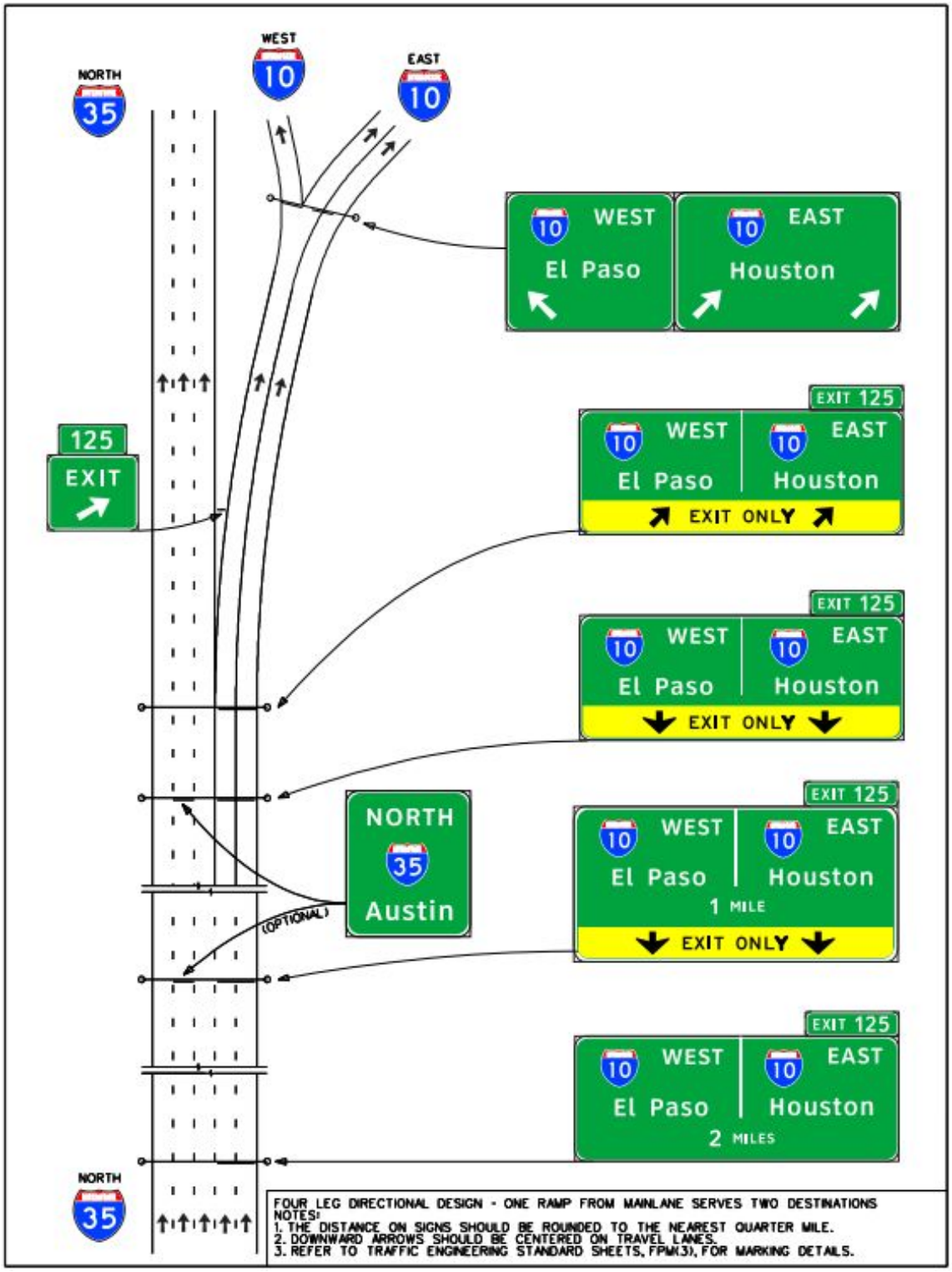


Figure 5-12. Signing for a four-leg directional interchange – one ramp from the freeway main lanes serves two destinations, double lane drop, one-lane connector to the left, and two-lane connector to the right.

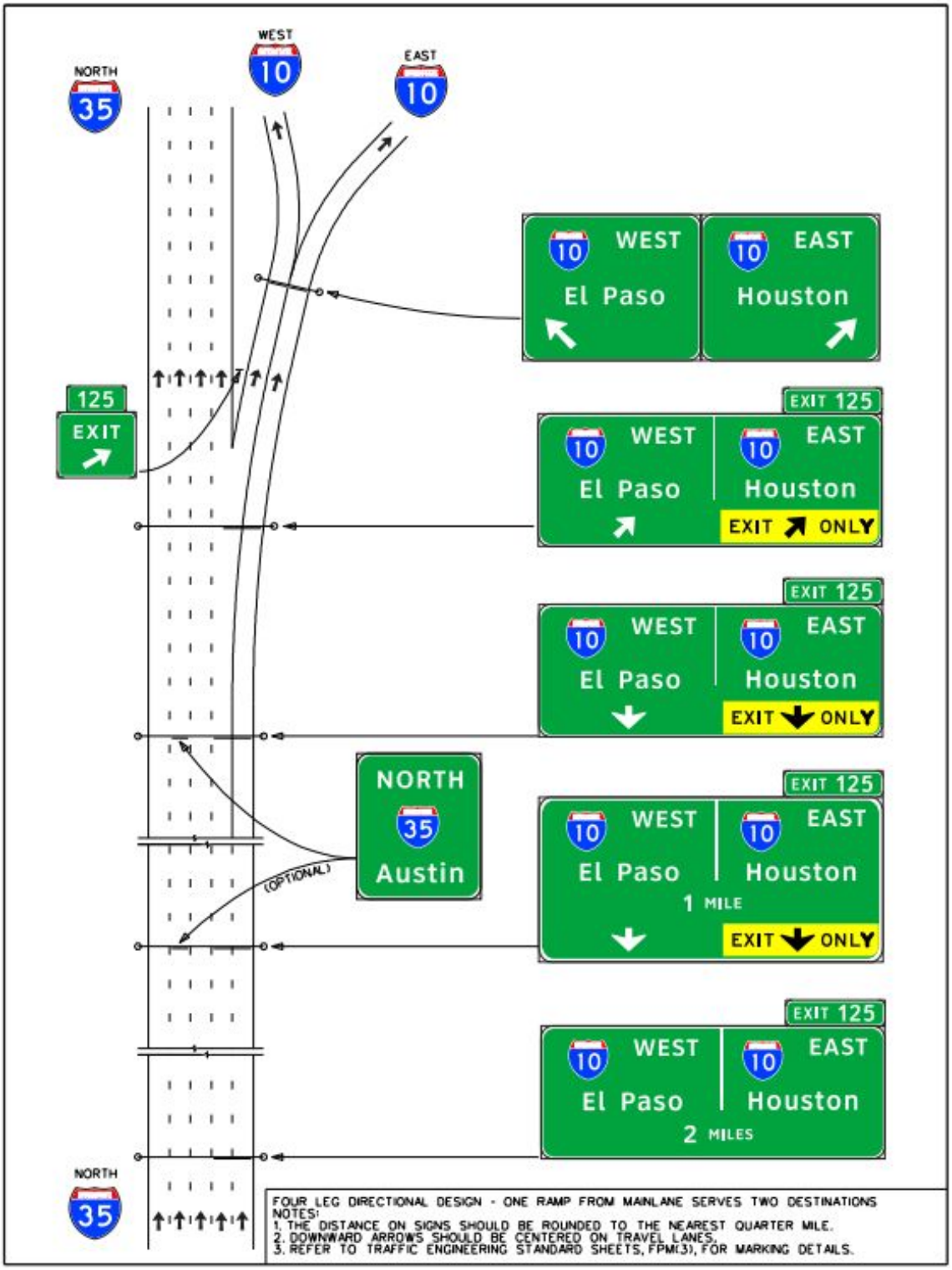


Figure 5-13. Signing for a four-leg directional interchange – one ramp from the freeway main lanes serves two destinations, single lane drop, optional exit, and one-lane connectors to the left and right.

Two Exit Directional Interchange

Figure 5-14 illustrates a directional interchange where traffic exiting the freeway exits at two locations. Signing for typical approaches to a two-exit directional interchange is illustrated in Figure 5-15 through Figure 5-18.

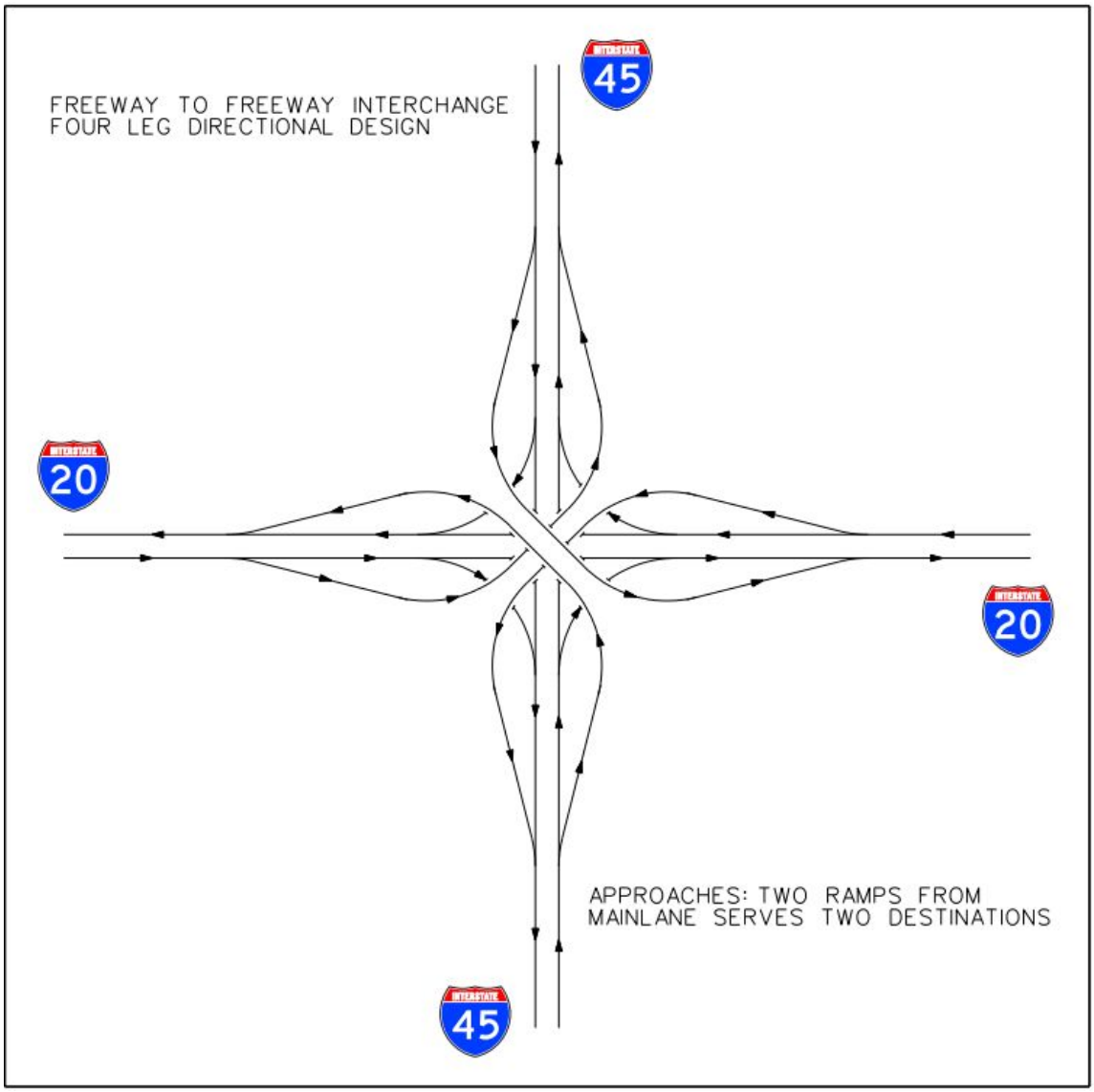


Figure 5-14. Four-leg directional interchange with two ramps from freeway main lanes serving two destinations.

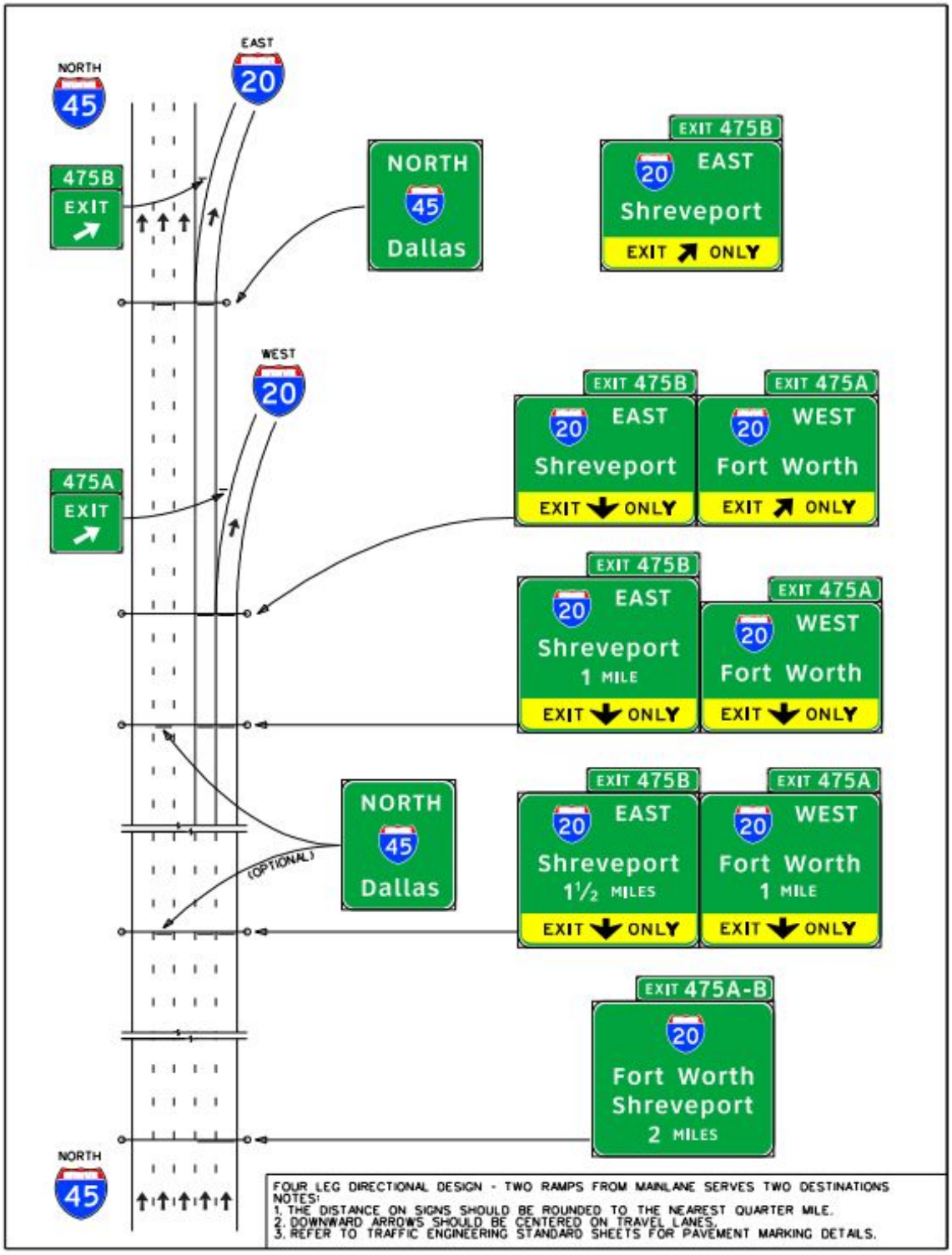


Figure 5-15. Signing for a four-leg directional interchange – two ramps from the freeway main lanes serve two destinations and lane drop for both ramps.

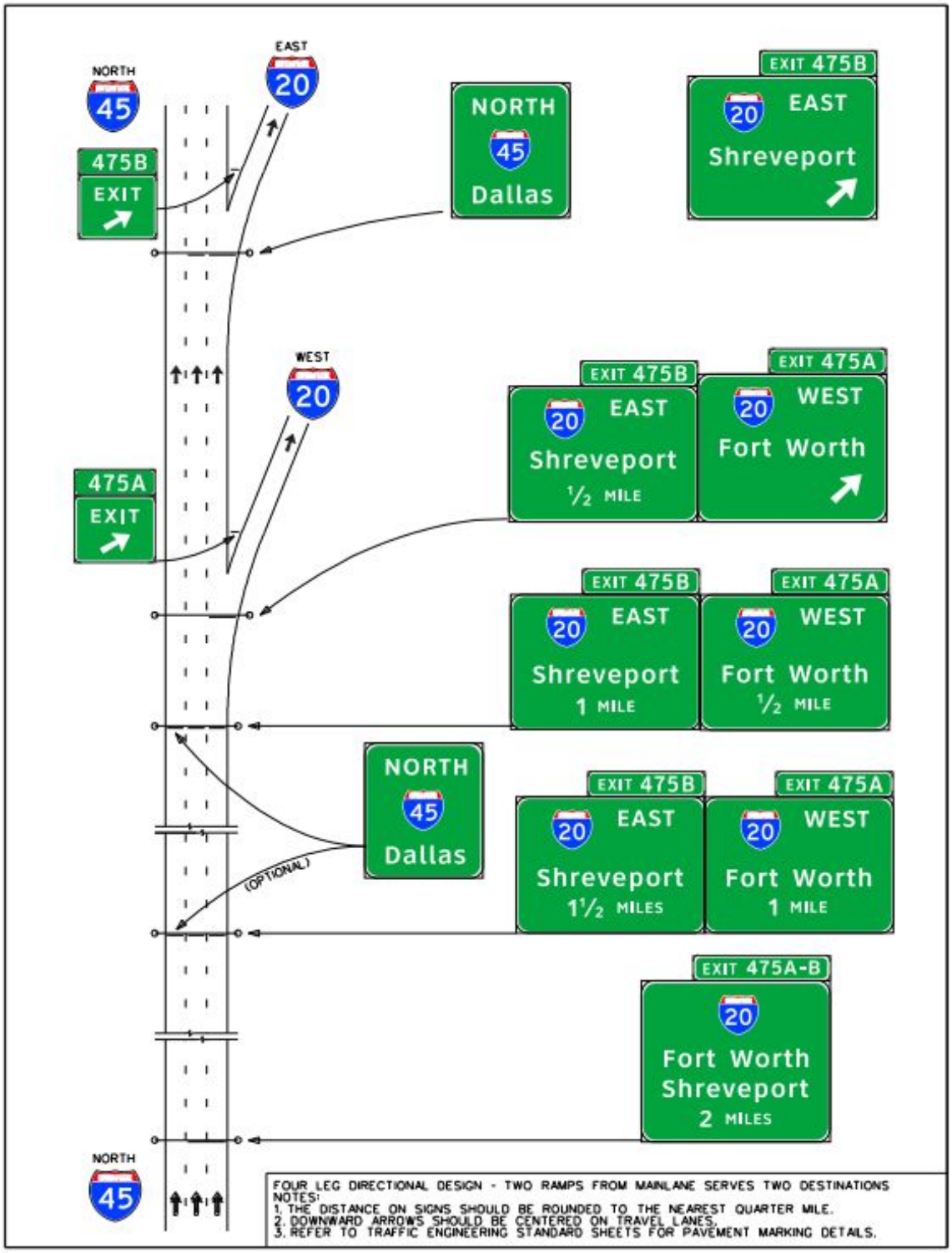


Figure 5-16. Signing for a four-leg directional interchange – two ramps from the freeway main lanes serve two destinations, single right-lane exit both ramps.

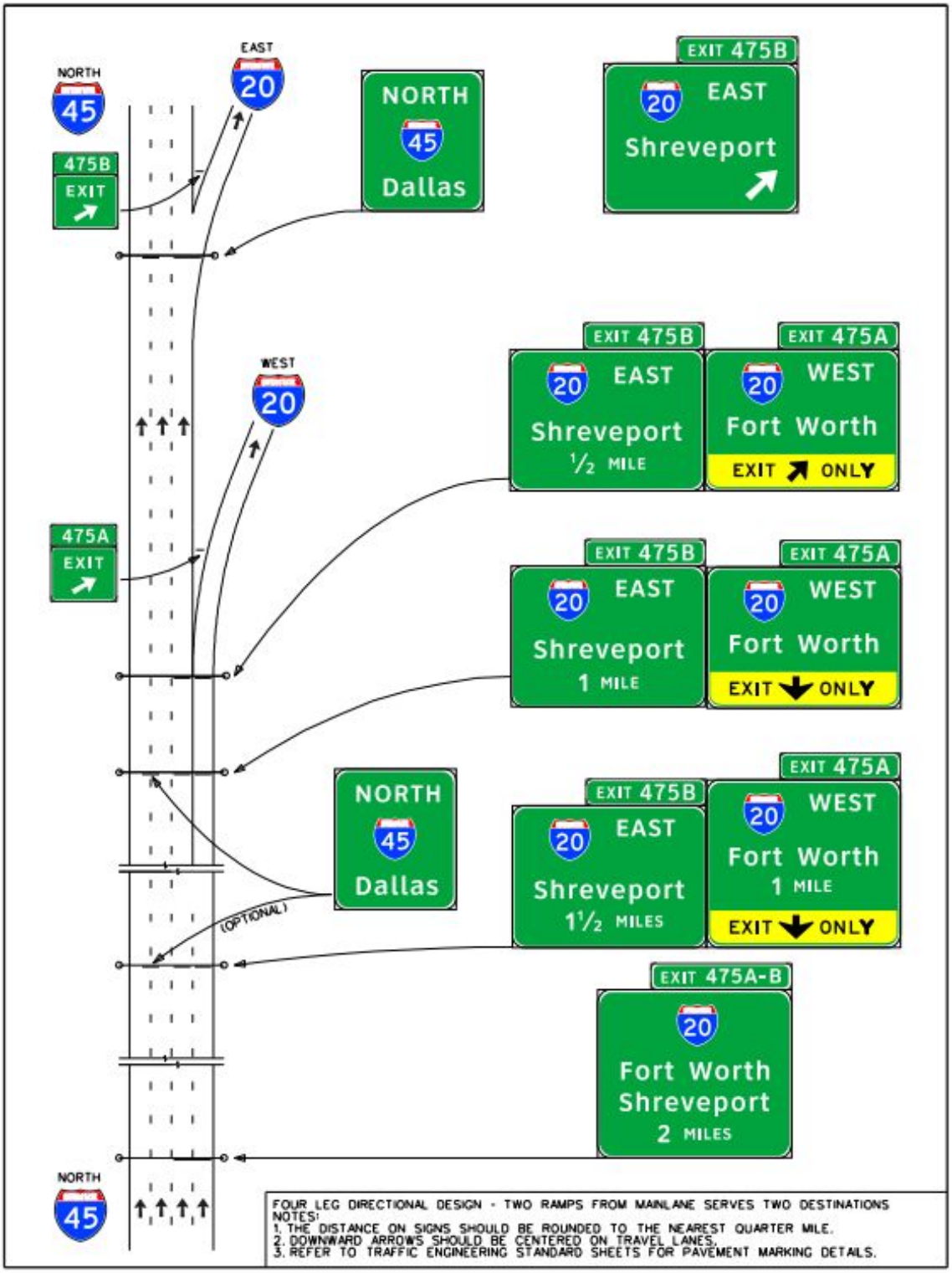


Figure 5-17. Signing for a four-leg directional interchange – two ramps from the freeway main lanes serve two destinations, single right-lane drop for first ramp, and single right-lane exit for second ramp.

