الهيئة العامة للطرق
Roads General Authority

كـود الطرق السعـودي
SAUDI HIGHWAY CODE

SAUDI HIGHWAY CODE (SHC)

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Traffic Engineering and Road Safety
SHC 602 – Manual on Uniform Traffic Control Devices

رؤيـة VISION 2030
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA

كـــود الطـرق السعـودي
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1	Introduction	SHC 101	General
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3		SHC 202	Surveying and Mapping
4		SHC 203	Preliminary Studies
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7		SHC 303	Highway Facilities and Utilities Design Rest Areas, Truck Inspection Stations, Parking & Garage Facilities
8		SHC 304	Highway Facilities and Utilities Design - Passive Safety Systems Design
9		SHC 305	Highway Facilities and Utilities Design - Work Zone Design
10		SHC 306	Highway Facilities and Utilities Design - Public Utilities, Highway and Street Lighting, Control and Monitoring Devices
11		SHC 307	Highway Facilities and Utilities Design - Landscape Planting, Outdoor Advertising
12		SHC 308	Pavement Design
13		SHC 309	Material Specifications and Standardized Testing
14		SHC 310	Bridges and Tunnels Design
15	Construction of Highways, Bridges and Tunnels	SHC 401	Construction of Highways
16		SHC 402	Construction of Bridges and Tunnels
17		SHC 403	Construction of Highway Facilities
18	Highways, Bridges and Tunnels Maintenance and Management Systems	SHC 501	Pavement Maintenance Management Systems
19		SHC 502	Bridges and Tunnels Maintenance and Management Systems
20		SHC 503	Highway Facilities Maintenance and Management Systems
21	Traffic Engineering and Road Safety	SHC 601	Traffic Engineering
22		SHC 602	Manual on Uniform Traffic Control Devices
23		SHC 603	Road Safety
24	Environmental Aspects of Highways	SHC 701	Environmental Aspects of Highways
25	Autonomous Vehicles Requirements	SHC 801	Autonomous Vehicles Requirements

Roads General Authority (RGA)
Kingdom of Saudi Arabia, Riyadh, King AbdulAziz road, P.O. Box 12628
0118744444 Local Tel./ +966118744444 Outside Kingdom of Saudi Arabia
https://rga.gov.sa

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1. Introduction

1.1. Summary of Chapters

Volume SHC 602 - Manual on Uniform Traffic Control Devices (MUTCD), is divided into 7 chapters. A brief outline of these chapters is given below.

Chapter 1. Introduction - This chapter provides an overview of the chapters, the scope of the volume, and a full list of the standards referenced within the volume.

Chapter 2. General Provisions - This chapter provides general provisions including the purpose of traffic control devices and identifying the authorities responsible of traffic control devices and their placement.

Chapter 3. Signs - This chapter provides the standards, guidance, options, and support for the signing of all types of highways.

Chapter 4. Markings - This chapter provides the standards, guidance, options, and support for the pavement marking of all types of highways.

Chapter 5. Signals - This chapter provides the standards, guidance, options, and support for the signals' installation and application.

Chapter 6. Traffic Control for Special Zones - This chapter provides the standards, guidance, options, and support for all of traffic control devices in some special zone.

Chapter 7. Typical Traffic Control for Work Zones - This chapter provides the standards, guidance, options, and support for the all the traffic control devices and equipment needed for the work zone.

1.2. Scope

This volume is to be utilized as a manual by designers, contractors and authorities involved in the selection, installation, and maintenance of traffic control devices. The criteria related to the traffic control devices selection process in general constitute Standards, reference to which are binding and mandatory, and Guidance which are recommended; however, exceptions in specific cases are allowed with the given conditions which are identified as Options in this Volume.

1.3. Reference Standards and Codes

Standards and codes for all materials and procedures shall be as specified in this Guideline, in the Contract documents, if any, and from the following sources, in their latest edition: if not found in this Volume:

- ASTM American Society for Testing and Materials;
- SASO Standards & Technical Regulations.