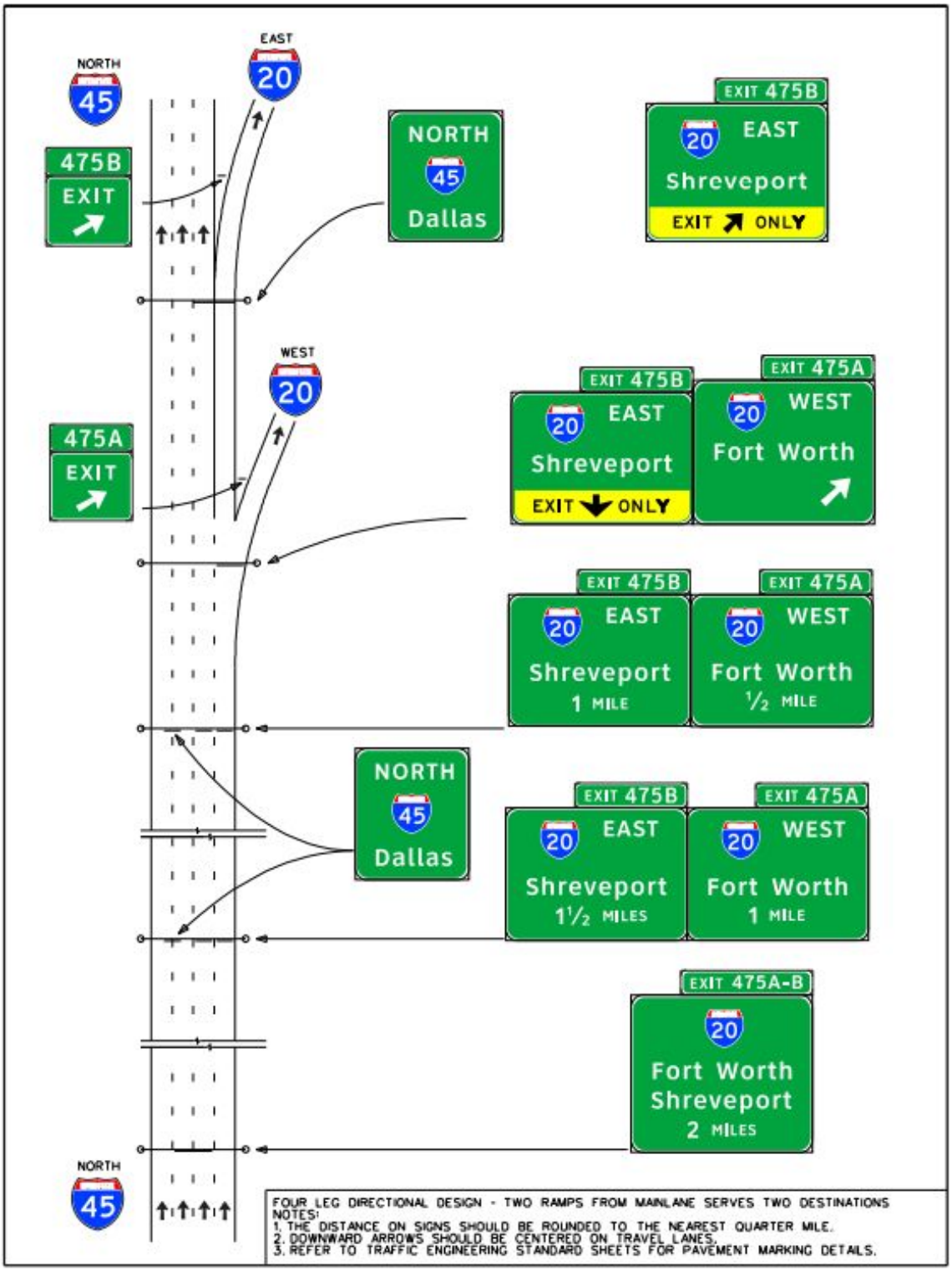


Figure 5-18. Signing for a four-leg directional interchange – two ramps from the freeway main lanes serve two destinations, single right-lane exit for first ramp, and single right-lane drop for second ramp.

Three-Leg Directional Interchange

Figure 5-19 illustrates three-leg directional interchanges with various configurations of continuing and terminating routes. Figure 5-20 through Figure5-22 illustrate appropriate signing for the freeway approaching the split for each of the configurations.

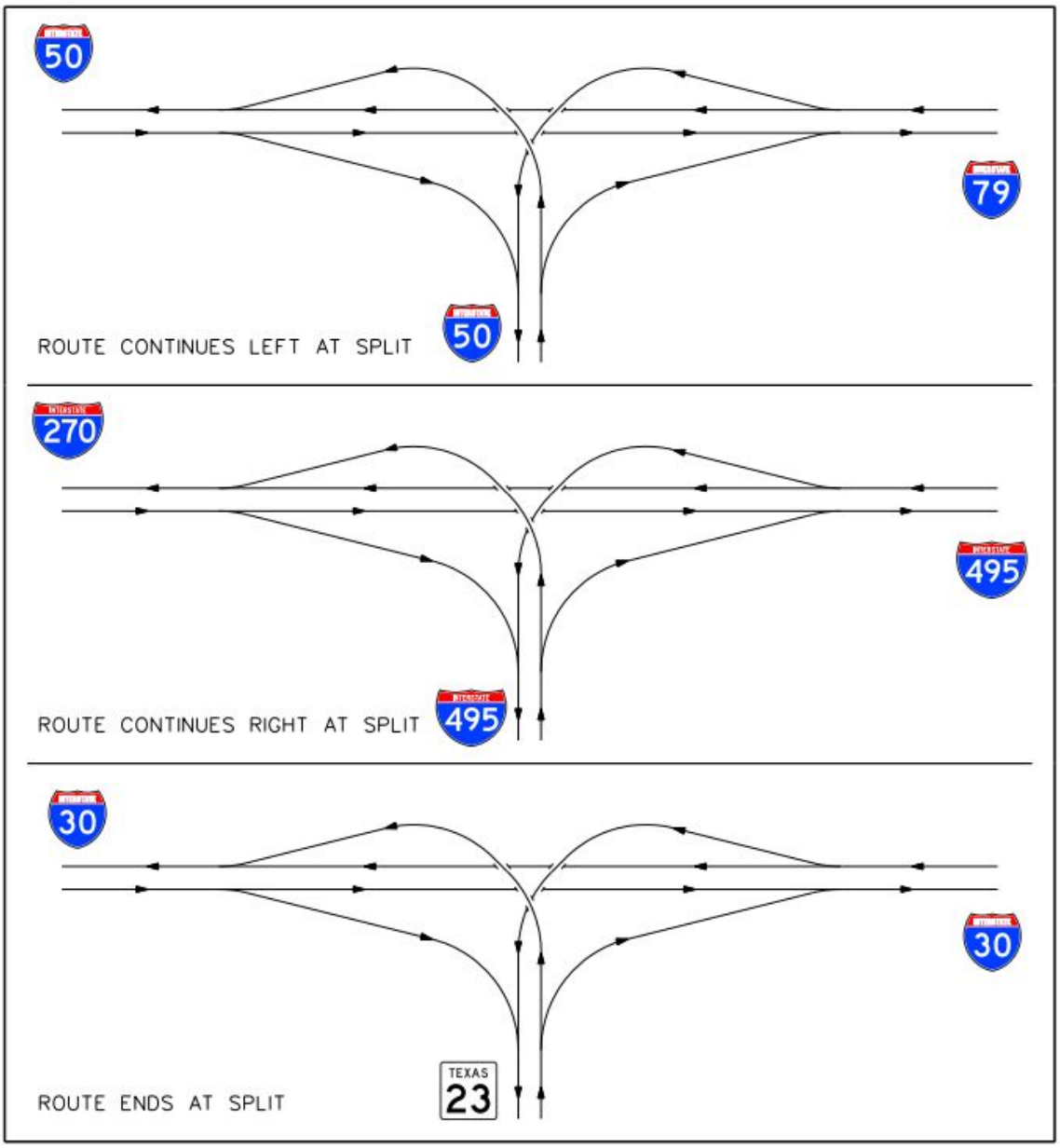


Figure 5-19. Three-leg directional interchanges with continuing and terminating routes.

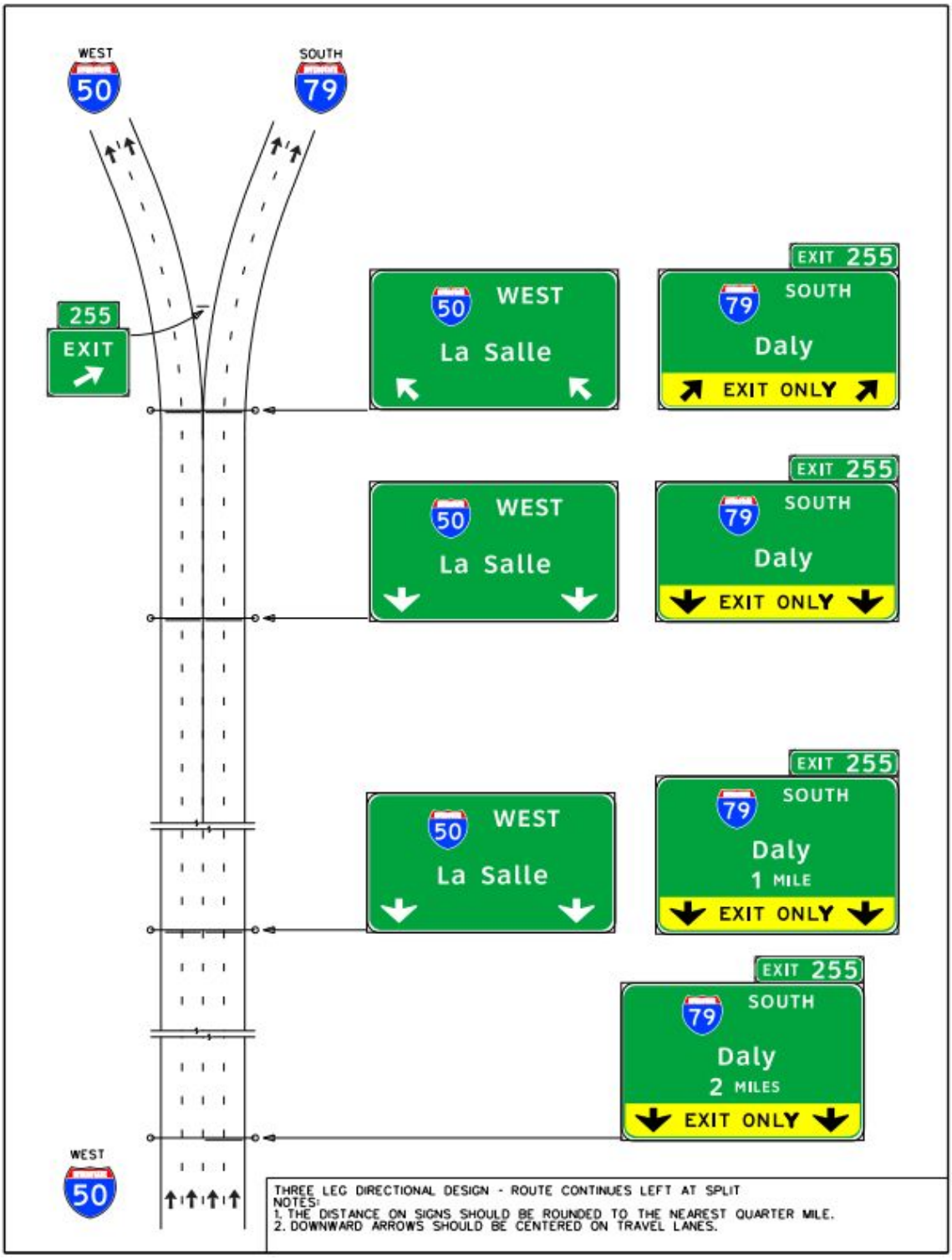


Figure 5-20. Signing for a three-leg directional interchange approach with route continuing left at the split.

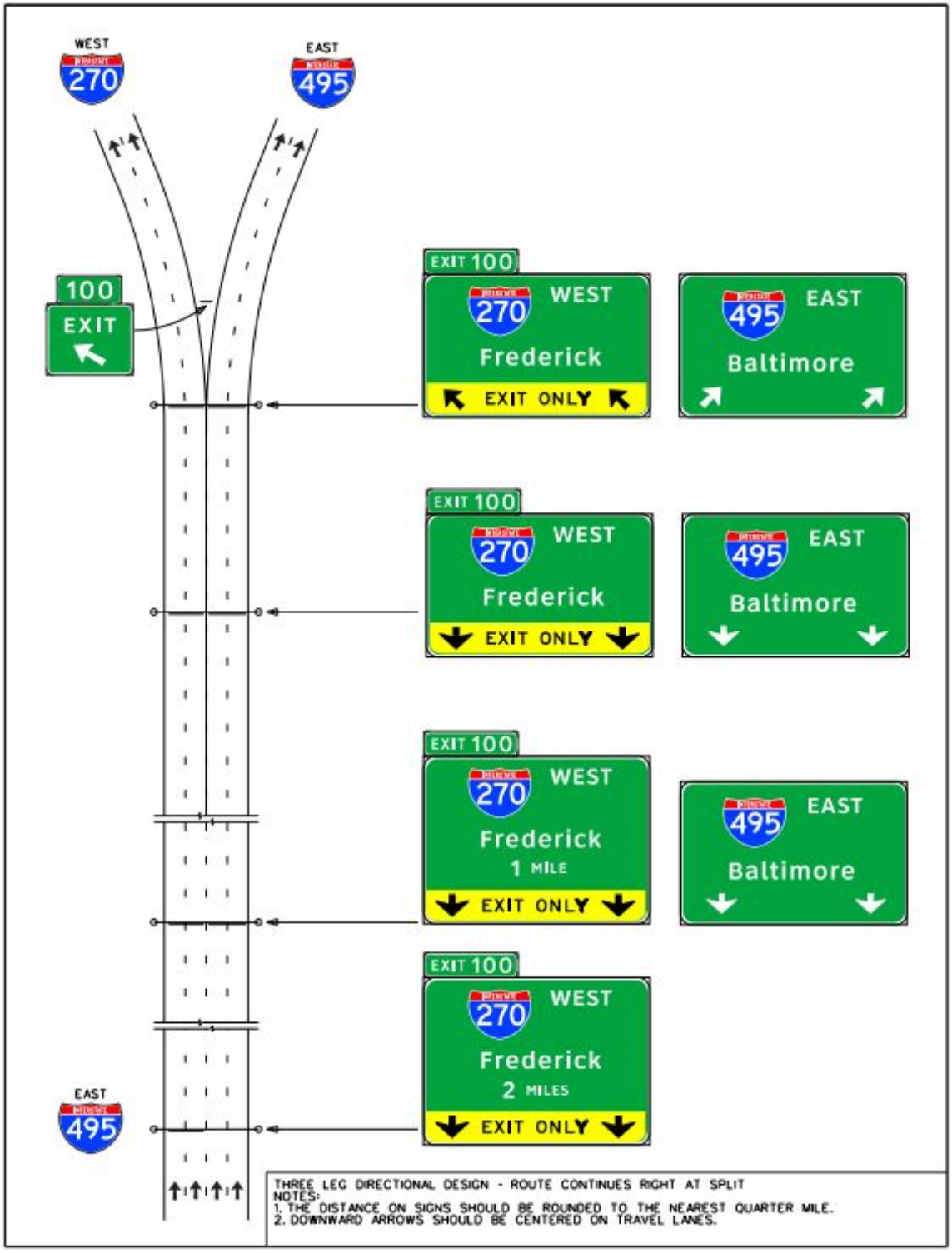


Figure 5-21. Signing for a three-leg directional interchange approach with route continuing right at the split.

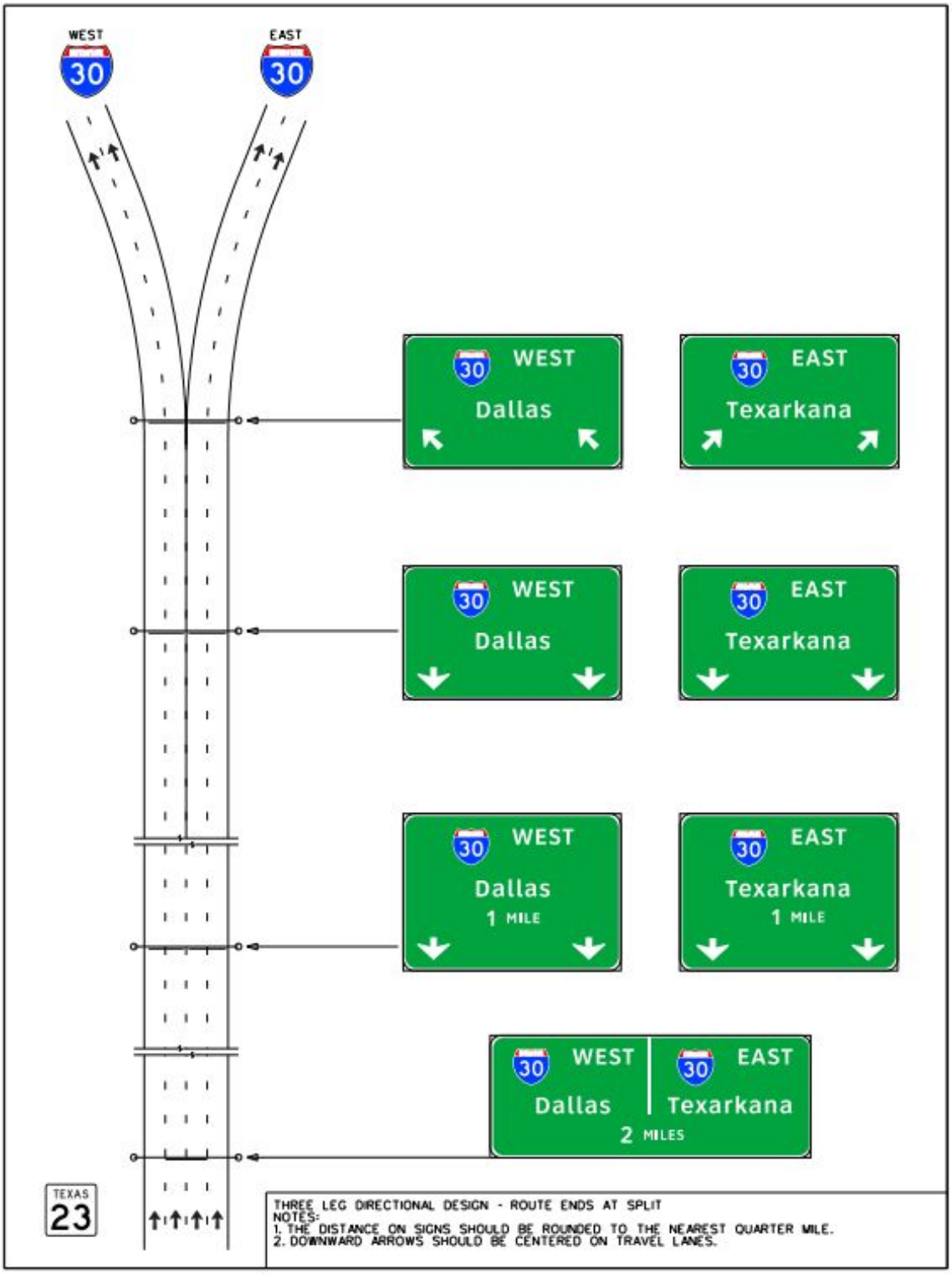


Figure 5-22. Signing for a three-leg directional interchange approach with route ending at the split.

Cloverleaf Interchange Designs

Figure 5-23 illustrates a full cloverleaf interchange with collector-distributor roads and where all traffic exiting the freeway exits at one location. Signing for typical approaches to a cloverleaf interchange with and without collector-distributor roads is illustrated in Figure 5-24 and Figure 5-25.

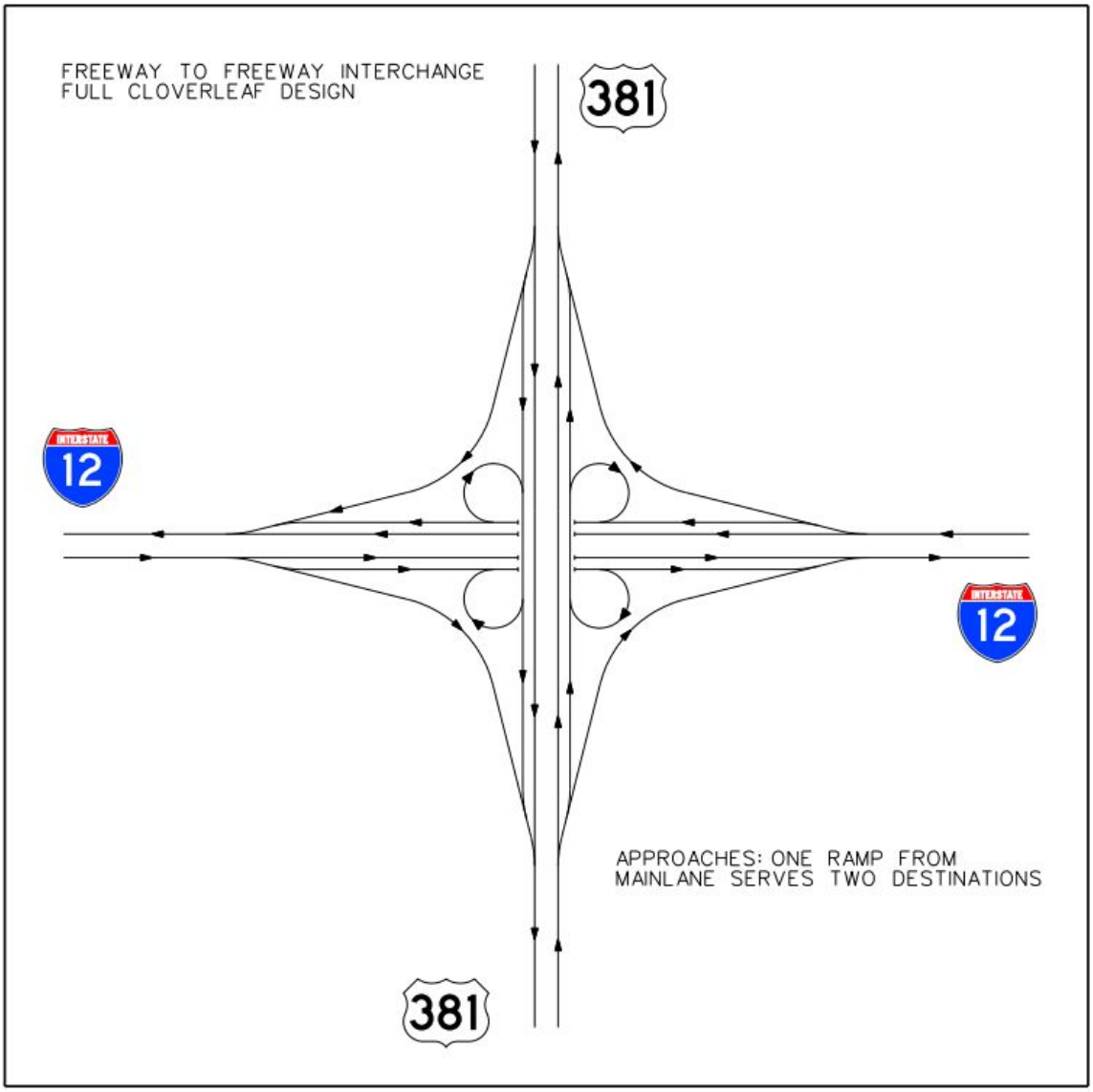


Figure 5-23. Cloverleaf interchange with collector-distributor roads.

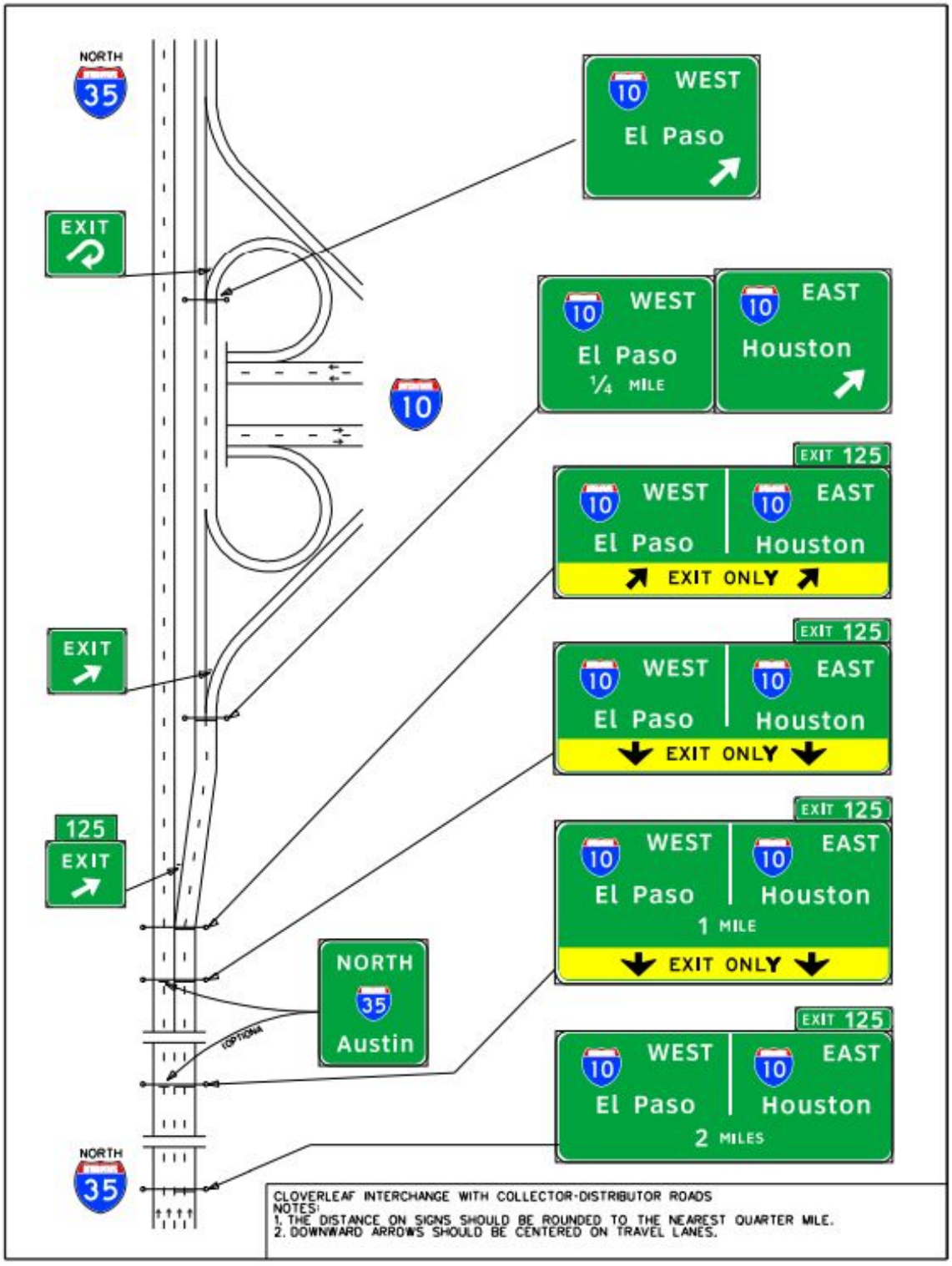


Figure 5-24. Signing for a typical cloverleaf interchange with collector-distributor roads.

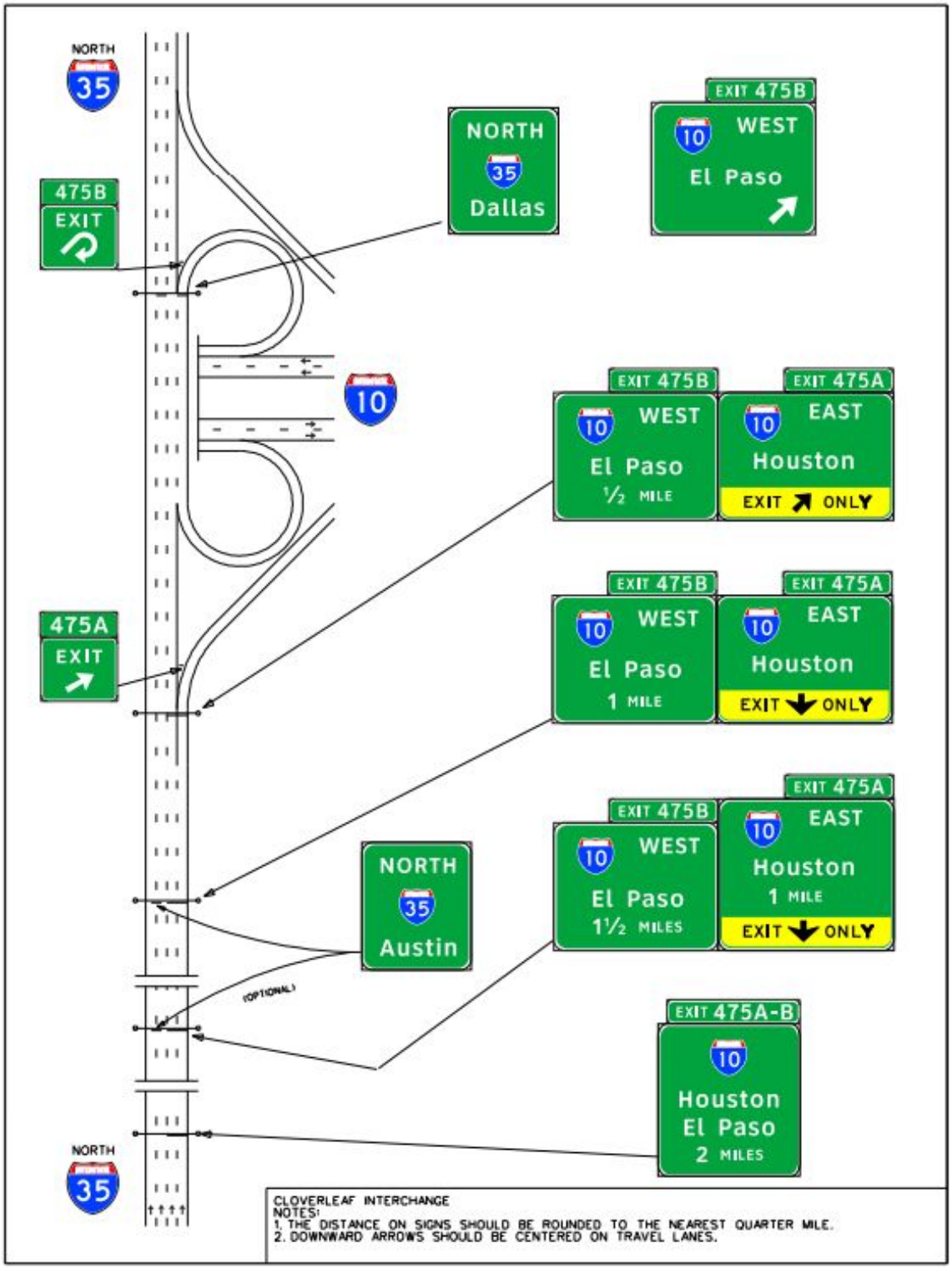


Figure 5-25. Signing for a typical cloverleaf interchange without collector-distributor roads.

Section 5: Signing for Closely Spaced Interchanges

Interchange Sequence Signing

If there is less than 800 ft between interchanges, Interchange Sequence signs should be used instead of the Advance Guide signs for the affected interchanges. If interchanges are closely spaced, particularly through large urban areas, so Advance Guide signs cannot be adequately spaced, Interchange Sequence signs identifying the next two or three interchanges can be used. Figure 5-26 illustrates this type of signing.

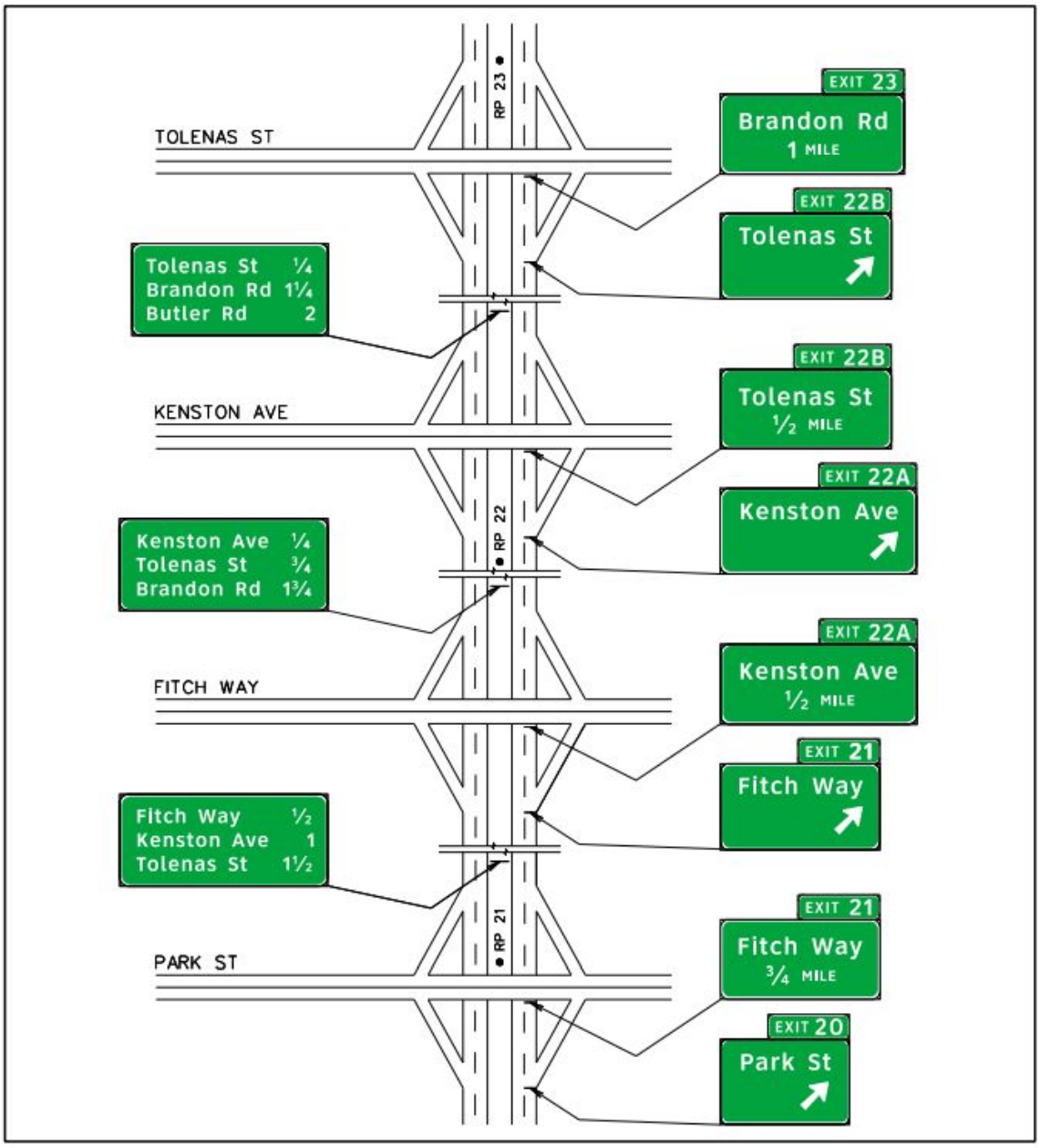


Figure 5-26. Signing of closely spaced interchanges using Interchange Sequence signs.

Signing Between Closely Spaced Entrance and Exit Ramps

Figure 5-27 through Figure 5-32 illustrate freeway signing for exit ramps in close proximity of an upstream entrance ramp.

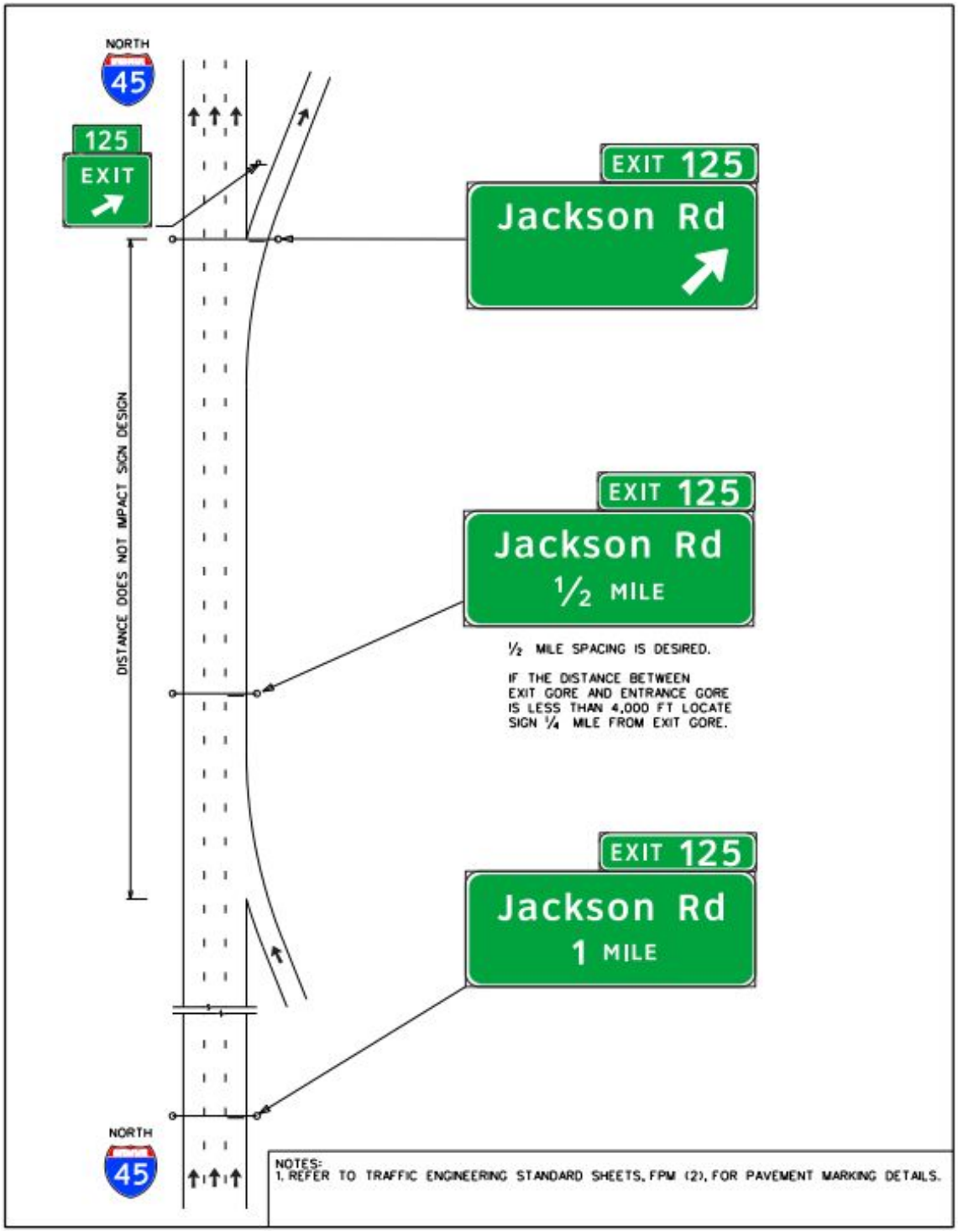


Figure 5-27. Closely spaced ramps with merge entrance ramp and diverge exit ramp.

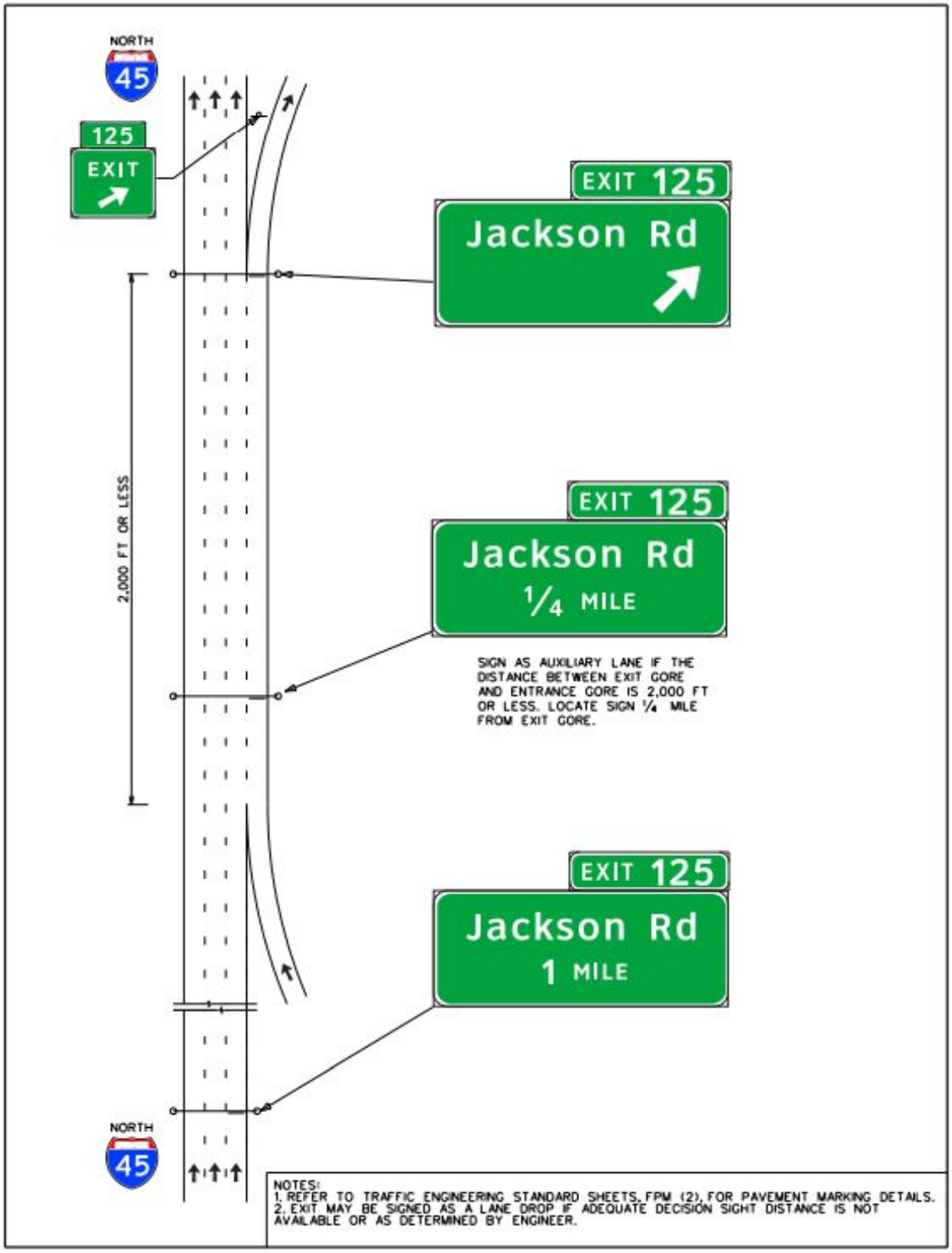


Figure 5-28. Closely spaced ramps with an added-lane entrance ramp and a lane drop exit ramp and 2000 ft or less between exit and entrance ramp gores.