Table 1-1 presents ASTM and SASO standards that have been taken into consideration in this Volume.

Table 1-1 Designations and Titles for ASTM and SASO Standards Applying to Volume SHC 602

ASTM	SASO	Title
D4956	ASTM D4956	Standard Specification for Retroreflective Sheeting for Traffic Control
E1347		Standard Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry
E1349		Standard Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional (45°:0° or 0°:45°) Geometry
	819	Paints and Varnish - Road Marking Paints
	944	Paints and Varnishes - Glass Beads for Road Marking Paints
	1482	Ceramic Road Markers
	2869	Paints and Varnish - Water Based Road Marking Paint
	2935	Paints and Varnishes -Anti-carbonation Paints Water Based
	2980	Specifications of Portable Plastic Safety Barrier System
	EN-1317-2	Road Restraint Systems - Part 2: Performance Classes, Impact Test Acceptance Criteria and Test Methods for Safety Barriers including Vehicle Parapets

2. General Provisions

2.1. Definitions

It should be underlined that the following words, when used in this Manual, **shall** have the following meanings:

1. **Shall** - The verb "**shall**" is typically used when a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. Standard statements are sometimes modified.
2. *Should* - The verb "*Should*" is typically used when a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate.
3. May - The verb "may" is typically used when a statement of practice that is a permissive condition and carries no requirement or recommendation. Option statements sometime contain allowable modifications to a Standard.

2.2. Purpose of Traffic Control Devices

Traffic control devices shall be defined as all signs, signals, markings, and other devices used to regulate, warn, or guide traffic, placed on, over, or adjacent to a highway facility. The purpose of traffic control devices is to improve highway safety by providing for the orderly movement of all road users on streets, highways, bikeways, and private highways open to public travel throughout Saudi Arabia.

Traffic control devices notify road users of regulations and provide warning and guidance needed for the uniform and efficient operation of all elements of the traffic stream in a manner intended to minimize the occurrences of crashes.

2.3. Requirements of Traffic Control Devices

This Manual contains the basic principles that govern the design and use of traffic control devices for all streets and highways. This Manual specifies the restriction on the use of a device if it is intended for limited application or for a specific system. It is important that these principles be given primary consideration in the selection and application of each device.

To be effective, a traffic control device *Should* meet five basic requirements:

1. Fulfill a need.
2. Command attention.
3. Convey a clear, simple meaning.
4. Command respect from road users.
5. Give adequate time for proper response.

Design, placement, operation, maintenance, and uniformity are aspects that *Should* be carefully considered in order to maximize the ability of a traffic control device to meet the five requirements listed above. Vehicle speed *Should* be carefully considered as an element that governs the design, operation, placement, and location of various traffic control devices. In the

case of regulatory devices, the actions required of vehicle operators and pedestrians are specified by the traffic regulations.

2.4. Authority for Placement

Traffic control devices **shall** be placed only by the concerned authority of a public body or official having jurisdiction, or in the case of a private road, by authority of the private owner for the purpose of regulating, warning, or guiding traffic.

2.5. Engineering Study and Engineering Judgment

Engineering Study and Engineering Judgment, wherever they are mentioned in this volume, **shall** be conducted by a qualified engineer. However, if the responsible authority does not have available engineers or trained/or experienced individuals in traffic control devices, they *Should* seek assistance from a qualified traffic engineering consultant.

Engineering Judgment is the evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in this Manual and other source, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment **shall** be exercised by a qualified engineer. Documentation of engineering judgment is not required.

Engineering Study is the comprehensive analysis and evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in these Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. An engineering study **shall** be performed by a qualified engineer. An engineering study **shall** be documented.

A qualified engineer is an engineer who is a certified Professional Traffic Operations Engineer accredited by the relevant concerned authority of KSA (PTOE) or equivalent or possesses a Professional Engineer (PE) license in transportation or equivalent from other countries.