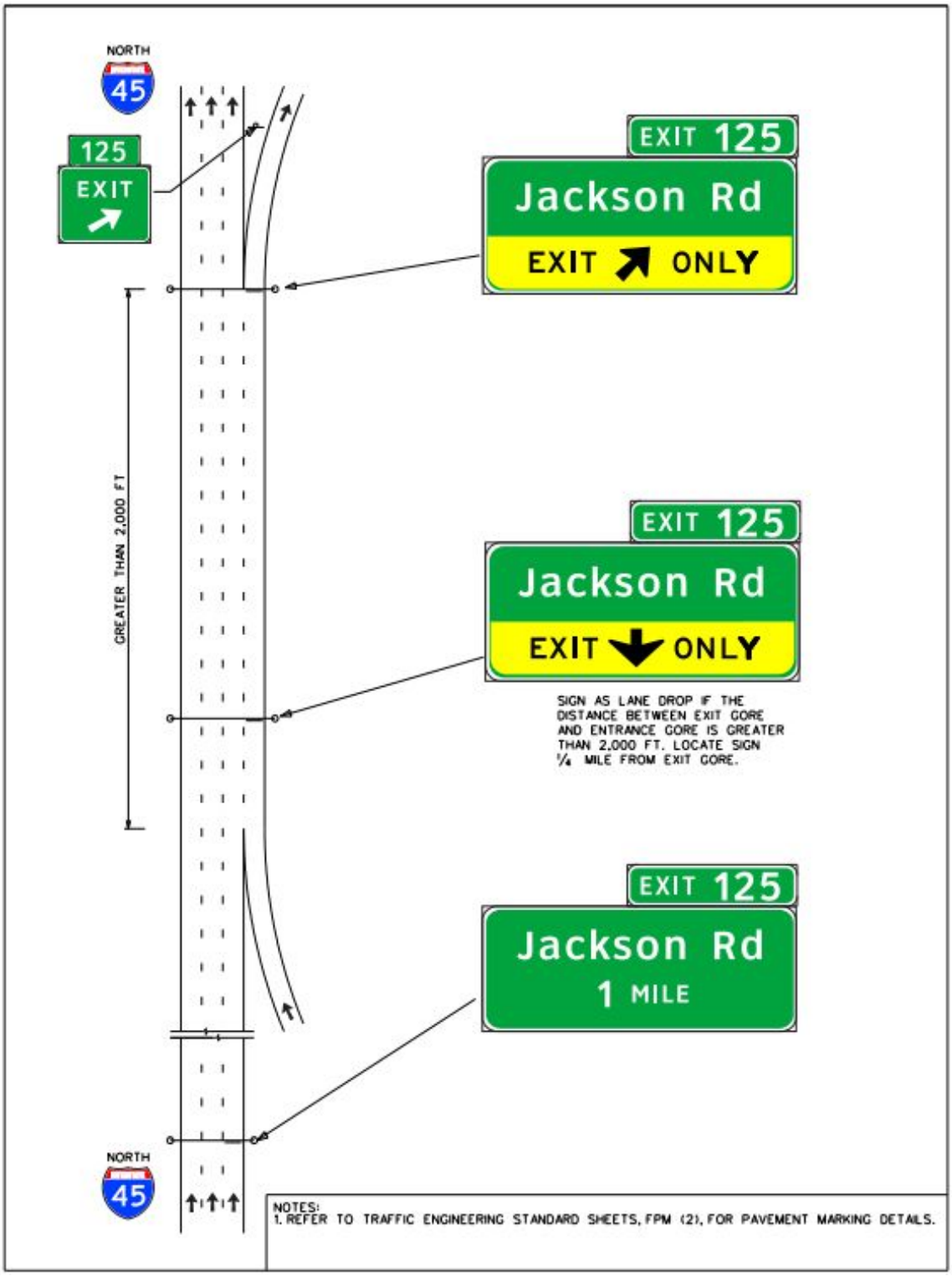


Figure 5-29. Closely spaced ramps with an added-lane entrance ramp and a lane drop exit ramp and greater than 2000 ft between exit and entrance ramp gores.

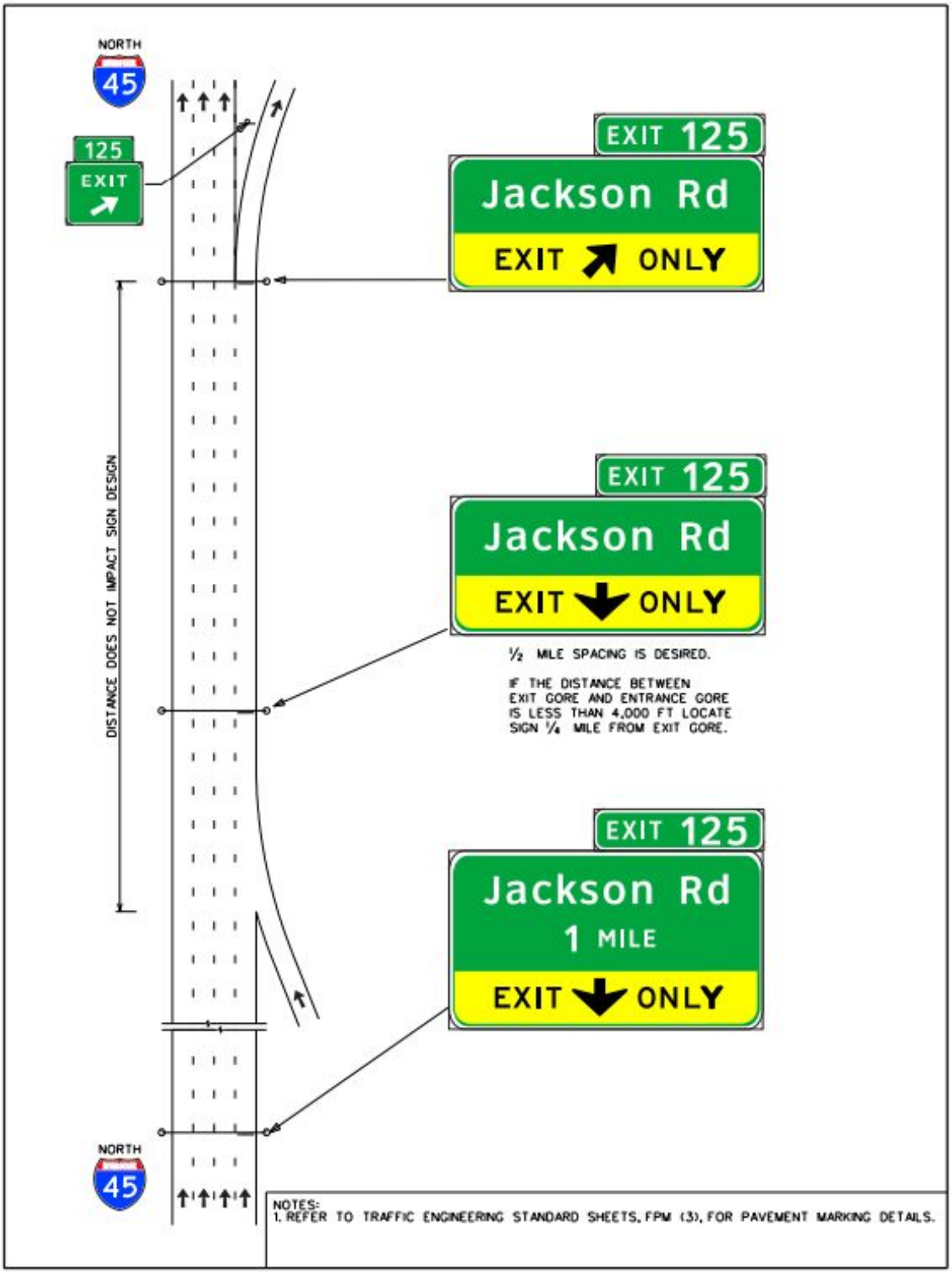


Figure 5-30. Closely spaced ramps with a merge entrance ramp and a lane drop exit ramp.

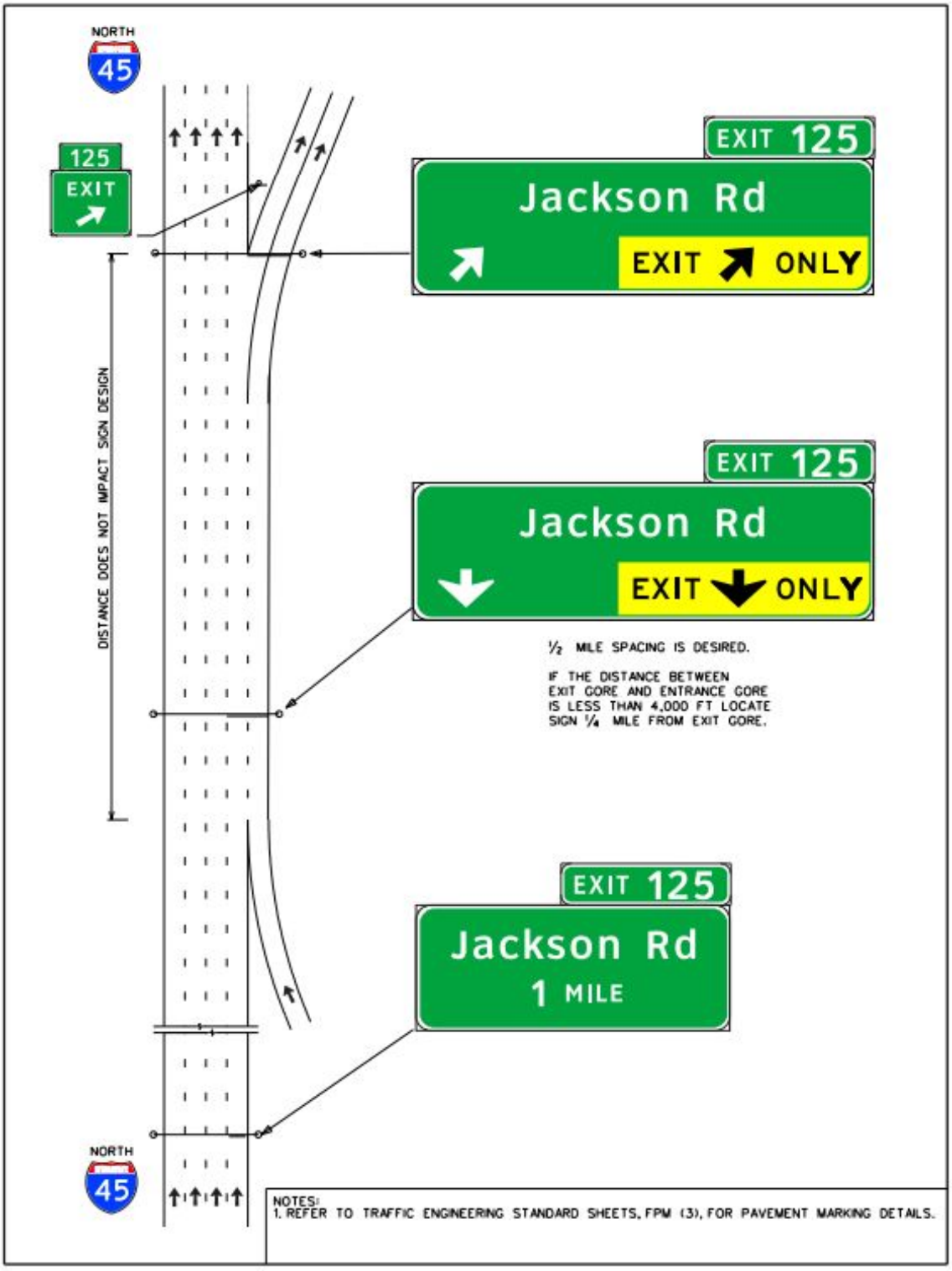


Figure 5-31. Closely spaced ramps with an added-lane entrance ramp and a multilane exit ramp.

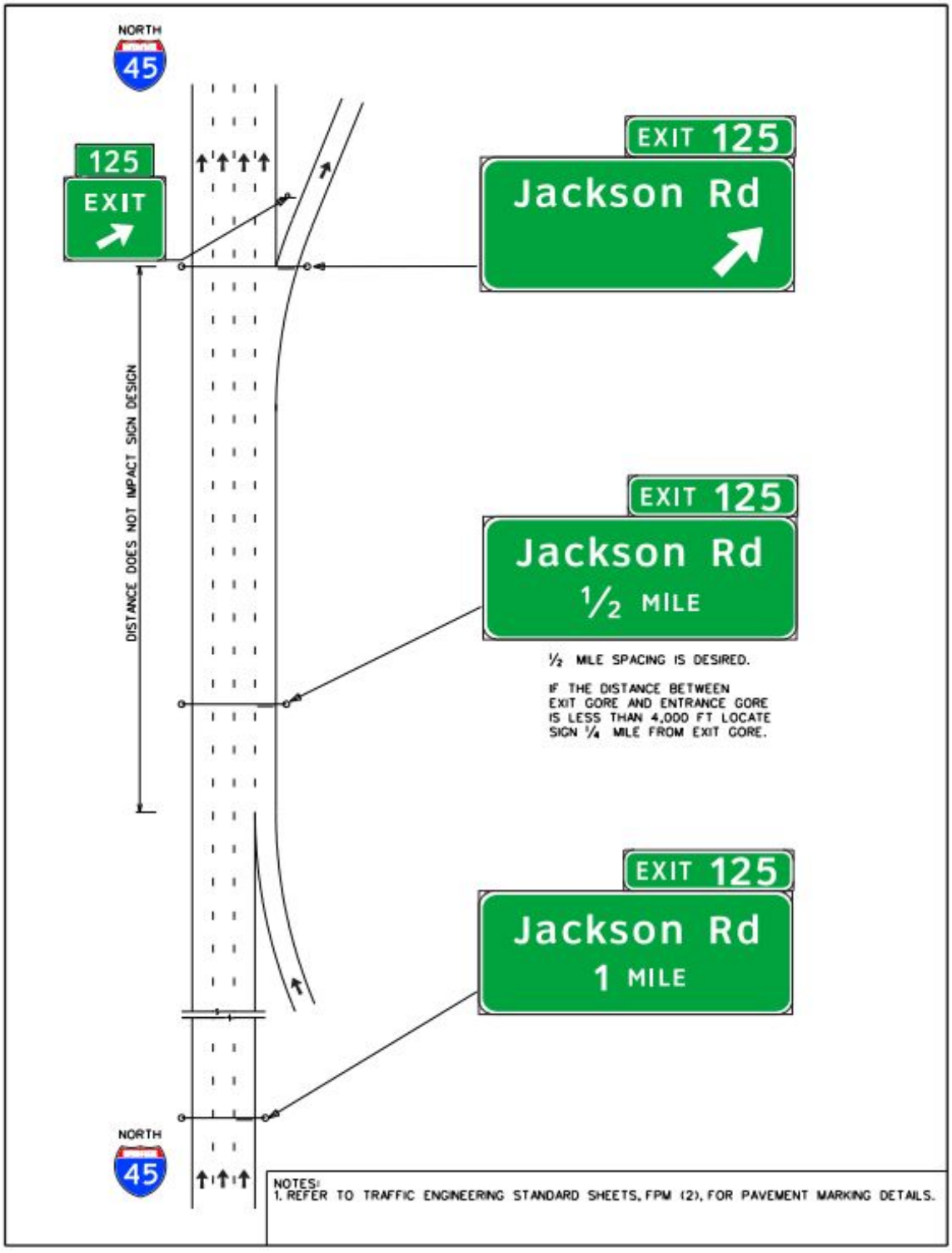


Figure 5-32. Closely spaced ramps with an added-lane entrance ramp and a diverge exit ramp.

Section 6: Other Situations

Freeway Ends

Figure 5-33 illustrates signing for a freeway-ends situation.

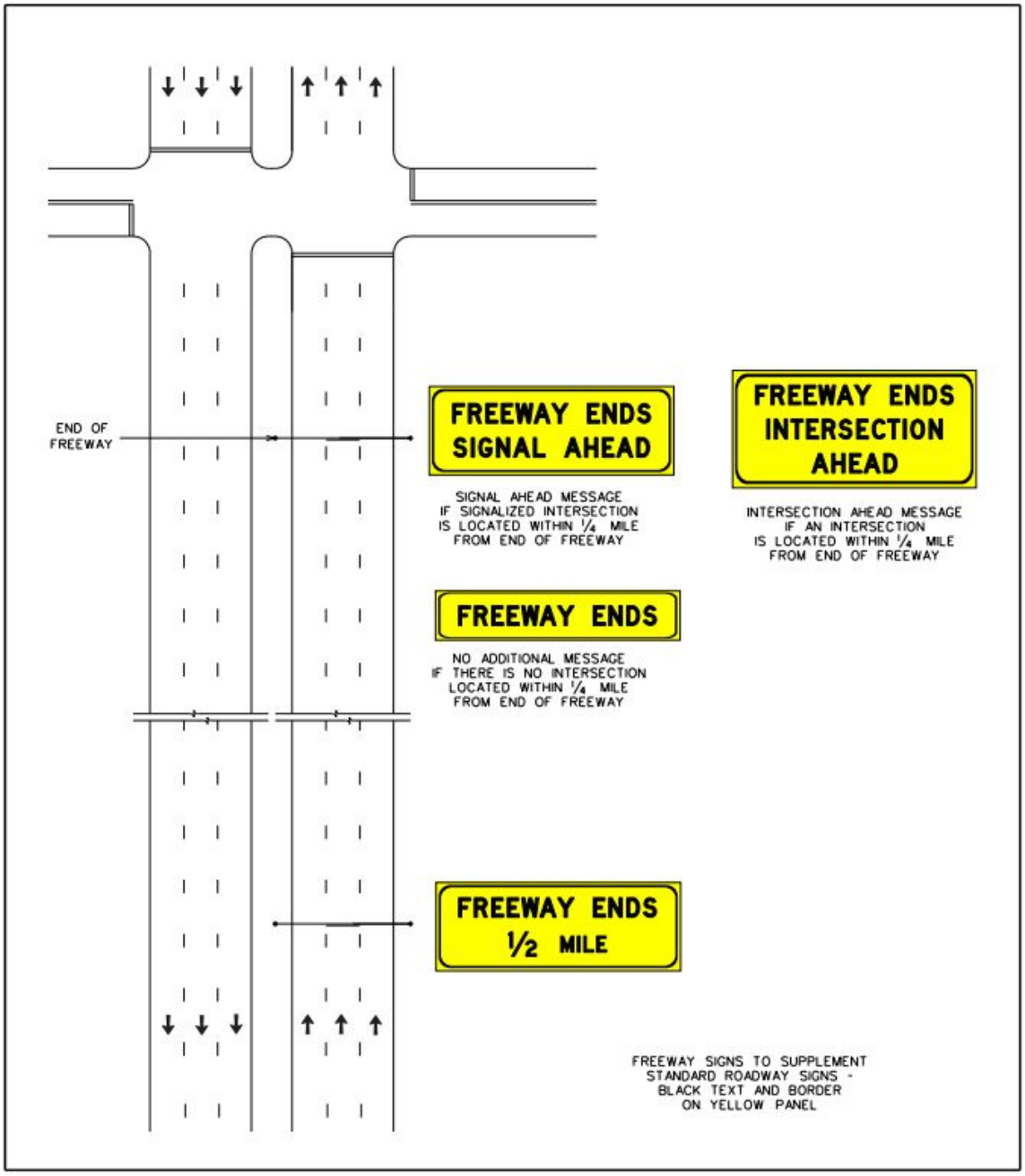


Figure 5-33. Freeway signing for a freeway-ends situation.

Lane Ends

Figure 5-34 illustrates signing for a left-lane ends situation on a freeway.

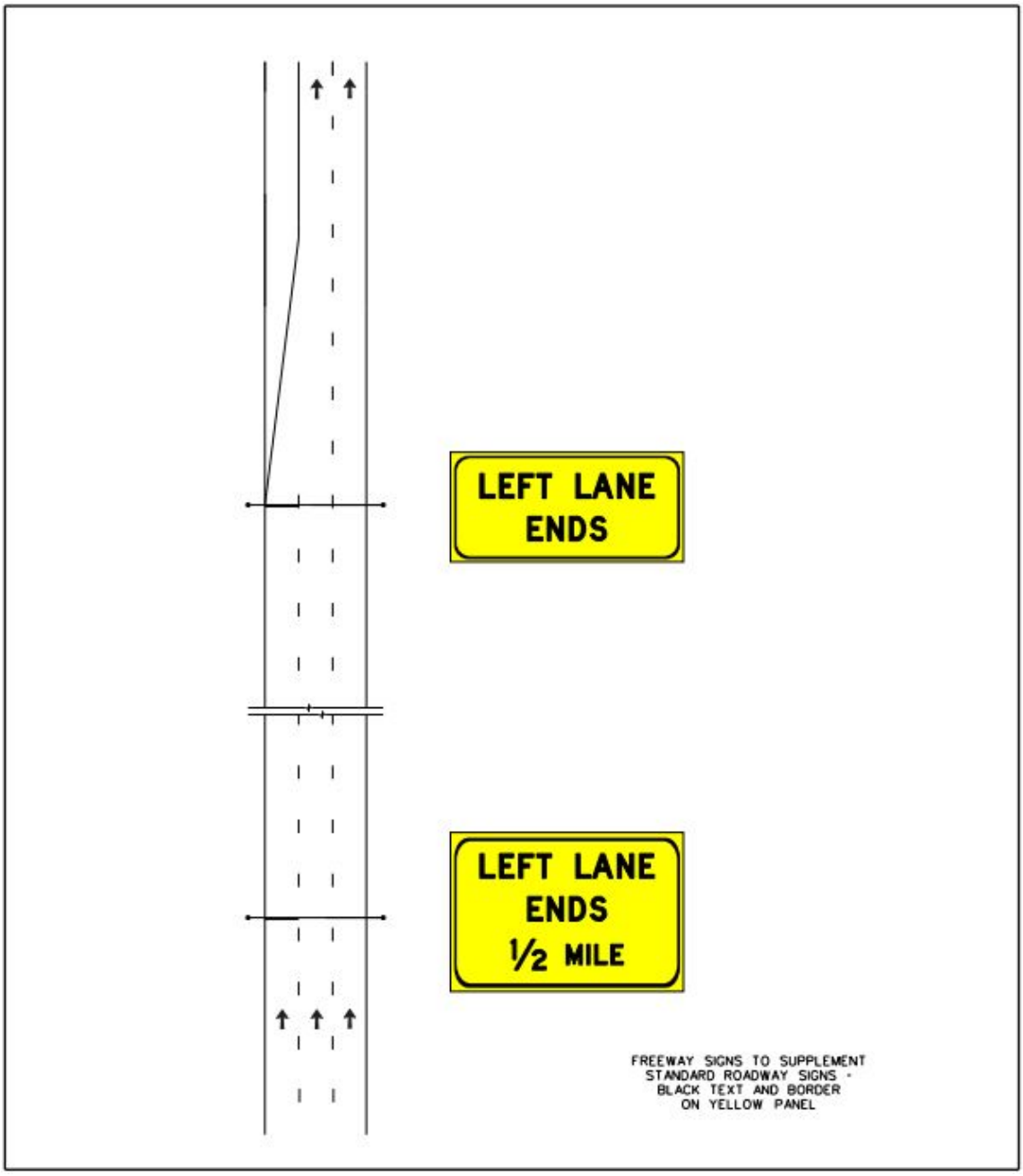


Figure 5-34. Freeway signing for a left-lane ends situation.