2.6. Highway Classification

General classification for highways follows Table 2-1 and encompasses highways and streets classes by speed and carriageway configuration. Individual Transport Jurisdictions may utilize other terminology such as “Boulevards” to describe particular routes – however, all classes of highways defined by both SHC 201 (Planning Process) and SHC 301 (Highway Geometric Design) *Should* map to one of the general classifications presented below.

Table 2-1 Highway Classification (SHC 301 (Highway Geometric Design))

Class	Type	Description
Freeways	Rural	Rural freeways mainly connect heavily populated regions and large cities. A Freeway is a fully controlled-access highway that provides an unhindered flow of traffic, with no traffic signals, intersections, or property access. The average running speed for off-peak conditions is between 90 to 140 km/h.
	Urban	Urban freeways are limited-access, multi-lane divided highways in populated areas. They are designed to move motorized traffic over long distances at high speeds. Some urban freeways run through city centers while others encircle the urban core. All freeways have full control of access. Only emergency parking is permitted. The average running speeds for off-peak conditions are between 80 and 100 km/h.
Expressways	Rural	An expressway is a divided or undivided highway with partial control of access. It has intersections but no entrances. It does not also allow direct access to adjacent properties. Expressways can, however, have interchanges. There are no pedestrians and slow-moving vehicles in expressways. Usually, they are made over completely new routes. They *Should* not pass through largely populated areas but only near them. The average running speed for off-peak conditions is between 80 to 120 km/h.
	Urban	Urban expressways (major or principal arterials) are intra-city expressways and controlled-access, multi-lane divided highways in populated areas. Due to lack of space many of these expressways are constructed as viaducts running above local highways. The average running speeds for off-peak conditions are between 80 and 100 km/h.

Class	Type	Description
Arterials	Rural	A rural arterial highway refers to roadways consisting of two lanes in the cross-section, one for each direction of travel. Occasionally, passing lanes may be added to one or two sides of the highway extending the cross-section to three or four lanes at those locations. In this entry, two-lane highways strictly refer to roadways in rural areas meeting the previous definition and do not include urban and suburban streets. For higher traffic volumes multilane rural highways could be designed with two or more traffic lanes per direction, to upgrade the provided level of service. A central median could be placed in between two directions, while leveled intersections are usually applied in connections with other roads. The average running speed for off-peak conditions is between 60 and 110 km/h.
	Urban	An arterial highway is a high-capacity urban highway that corresponds below freeways/expressways on the highway hierarchy in terms of traffic flow and speed. The primary function of an arterial highway is to deliver traffic from collector highways to freeways or expressways, and between urban centers at the highest level of service possible. As such, many arteries are limited-access highways, or feature restrictions on private access. Because of their relatively high accessibility, many major highways face large amounts of land use and urban development, making them significant urban places. The average running speeds for off-peak conditions are between 50 and 80 km/h.
Collectors	Rural	A rural collector highway is similar to rural arterial highway, usually with lower traffic volumes. Consisting of two lanes in the cross-section, one for each direction of travel. The average running speed for off-peak conditions is limited to 90 km/h.
	Urban	A collector highway or distributor highway is a low-to-moderate-capacity highway which serves to move traffic from local streets to arterial highways. Unlike arterials, collector highways are designed to provide access to residential properties. The average running speeds for off-peak conditions are between 30 and 50 km/h with the higher value predominating in outlying areas.

Class	Type	Description
Locals	Rural	Rural locals are mainly low-volume highways that lying outside of built-up areas of cities, towns, and communities. Depending upon the condition of the highway surface, the average running speed for off-peak conditions is from 40 to 80 km/h.
	Urban	Urban locals provide access to a specific destination, as to a main highway or to a property that lies within another property. Is often used to provide access to private driveways, shops, houses, industries, or farms. Residential streets mean a subdivision street adjacent to property that is anticipated to develop as single-family residences or multi-family blocks, apartment buildings, or other similar dwelling structures. The average running speed for off-peak conditions is between 30 and 40 km/h.