Chapter 6: Frontage Road Signing

Contents:

Section 1: Overview

The figures in this chapter illustrate the placement of signs on frontage roads. It includes signs for entrance ramps, signs for exit ramps, and signs for the approach to an intersection with the frontage road. The chapter also includes drawings illustrating Route sign use on the crossroad approaching a freeway.

Section 2: Entrance Ramp Signing

Introduction

Figure 6-1 through Figure 6-3 illustrate entrance ramp signing for one-way and two-way frontage roads.

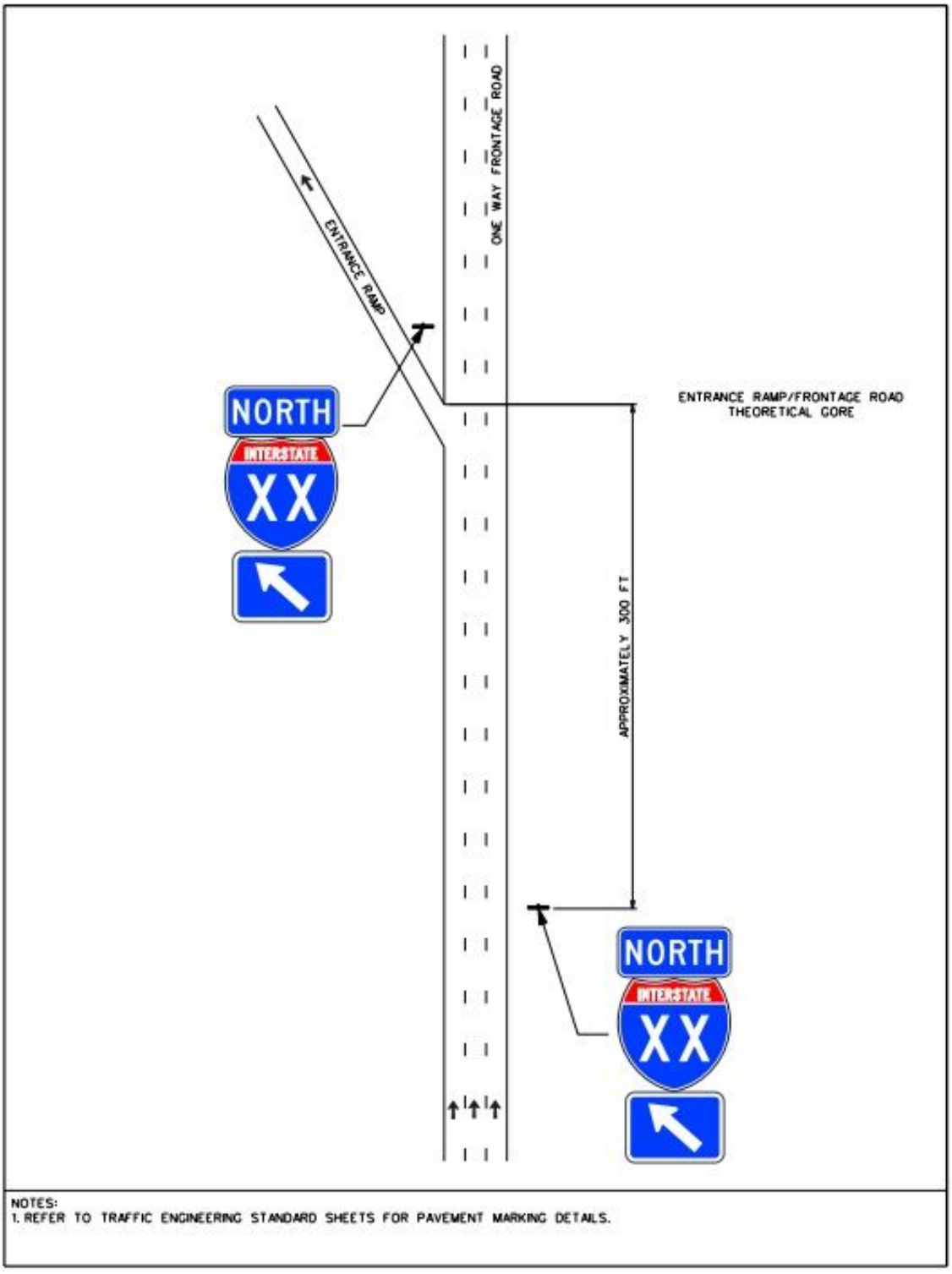


Figure 6-1. Typical signing for an entrance ramp from a one-way frontage road – diverge condition.

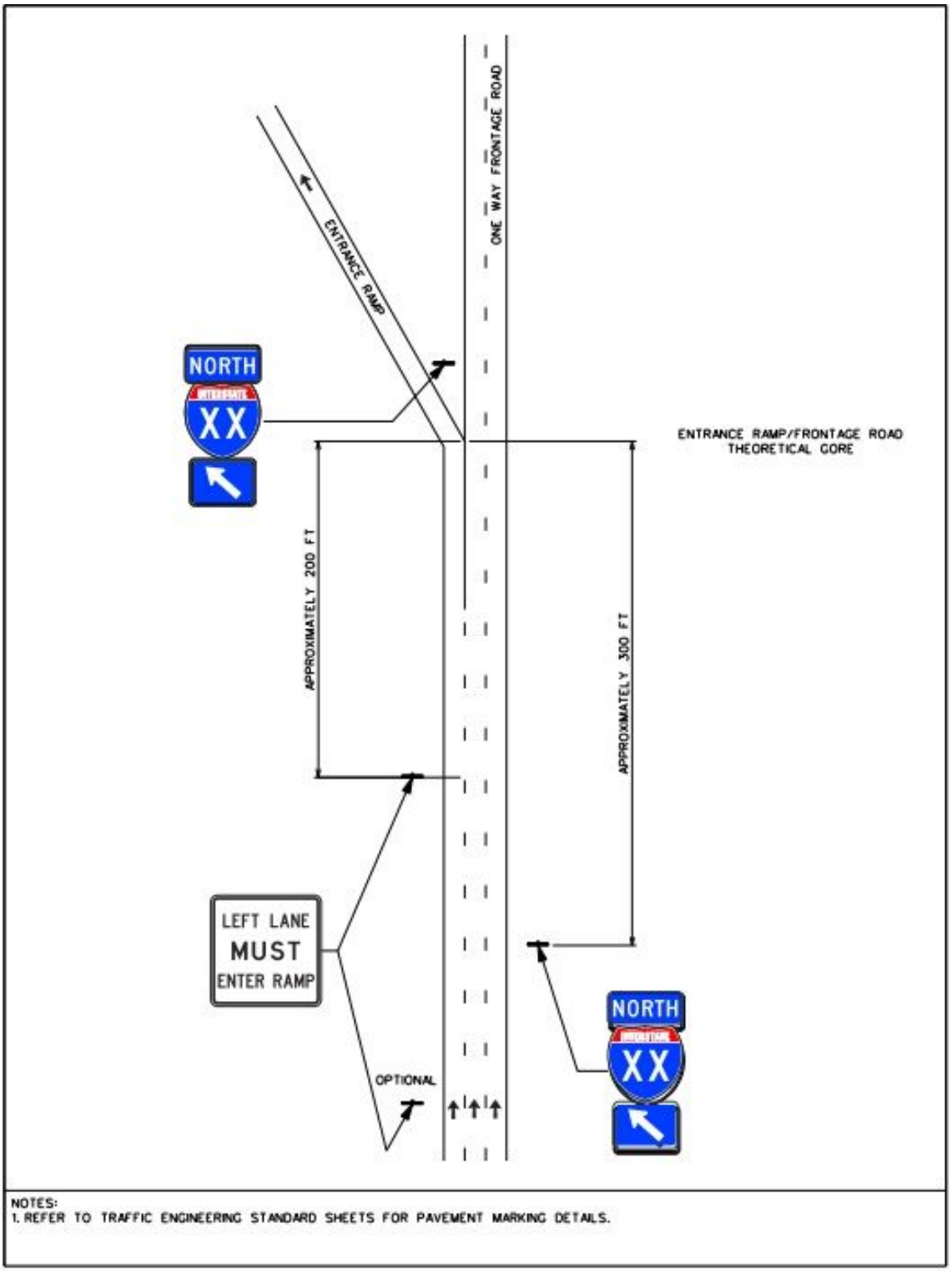


Figure 6-2. Typical signing for an entrance ramp from a one-way frontage road – lane-drop condition.

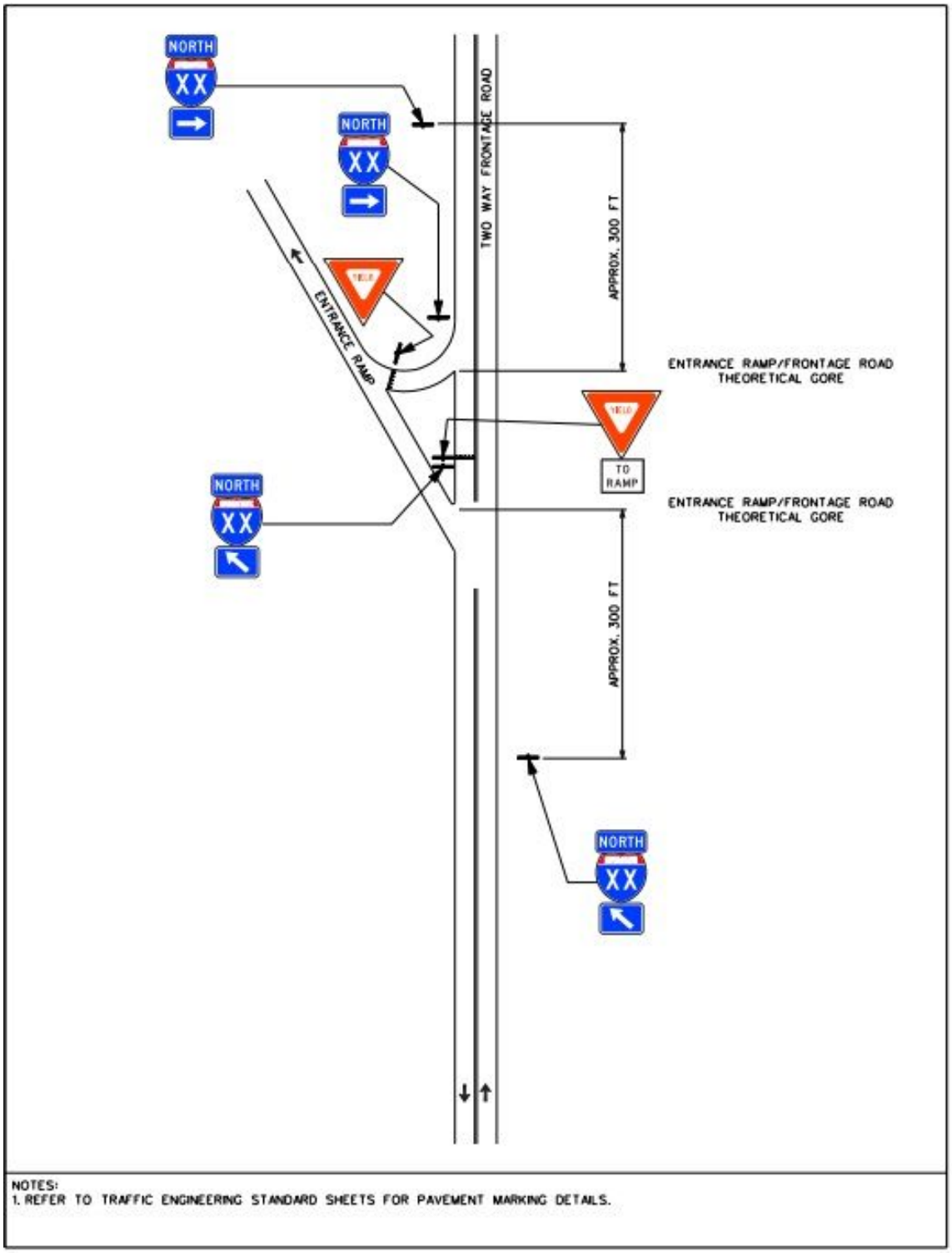


Figure 6-3. Typical signing for an entrance ramp from a two-way frontage road.

Section 3: Exit Ramp Signing

Introduction

Figure 6-4 through Figure 6-6 illustrate exit ramp signing for one-way and two-way frontage roads.

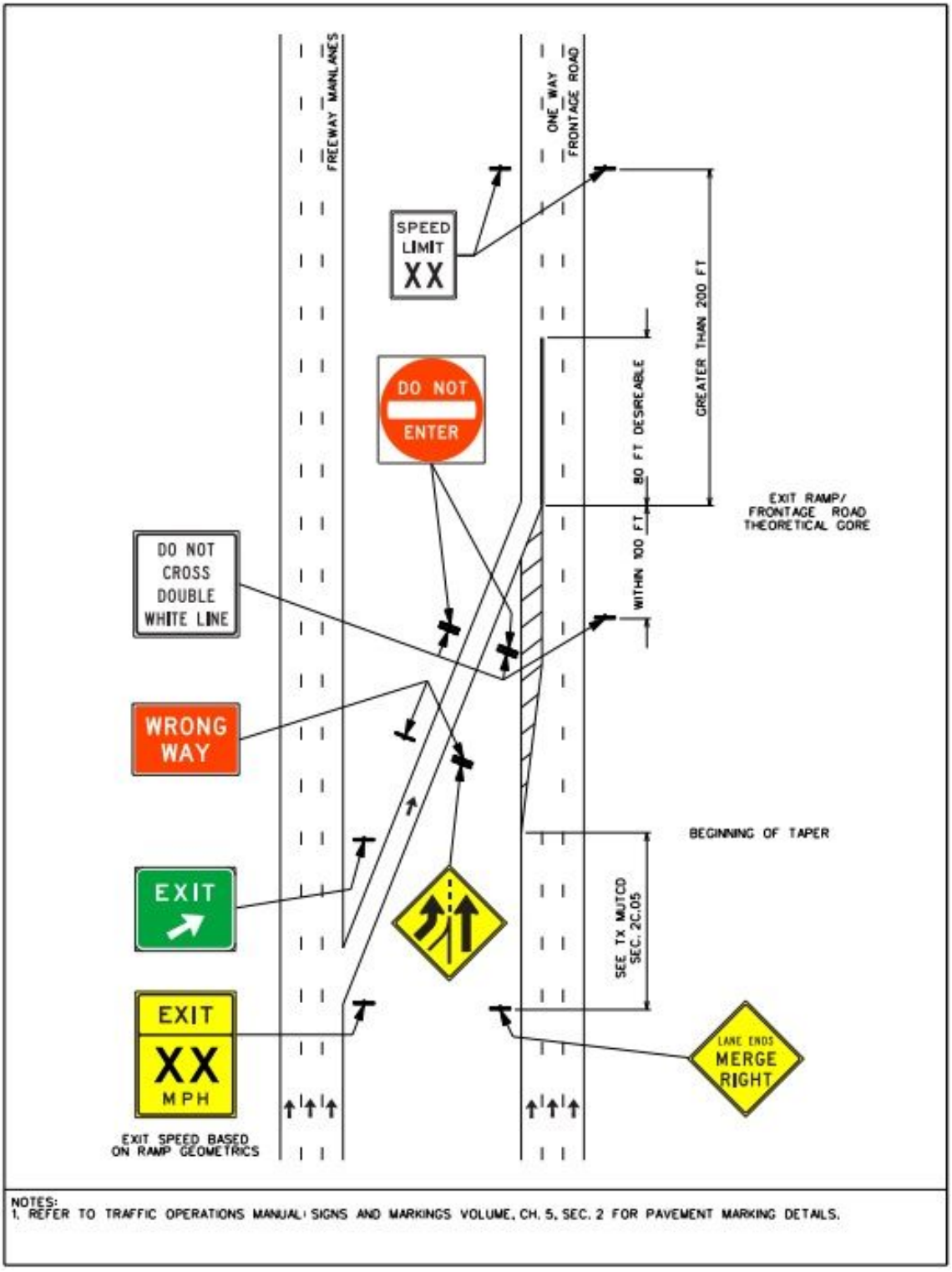


Figure 6-4. Typical signing for an exit ramp to a one-way frontage road – free lane available with lane reduction upstream of the ramp.

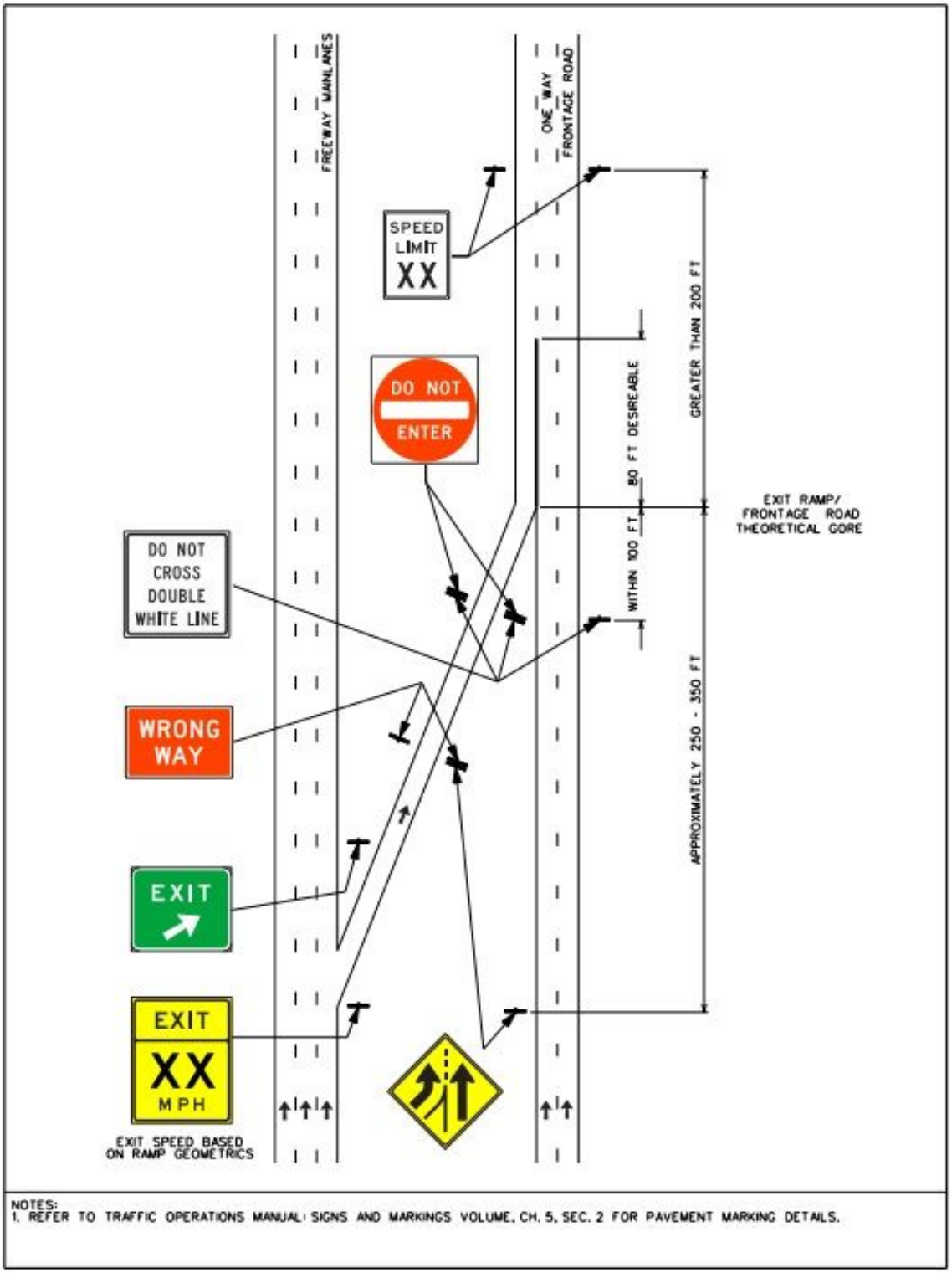


Figure 6-5. Typical signing for an exit ramp to a one-way frontage road – free lane available.

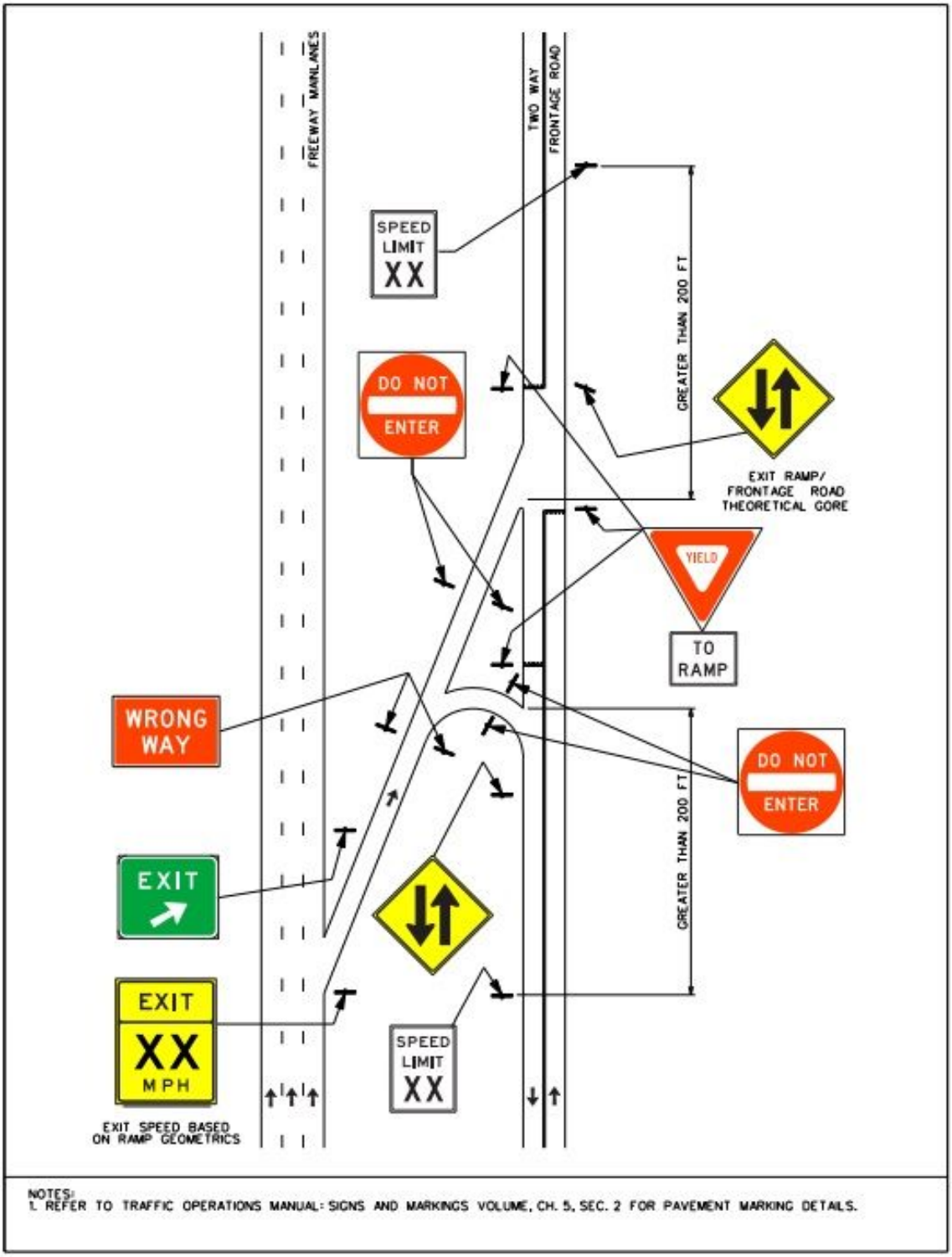


Figure 6-6. Typical signing for an exit ramp to a two-way frontage road.

Section 4: Frontage Road Approach Signing

Introduction

Figure 6-7 through Figure 6-17 illustrate frontage road approach signing for one-way frontage roads approaching a cross-street. Figure 6-17 illustrates the use of an advance intersection lane control sign located on a mast arm.

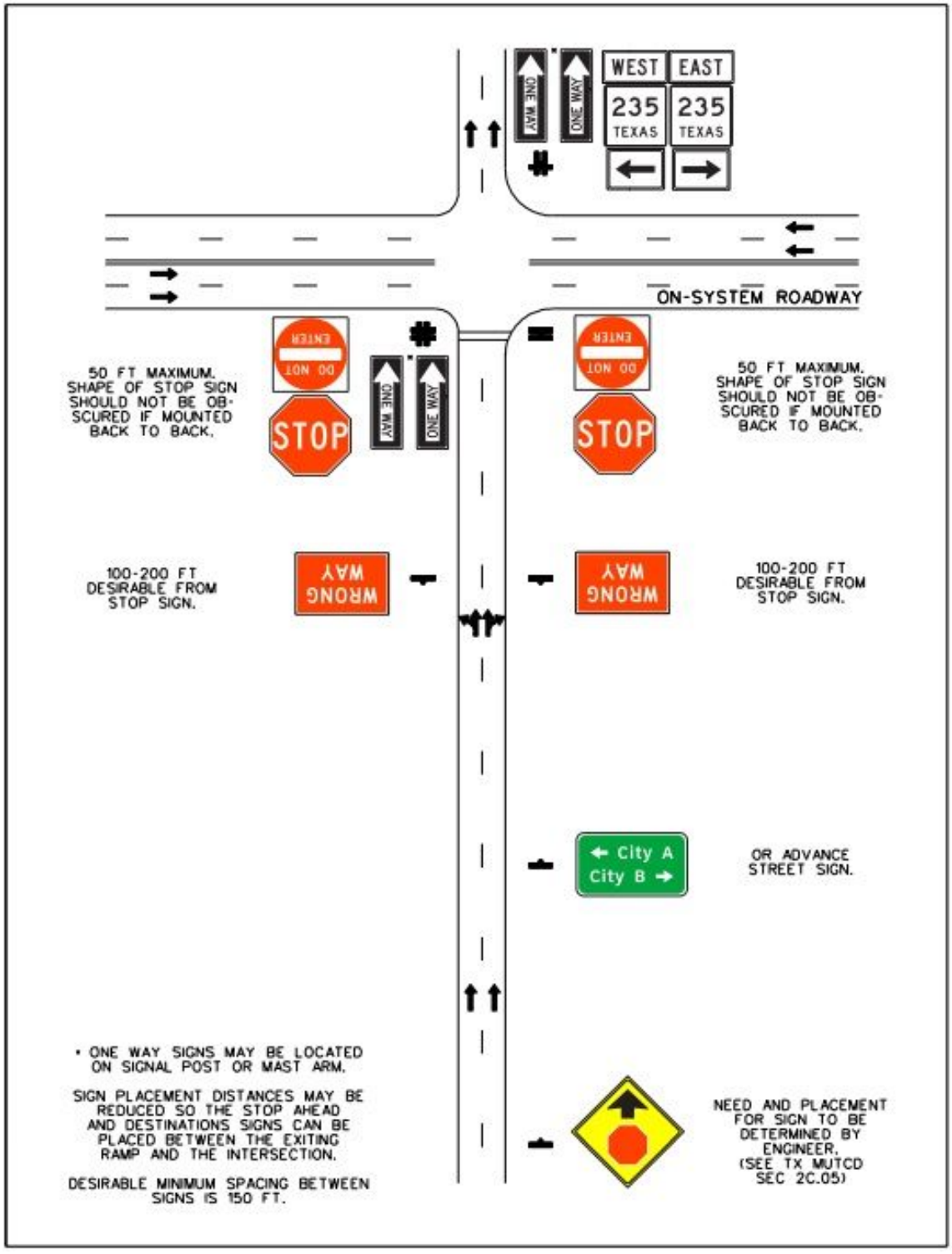


Figure 6-7. Frontage road approach signing for a two-lane approach to an on-system roadway – stop control.

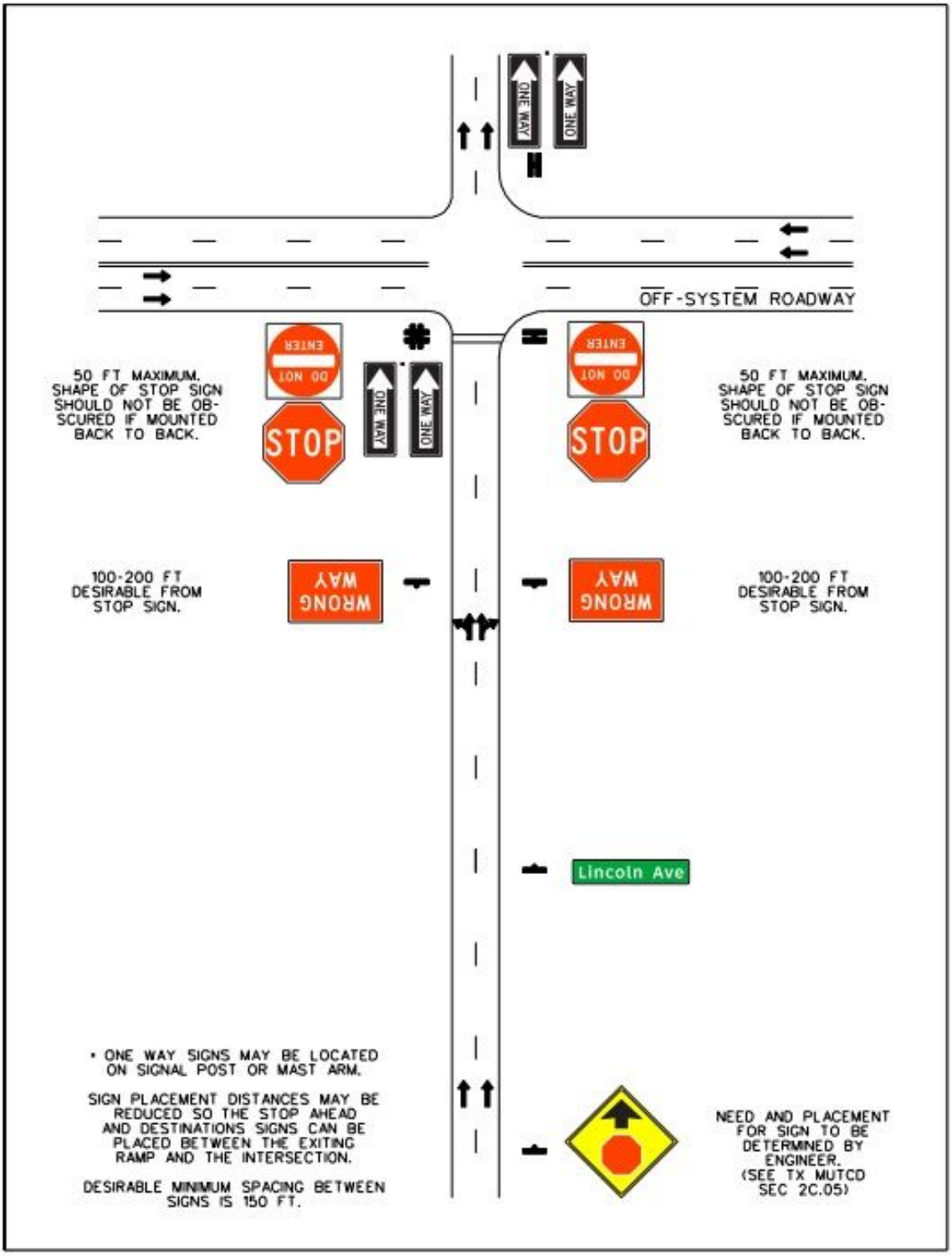


Figure 6-8. Frontage road approach signing for a two-lane approach to an off-system roadway – stop control.

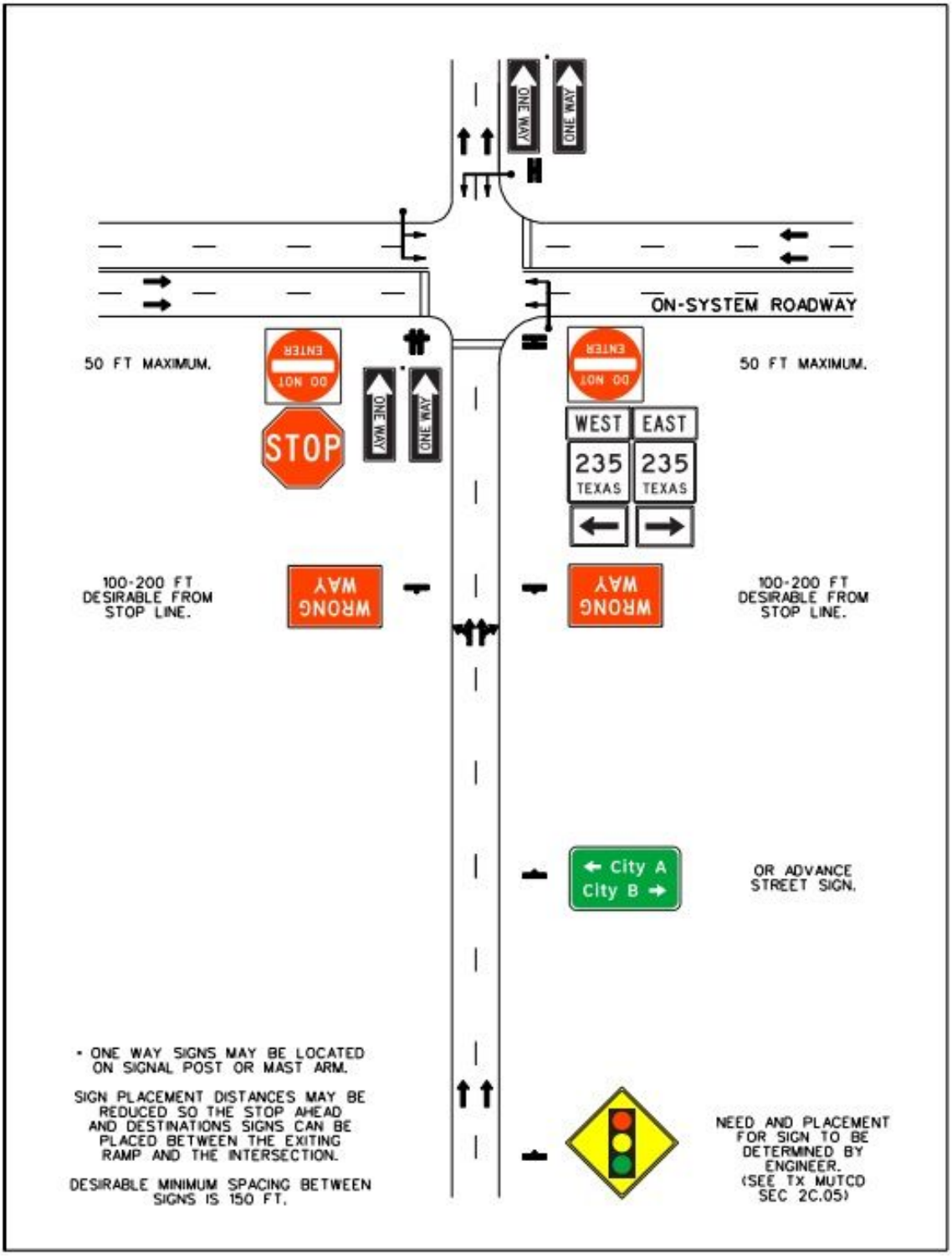


Figure 6-9. Frontage road approach signing for a two-lane approach to an on-system roadway – signal control.

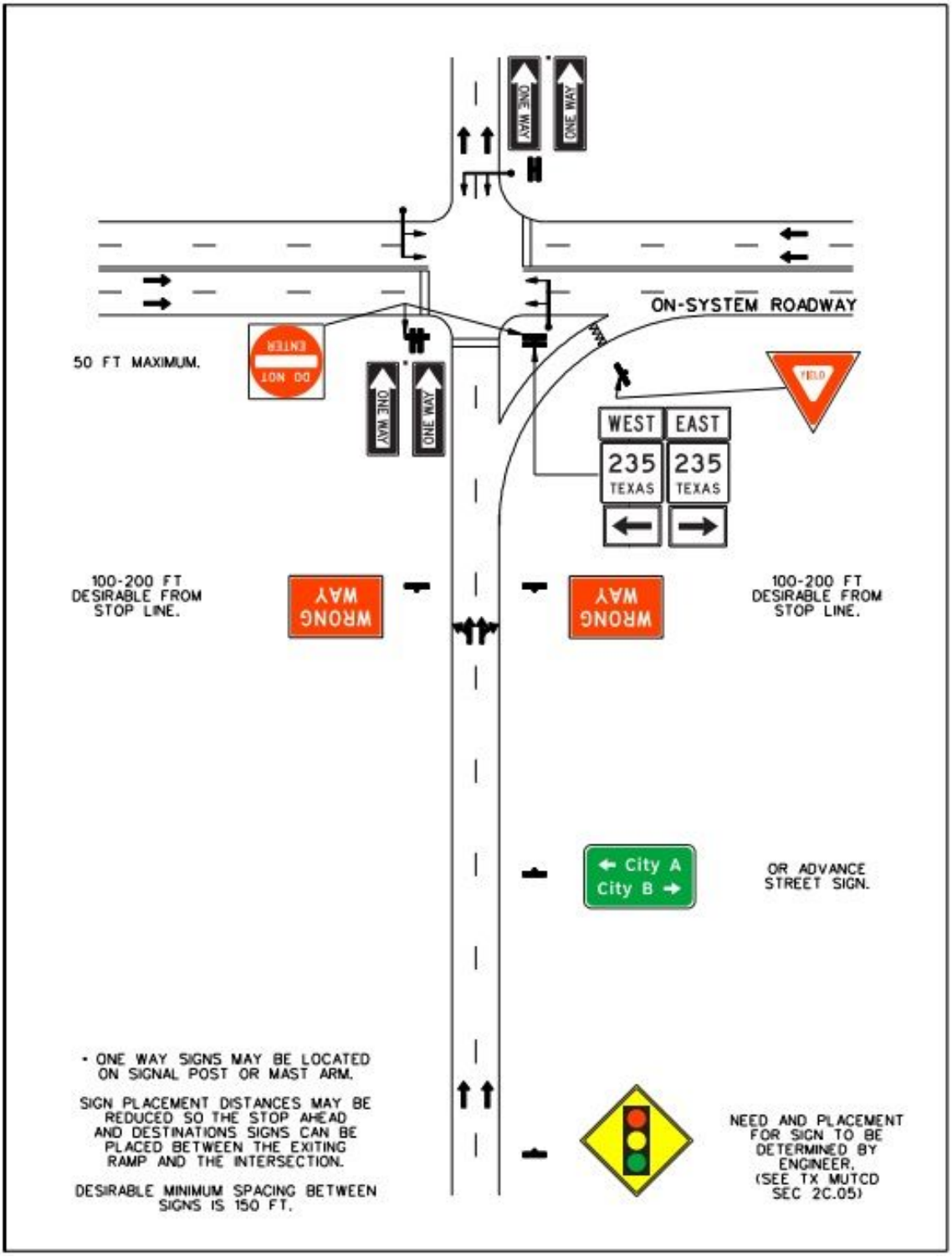


Figure 6-10. Frontage road approach signing for a two-lane approach to an on-system roadway – right-turn lane and signal control.

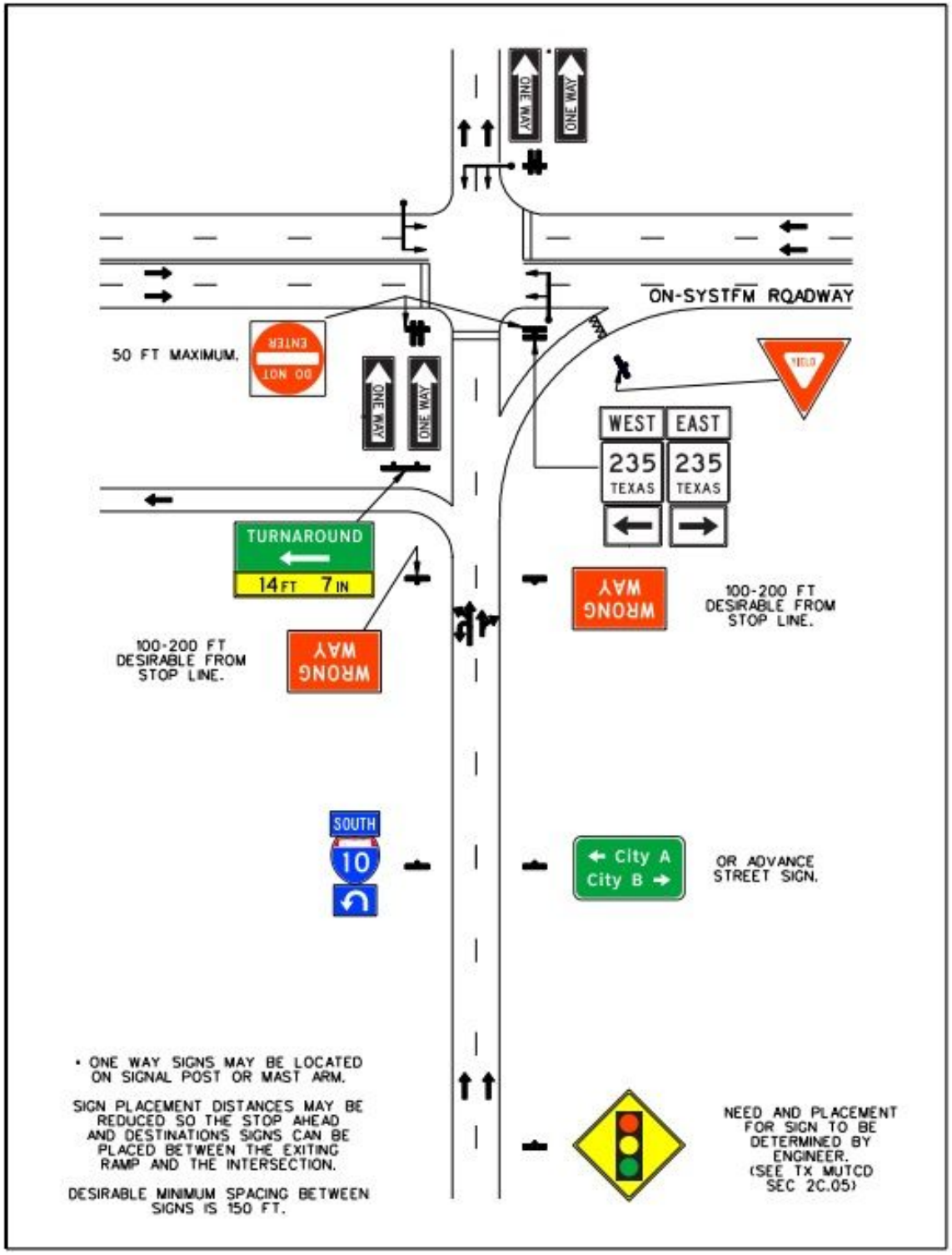


Figure 6-11. Frontage road approach signing for a two-lane approach to an on-system roadway – turnaround lane, right-turn lane, and signal control.

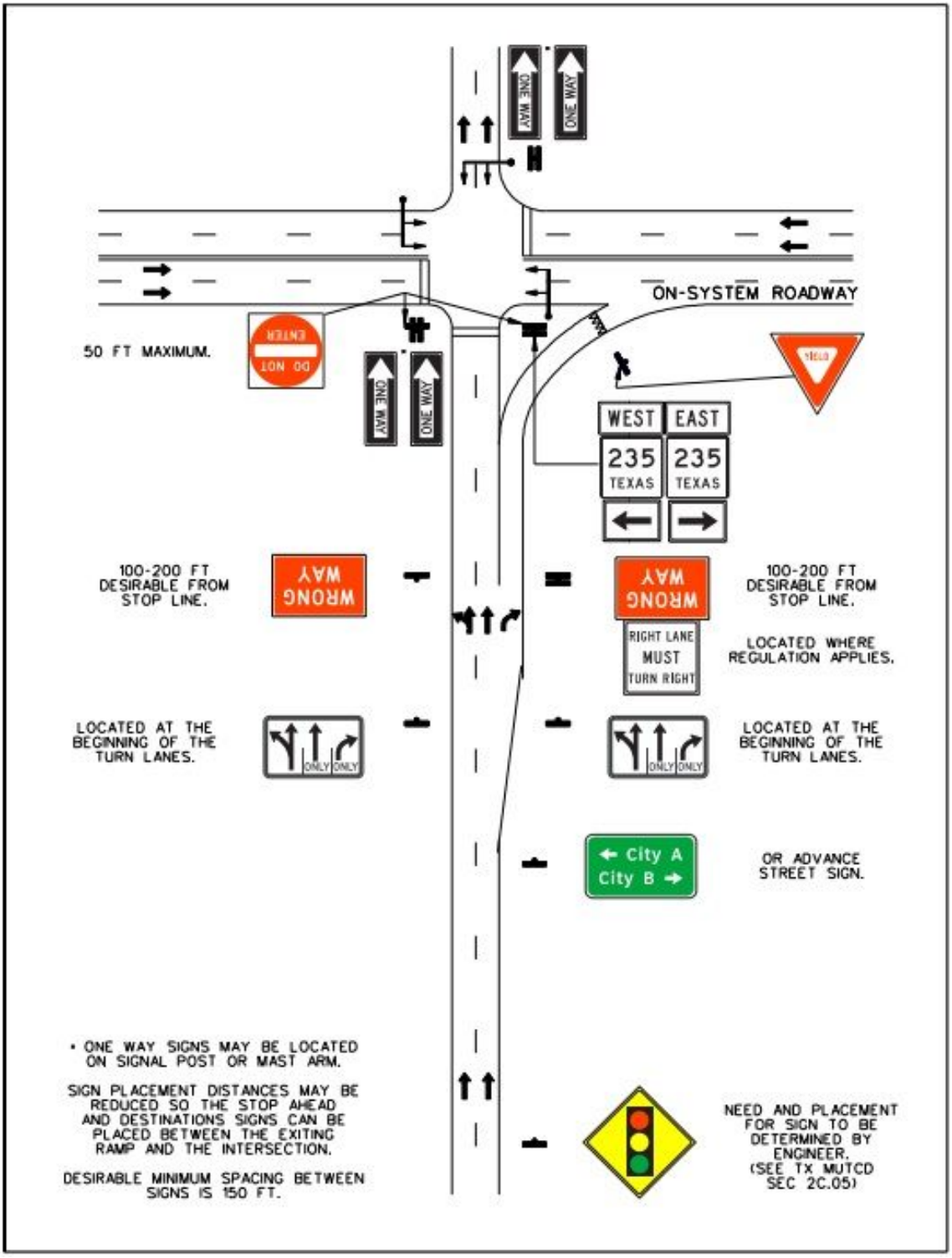


Figure 6-12. Frontage road approach signing for a two-lane approach to an on-system roadway – right-turn bay and signal control.