3. Signs

3.1. General Guidelines

3.1.1. Introduction

This chapter contains standards and guidelines for the signing of all types of highways and streets open to public travel. The traffic signs shall be used to provide regulations, warnings, and guidance information for road users. Words, symbols, and arrows *Should* be used to convey the messages.

Signs *Should* be used only where this Manual indicates the need for placement. Signs may be required where specific regulations apply at specific places or at specific times only, or where hazards are not self-evident. Signs also give information as to highway route designations, directions, destinations, and points of interest. "Rules of the Road" and other regulatory codes *Should* not require specific signage to affirm their legality or validity.

This Manual prescribes standards for the signing within the right-of-way of all highway design classes (refer to SHC 201 (Planning Process) and SHC 301 (Highway Geometric Design)). Detailed Regulatory, Warning, and Informative signs are found in the next sections of this Volume.

3.1.2. Application

Each standard sign **shall** be displayed only for the specific purpose prescribed for it in this Manual. Uniformity of design and placement is as important as the use of signs. Identical conditions **shall** always be indicated with the same type and placement of sign, despite where those particular conditions exist.

It is recognized that urban traffic conditions differ from those in rural environments, and in many instances, signs are applied and located differently. Where pertinent and practical, this Manual sets forth separate guidelines for urban and rural conditions.

The general signing requirements for Informative signs on expressways and arterials have the same standards for use and design. Roadway geometric design and signing shall be coordinated providing effectively placed signing to give drivers necessary, regulatory, warning, and informative information.

Regulatory and warning signs *Should* be used conservatively because these signs, if used too excessively, tend to lose their effectiveness. In the case of informative signs, they *Should* be used frequently because their use promotes efficient operations by keeping road users informed of their location.

Signs **shall** be defined by their function as follows:

1. Regulatory signs give notice of traffic laws or regulations.
2. Warning signs call attention to conditions on, or adjacent to, a highway or street potentially hazardous to traffic operations.
3. Informative (or Guidance) Signs show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information.

3.1.3. General Design Principles

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

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

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

This Manual shows many typical standard signs. The standards for these designs do not preclude making minor changes in proportion of symbols, width of borders, or layout of word messages, but all shapes and colors *Should* be as indicated for consistency throughout Saudi Arabia.

- The term legend **shall** include all word messages and symbol and arrow designs that are intended to convey specific meanings.
- Uniformity in design **shall** include shape, color, dimensions, legends, borders, and illumination or retro-reflectivity.
- Standardization of these designs does not preclude further improvement by minor changes in the proportion or orientation of symbols, width of borders, or layout of word messages, but all shapes and colors **shall** be as indicated.
- Where a standard word message is applicable, the wording **shall** be as provided in this Manual.
- In situations where word messages are required other than those provided in this Manual, the signs **shall** be of the same shape and color as standard signs of the same functional type.
- Pictographs **shall** not be displayed on signs except as specifically provided in this Manual. Pictographs **shall** be simple, dignified, and devoid of any advertising. When used to represent a political jurisdiction (such as a Regional, City, or Municipal corporation) the pictograph **shall** be the official designation adopted by the jurisdiction. When used to represent a college or university, the pictograph **shall** be the official seal adopted by the institution. Pictorial representations of university or college programs **shall** not be permitted to be displayed on a sign.

Although the standard design of symbol signs cannot be modified, the orientation of the symbol may be changed to better reflect the direction of travel, if appropriate.
Internet addresses, e-mail addresses, or telephone numbers with more than four characters **shall** not be displayed on signs, supplemental plaques, sign panels, and dynamic message signs (DMS).

For more guidance regarding standard testing, passive safety system and specifications for traffic signs, refer to SHC 309 (Material Specifications and Standardized Testing), SHC 304 (Highway Facilities and Utilities Design – Passive Safety Systems Design) and SHC 403 (Construction of Highway Facilities), respectively.