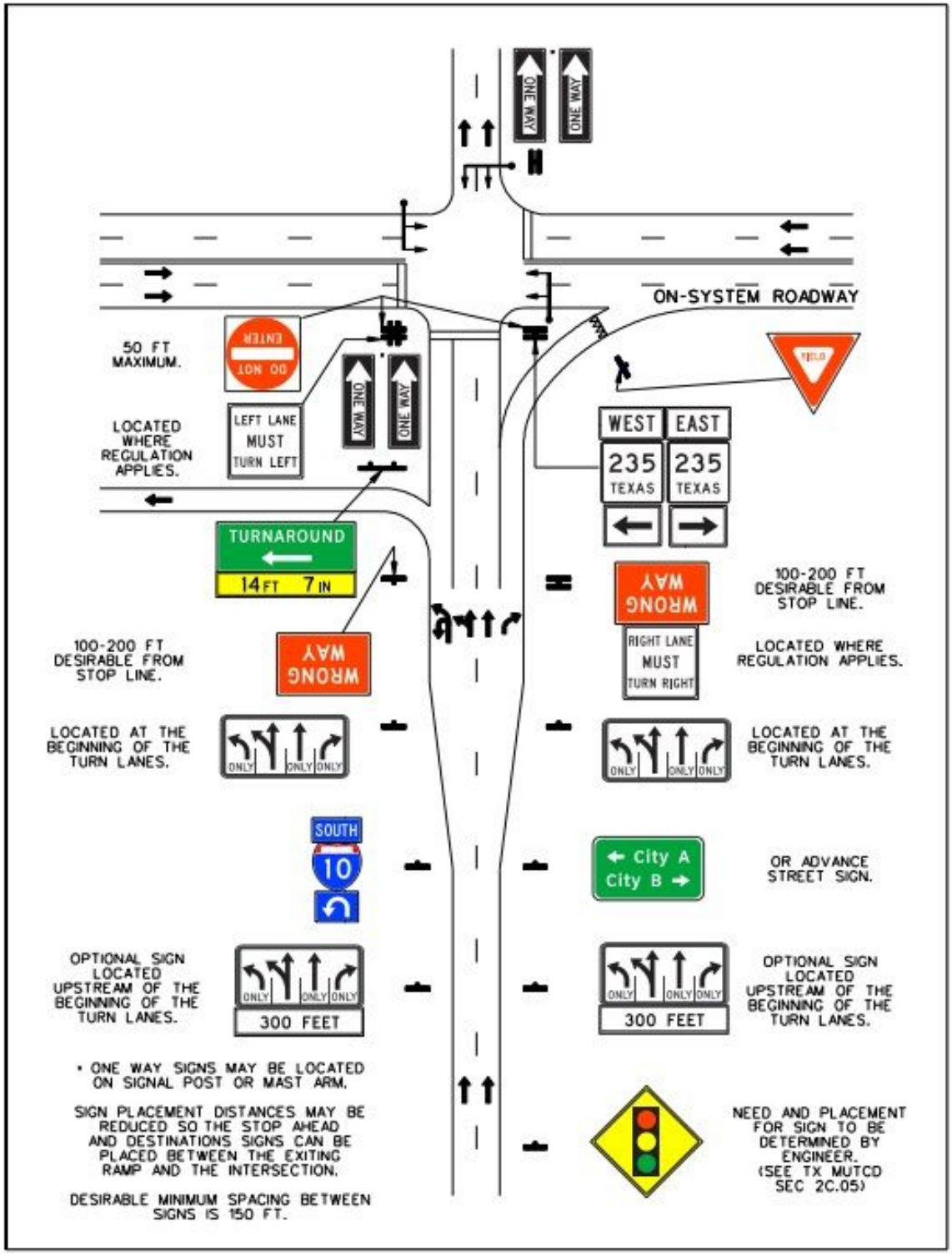


Figure 6-13. Frontage road approach signing for a two-lane approach to an on-system roadway – left-turn/turnaround bay, right-turn bay, and signal control.

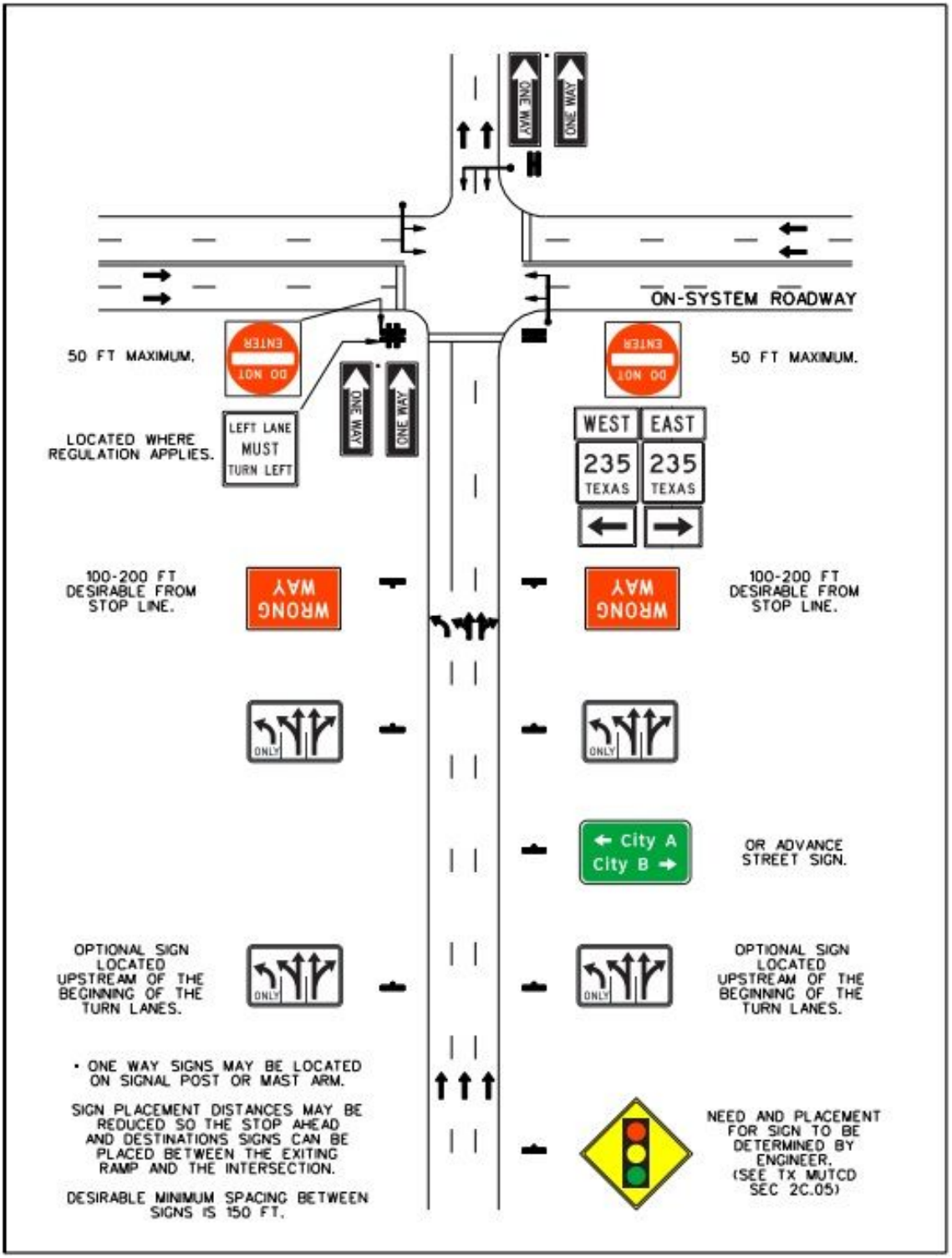


Figure 6-14. Frontage road approach signing for a three-lane approach to an on-system roadway – left-lane drop and signal control.

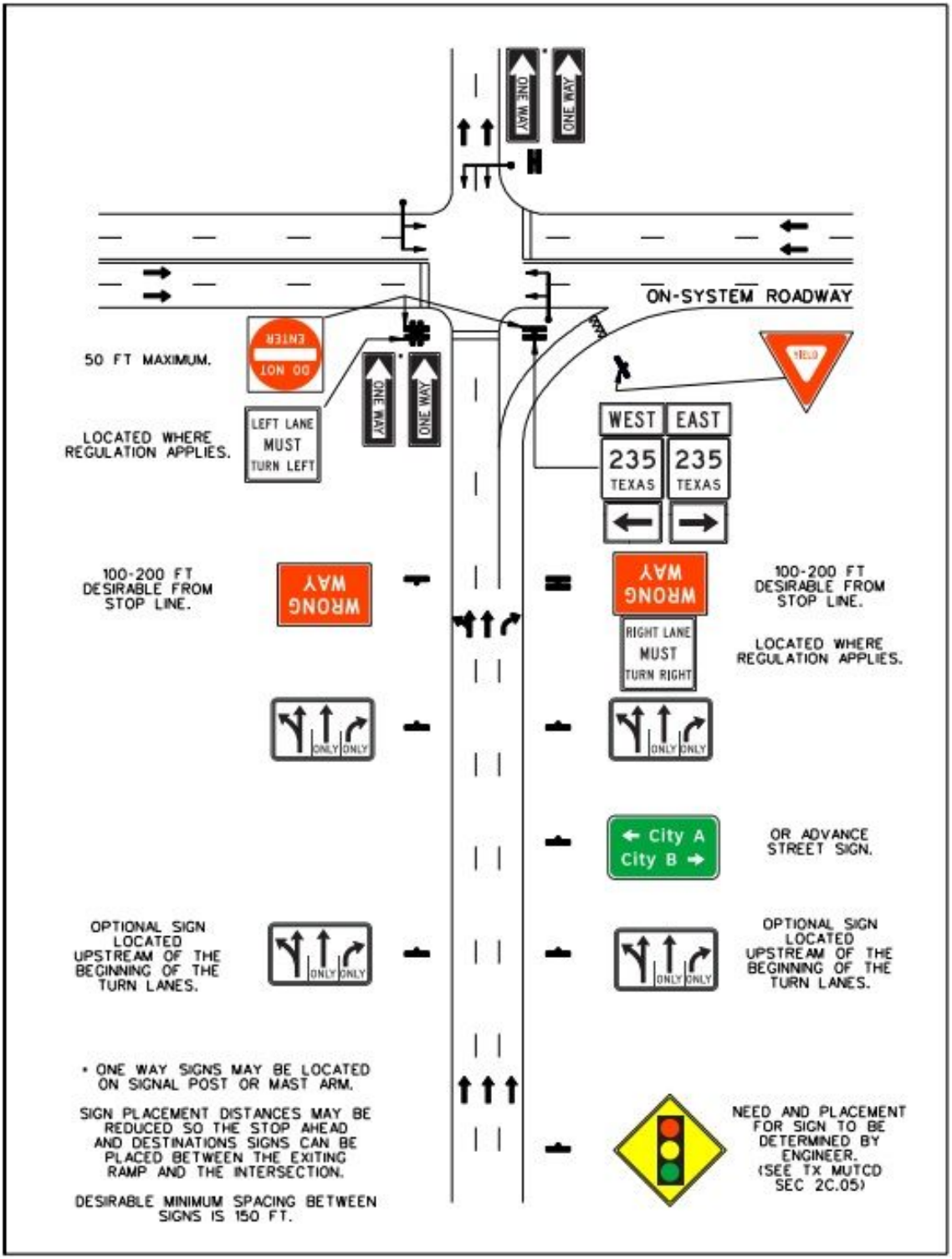


Figure 6-15. Frontage road approach signing for a three-lane approach to an on-system roadway – right-lane drop and signal control.

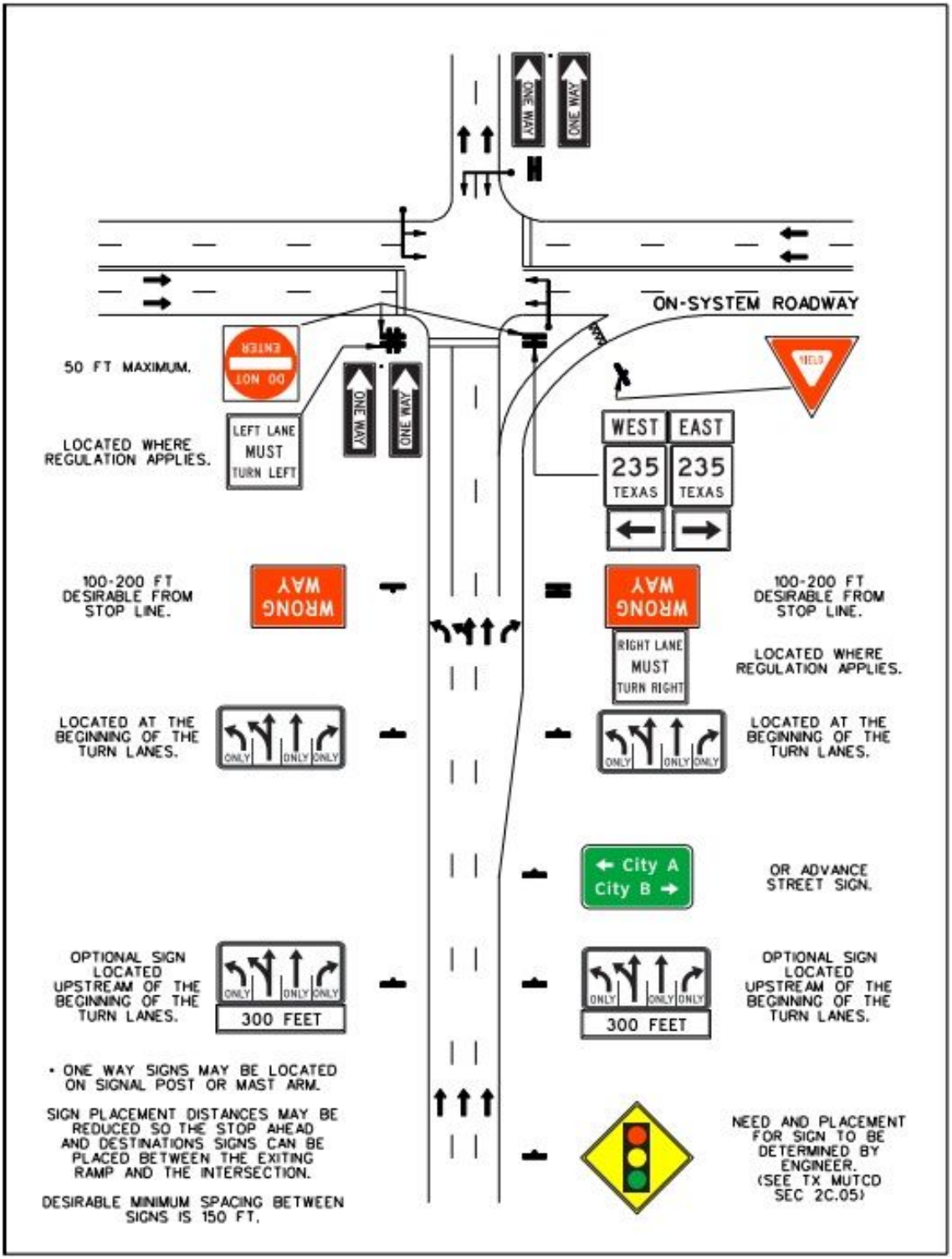


Figure 6-16. Frontage road approach signing for a three-lane approach to an on-system roadway – left-lane drop, right-turn bay, and signal control.

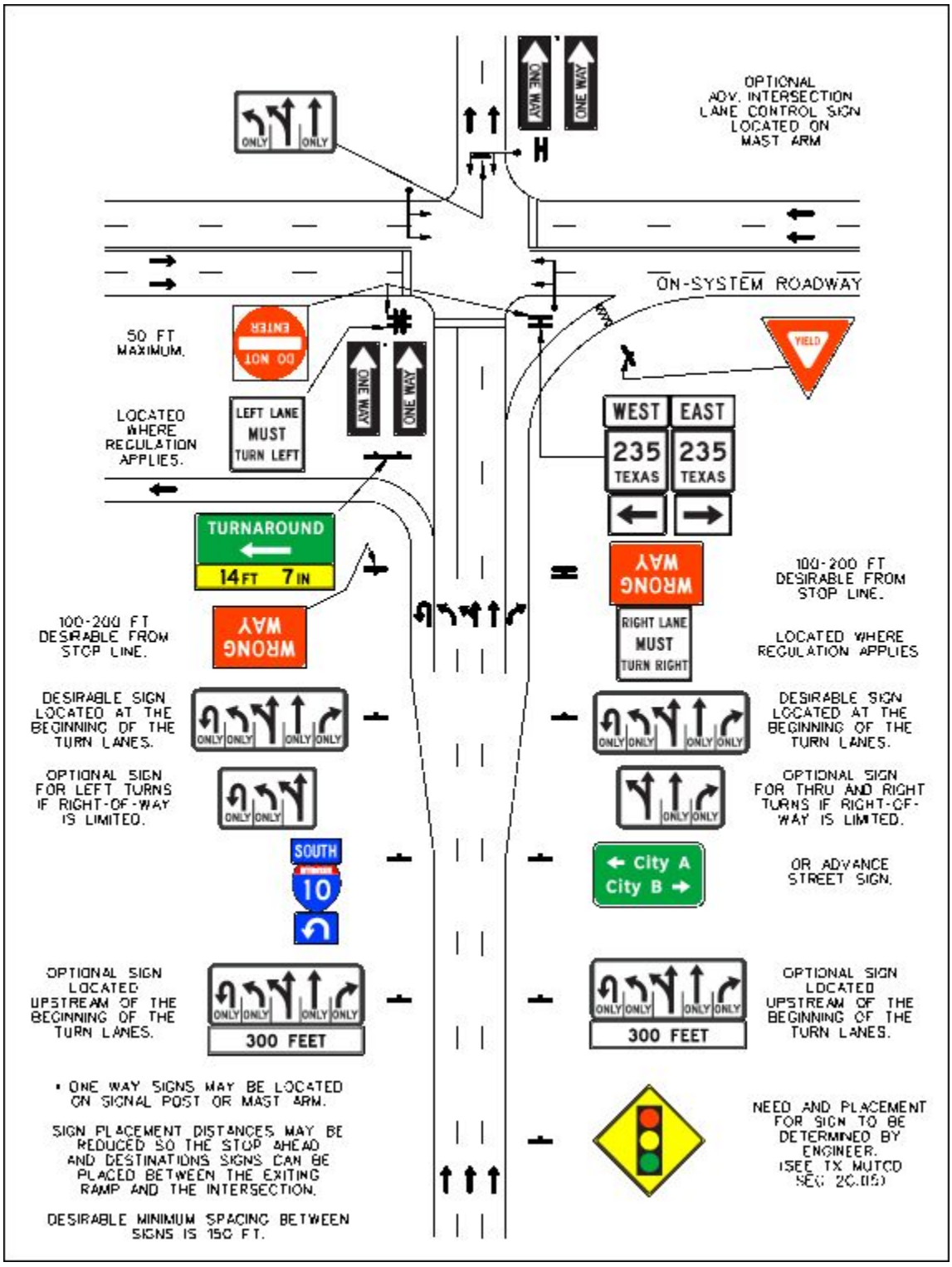


Figure 6-17. Frontage road approach signing for a three-lane approach to an on-system roadway with lane control signing on mast arm – turnaround bay, left-lane drop, right-turn bay, and signal control.

Section 5: Cross-Street Route Signing

Introduction

Figure 6-18 through Figure 6-21 illustrate cross-street route signing for typical and non-typical entrance ramp locations. The frontage road in the preceding figures can be two-way or one-way, or ramps leading directly to the freeway.