3.1.3.1. Shapes

Specific shapes, as shown in Table 3-1, **shall** be used exclusively for specific signs or series of signs, unless otherwise provided in the text discussion in this Manual for a particular sign or class of signs.

Table 3-1 Standard Sign Shapes

Standard Traffic Sign Shape	Function
	Reserved exclusively for Stop signs.
	Reserved exclusively for Yield signs.
	Reserved exclusively for Regulatory signs, including Mandatory (e.g., speed limit) and Prohibitory (e.g., no trucks, do not enter, no U- turn) signs
	Primarily used for specific Regulatory signs, including parking signs – also used for Attention and Information / Diagrammatic signs.
	Reserved exclusively for Advance Warning signs
	Primarily used for all Guide and Informative signs, comprising Direction, and General Information signs. Also used for One-Way signage and for Qualification Plates or Supplemental Plates below other sign shapes.
	Reserved exclusively for Chevron Direction Signs / Route Information

3.1.3.2. Colors

The colors used on standard signs **shall** be as follows:

- Red is used as a background color for the Stop sign. Red is used for messages or borders on certain Warning signs, certain Regulatory signs, and certain Informative signs.
- White is used as a background color on Regulatory, Warning signs, and certain Informative signs. White is used as the message or border on blue, red, black, and brown signs.
- Blue is used as a background color for all Mandatory signs and certain Informative signs.
- Yellow is used on some information panels and as a background for the signs in work zones.
- Black is used as a background color for certain Informative signs. Black is used for messages on yellow and white signs, Black is used for messages on End of All Special Prohibitions Imposed on Moving Vehicle signs.
- Brown is used as a background color for Recreation and Cultural Interest signs.
- Green is used on certain informative signs.

All color standards **shall** be based on Table 3-2 and Table 3-3.

Daytime color of retroreflective materials **shall** be measured in accordance with the ASTM Test Method E1349, ''Standard Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional Geometry'' or ASTM Test Method E1347 ''Standard Test Method for Color and Color- Difference Measurement by Tristimulus (Filter) Colorimetry". The CIE standard illuminant used in computing the colorimetric coordinates **shall** be D65 and then 2 Degree Standard CIE observer **shall** be used.

Nighttime colors **shall** be determined using CIE Standard Illuminant A for computing the colorimetric coordinates and the 2 Degree Standard CIE Observer **shall** be used.

Table 3-2 Daytime Color Specification Limits for Retroreflective Material with CIE 2° Standard Observer and 45/0 (0/45) Geometry and CIE Standard Illuminant D65

Color	Chromaticity Coordinates							
	1		2		3		4	
	x	y	x	y	x	y	x	y
White	0.303	0.300	0.368	0.366	0.340	0.393	0.274	0.329
Red	0.648	0.351	0.735	0.265	0.629	0.281	0.585	0.346
Orange	0.558	0.352	0.636	0.364	0.570	0.429	0.506	0.404
Brown	0.430	0.340	0.430	0.390	0.518	0.434	0.570	0.382
Yellow	0.498	0.412	0.557	0.442	0.479	0.520	0.438	0.472
Green	0.026	0.399	0.166	0.364	0.286	0.446	0.207	0.771
Blue	0.078	0.171	0.150	0.220	0.210	0.160	0.137	0.038
Purple	0.300	0.064	0.320	0.200	0.550	0.300	0.600	0.202

Table 3-3 Nighttime Color Specification Limits for Retroreflective Material with CIE 2° Standard Observer and Observation Angle of 0.33°, Entrance Angle of +5° and CIE Standard Illuminant A