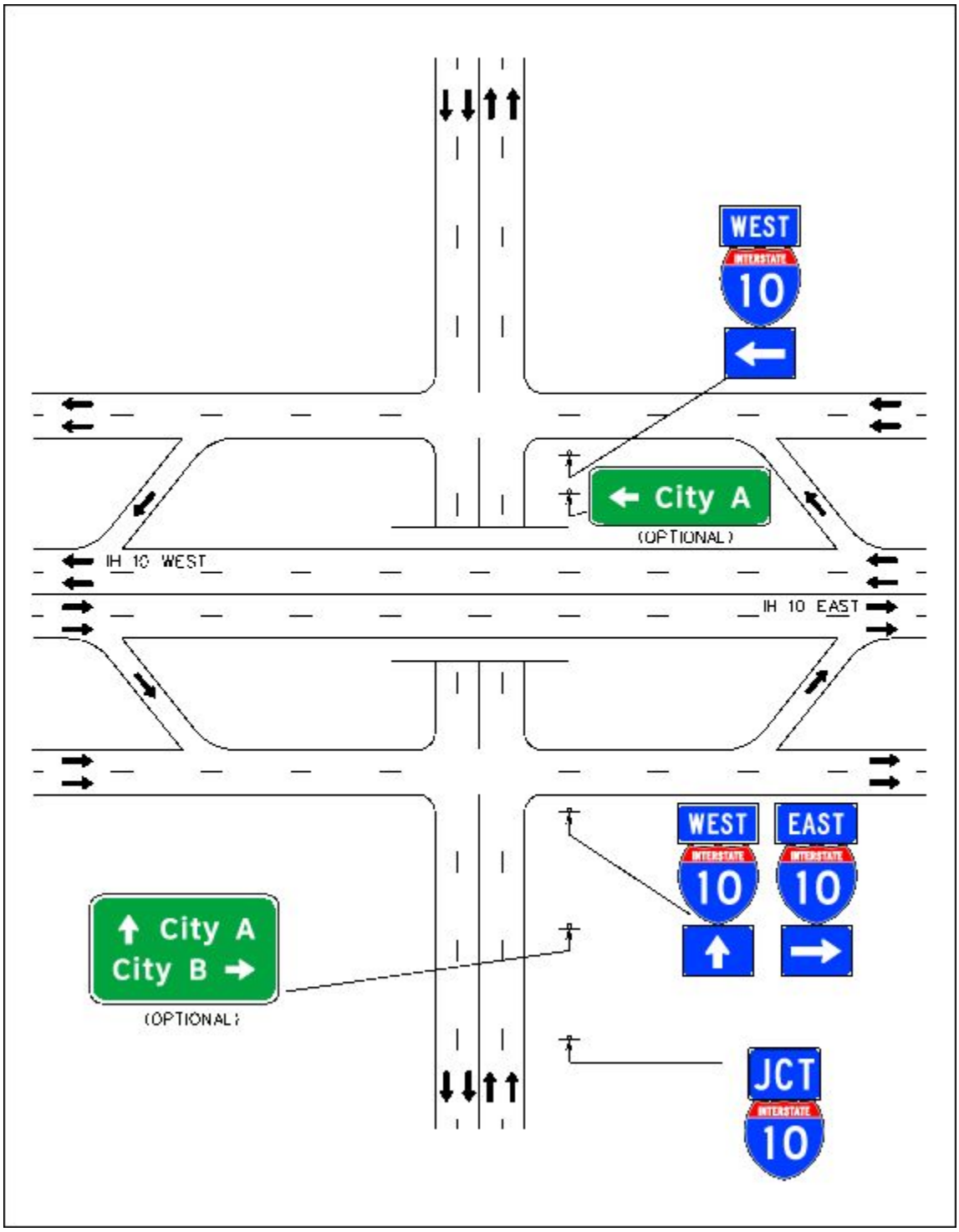


Figure 6-18. Cross-street route signing for left-direction entrance ramp located on the far-left frontage road and right-direction entrance ramp located on near-right frontage road.

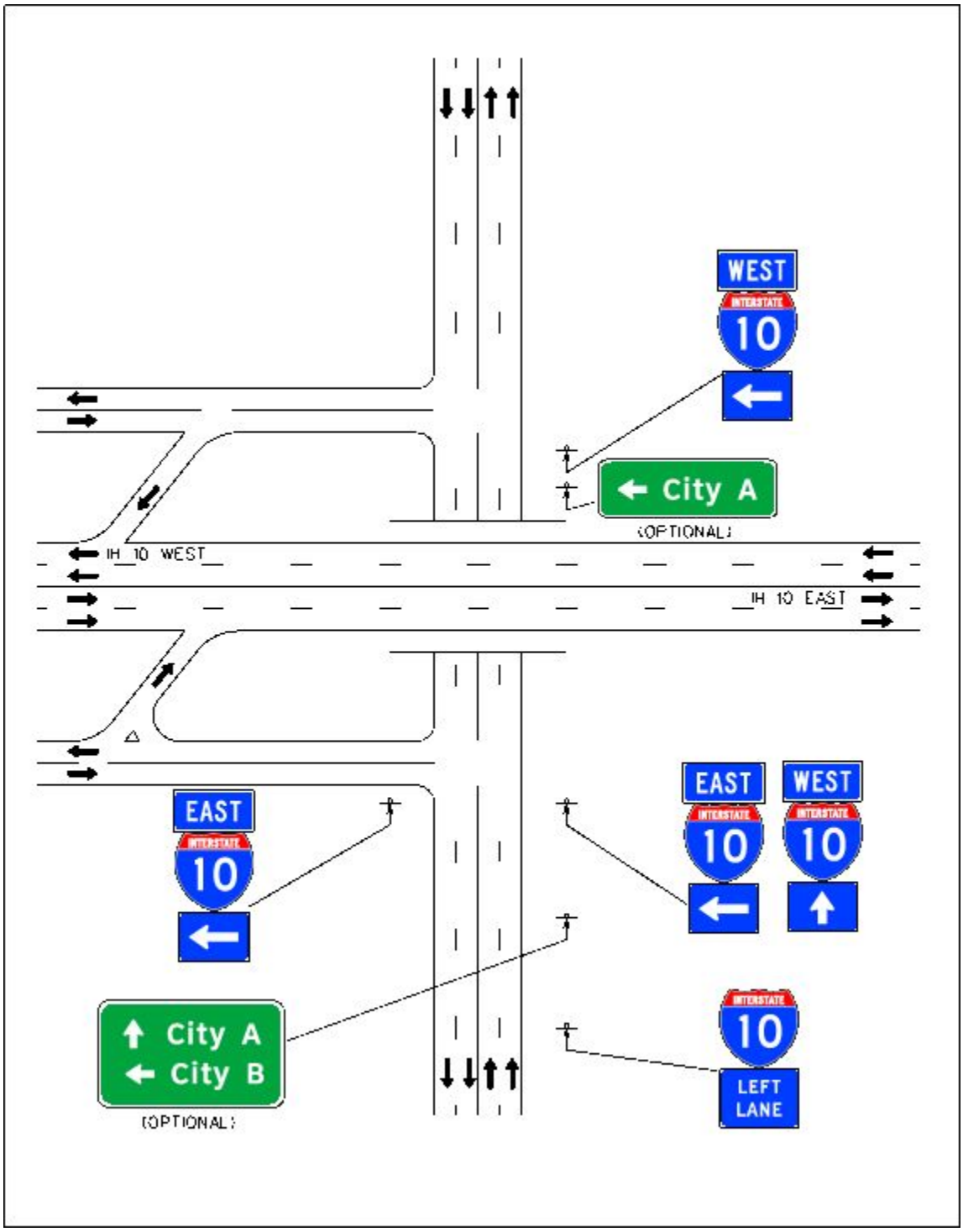


Figure 6-19. Cross-street route signing for left-direction entrance ramp located on the far-left frontage road and right-direction entrance ramp located on near-left frontage road.

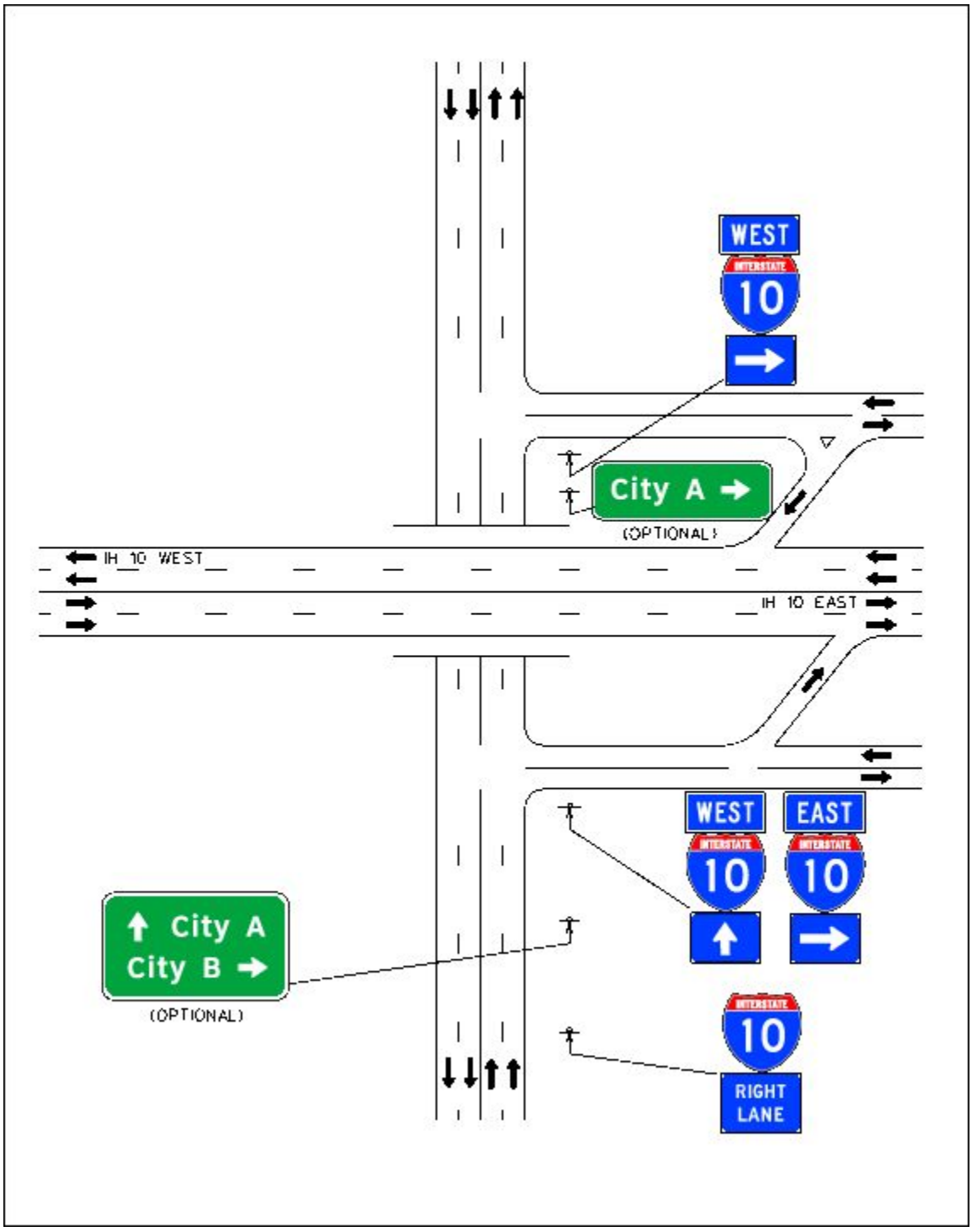


Figure 6-20. Cross-street route signing for left-direction entrance ramp located on the far-right frontage road and right-direction entrance ramp located on near-right frontage road.

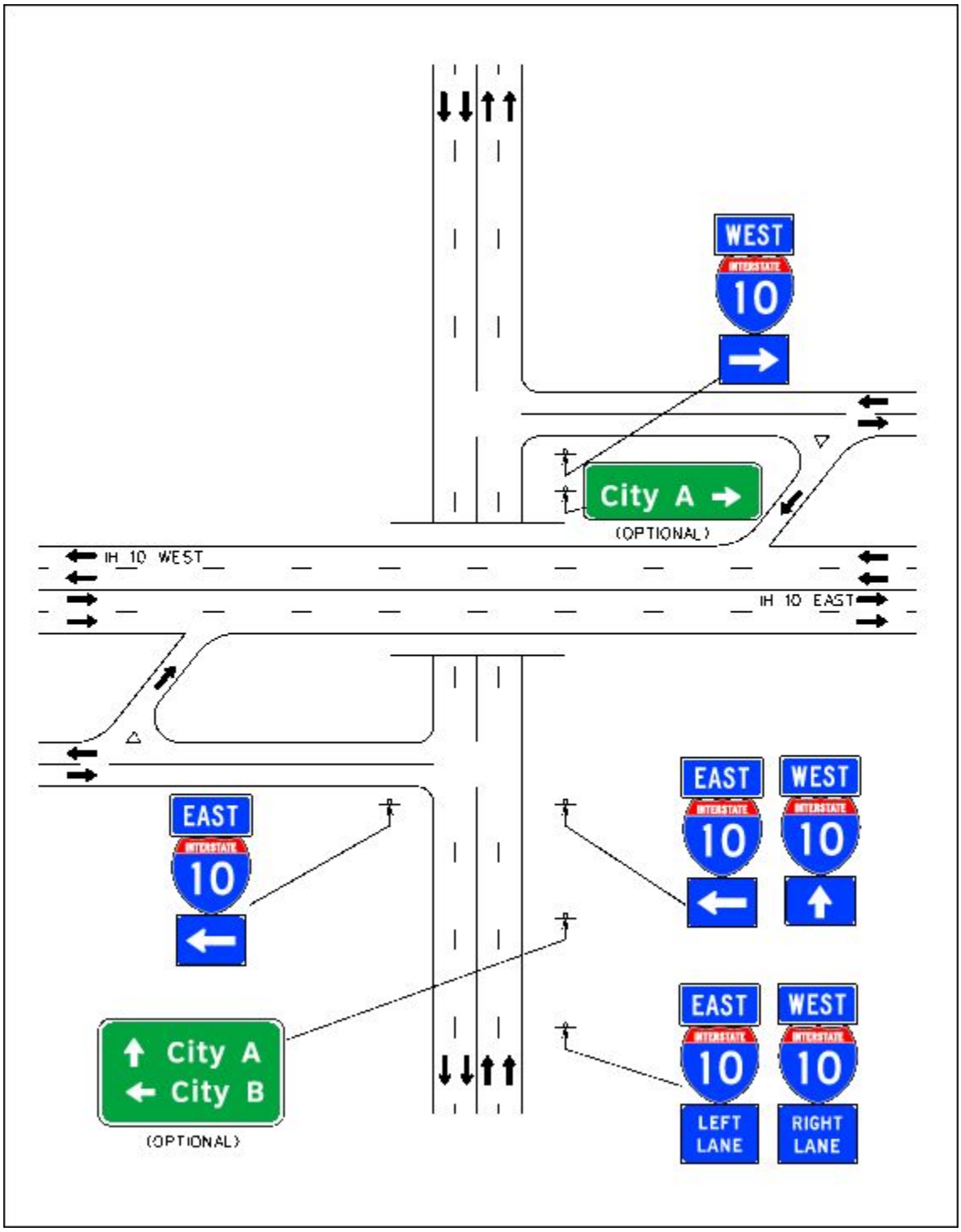


Figure 6-21. Cross-street route signing for left-direction entrance ramp located on the far-right frontage road and right-direction entrance ramp located on near-left frontage road.

Appendix A: Overhead Sign Lighting

Background

Section 2A.08 of the 2003 Texas MUTCD states that "all overhead sign installations should use retroreflective materials, unless an engineering study shows that illumination is needed."

In 1993, an all-districts memorandum stated that sign lighting is not required for overhead signs fabricated with Type C (high intensity) sheeting, except in areas where sign sight distance or geometric conditions warrant their use.

Recent changes in vehicle headlights have reduced the amount of light reaching overhead signs. This reduction requires that sign sheeting have higher retroreflectivity to maintain the same level of brightness.

In 2003, a change in the Traffic Control Standard Sheets established Type D sheeting (microprismatic) as the standard sheeting for overhead signs.

Standard Design

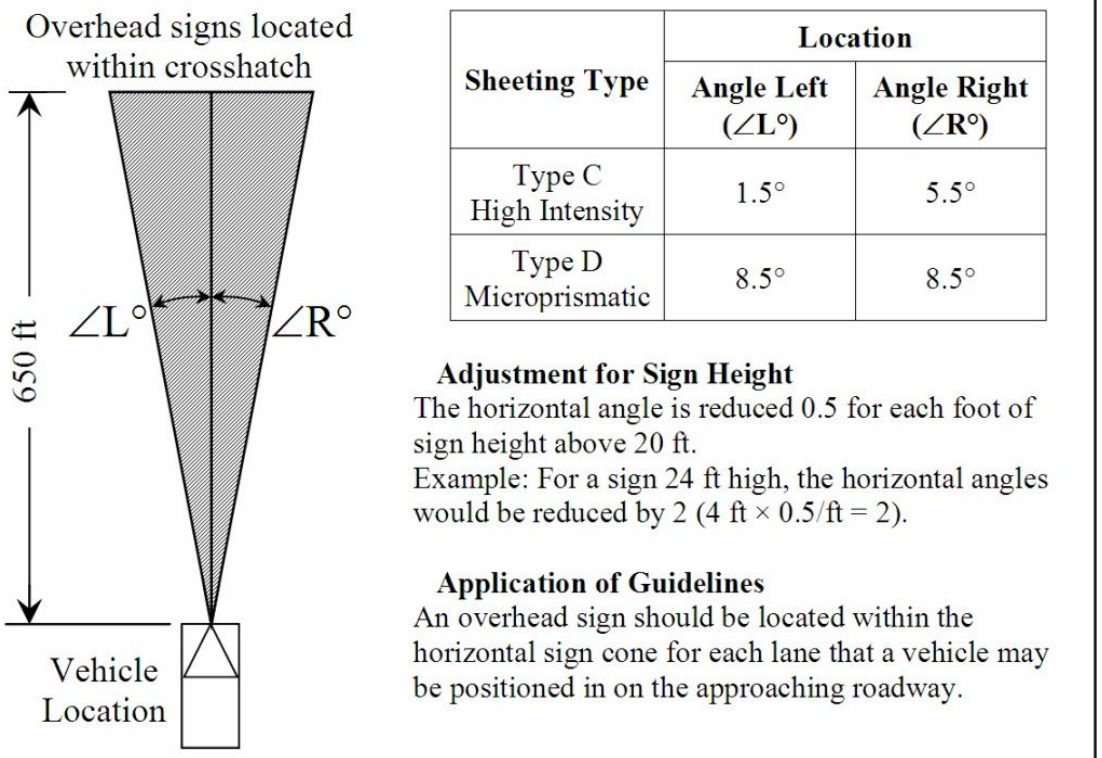
Standard designs for overhead sign lights are shown in the Traffic Control Standards Sheets (see Chapter 1 for a list of Traffic Control Standard Sheets).

When To Use Lighting

Sign lighting is generally not needed when all of the following criteria are met:

- The sign legend is fabricated from Type D (microprismatic) material.
- The sign is located in a rural environment.
- The height to the bottom of the sign is 20 ft or less.
- The sign and the area 650 ft upstream of the sign are located on continuous tangent alignment with a constant grade.

See Figure A-1 for further explanation and illustration of above.



Sheeting Type	Location	
	Angle Left (∠L°)	Angle Right (∠R°)
Type C High Intensity	1.5°	5.5°
Type D Microprismatic	8.5°	8.5°

Adjustment for Sign Height
The horizontal angle is reduced 0.5 for each foot of sign height above 20 ft.
Example: For a sign 24 ft high, the horizontal angles would be reduced by 2 (4 ft × 0.5/ft = 2).

Application of Guidelines
An overhead sign should be located within the horizontal sign cone for each lane that a vehicle may be positioned in on the approaching roadway.

Figure A-1. Horizontal Sign Cone.

When a sign does not meet all of these criteria, the flow chart in Figure A-2 should be used to determine if sign lighting is needed.

Sign lighting may also be appropriate in other situations for which the need cannot be specifically quantified. Potential situations where sign lighting may be needed include:

- locations where dew frequently covers the sign
- locations with high volumes of heavy vehicles
- areas with significant weaving volumes.

Engineering judgement may identify other situations that require overhead sign lighting.

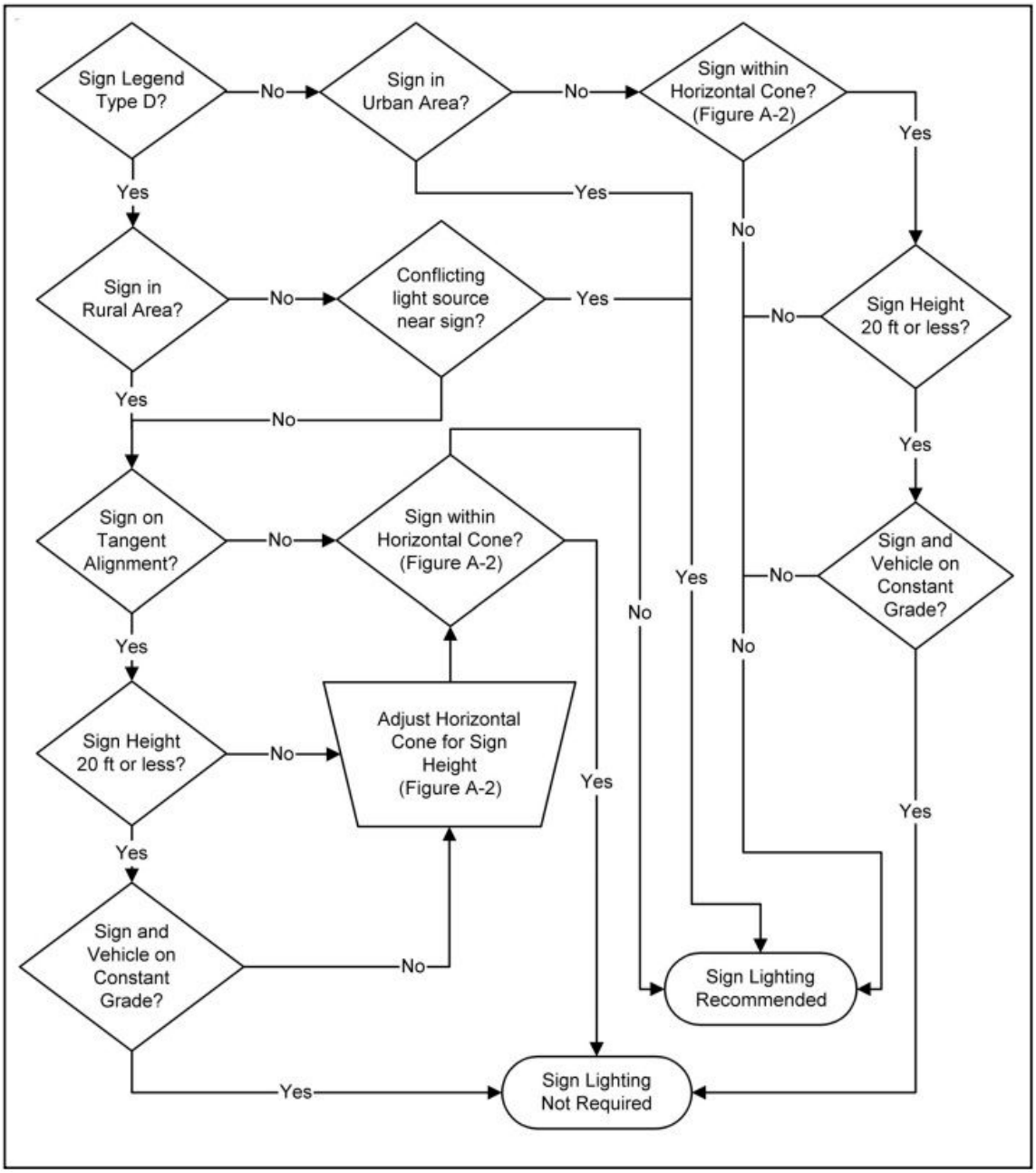


Figure A-2. Sign lighting flow chart.