Color	Chromaticity Coordinates							
	1		2		3		4	
	x	y	x	y	x	y	x	y
White	0.475	0.452	0.360	0.415	0.392	0.370	0.515	0.409
Red	0.650	0.348	0.620	0.348	0.712	0.255	0.735	0.265
Orange	0.595	0.405	0.565	0.405	0.613	0.355	0.643	0.355
Brown	0.595	0.405	0.540	0.405	0.570	0.365	0.643	0.355
Yellow	0.513	0.487	0.500	0.470	0.545	0.425	0.572	0.425
Green	0.007	0.570	0.200	0.500	0.322	0.590	0.193	0.782
Blue	0.330	0.370	0.180	0.370	0.230	0.240	0.091	0.133
Purple	0.355	0.088	0.385	0.288	0.500	0.350	0.635	0.221

More guidance regarding standard testing and specifications is provided in SHC 309 (Material Specifications and Standardized Testing) and SHC 403 (Construction of Highway Facilities).

3.1.3.3. Retro-reflectivity

Traffic signs function always, and it is thus necessary that they exhibit the same shape and color during both day and night hours. To this end, signs and object markers require some

type of retroreflective sheeting[1] (pressure sensitive adhesive-backed material covering the sign and text that captures light and reflects it back to the driver).

- Warning and Regulatory signs **shall** be reflectorized or internally illuminated to show the same color day and night. All Informative signs **shall** be reflectorized and, in certain instances, **shall** be illuminated as well. All overhead signs **shall** be illuminated where possible.
- Signage **shall** utilize retroreflective sheeting for signage and text that preserves the integrity of the messages as well as the color (i.e., non-black) backgrounds both in daylight and when illuminated by headlights in night-time and low light conditions.
- Minimum requirements for retroreflective sheeting that **shall** be used for national, regional, and local are presented in Table 3-4.
- Sign face sheeting. All sign faces **shall** be constructed using retroreflective sheeting, covering symbols, messages, background, and border.
- Preservation of shape, color and message. Regulatory, warning and information / guide signs **shall** be retroreflective or illuminated in order to show the same shape and similar color both day and night, except where specific exceptions are noted in this Volume.
- Uniform design of the sign and message **shall** be maintained without any decrease in visibility, legibility, or driver comprehension during either day-time, night-time, or transitional conditions.
- Installation of internally illuminated messages within sign. If internally illuminated messages or flashers are included within or above the sign face, the following **shall** be required:
    - If used, light-emitting diodes **shall** be provided with a maximum 6.35 mm diameter and **shall** be the following colors based on sign type:
        - Red, if used with Stop or Yield signs.
        - White, if used with regulatory signs other than Stop or Yield signs.
        - White or yellow, if used with warning signs.
        - White, if used with guide signs.
        - Yellow, if used with temporary traffic control signs.
        - White or yellow, if used with school area signs.
    - If flashed, all LED units **shall** flash simultaneously at a rate of more than 50 and less than 60 times per minute.
- Maintaining sign face retro-reflectivity. Public agencies or officials having jurisdiction **shall** use an assessment or management method that is designed to maintain sign retro-reflectivity at or above the minimum levels in Table 3-4. Contrast between legend and background *Should* be at a minimum ratio of 3:1.
- Retroreflective sheeting *Should* use ASTM D4956 Type IV or Type XI as follows:
    - Type IV sheeting **shall** be used for normal regulatory and warning sign applications, as well as for guide signs with white backgrounds.
    - Type XI sheeting **shall** be used for all ground-mounted guide signs with non-white background, as well as for all overhead signs.

[1] Retroreflective sheeting Should use ASTM D4956 standard - Type IV, V, IX, VIII, or Type XI.

Table 3-4 Minimum Sign Retro-reflectivity to be Maintained

Sign Color	Minimum Retro-reflectivity Requirements (candela/lux/m^2)	Additional Criteria
White on Blue	W ≥ 250, B ≥ 12	Overhead guide signs
	W ≥ 120, B ≥ 10	Post-mounted guide sings
White on Green	W ≥ 250, G ≥ 25	Overhead guide signs
	W ≥ 220, G ≥ 22	Post-mounted guide sings
White on Red	W ≥ 75, R ≥ 23	Stop signs (post)
Black on White (With Red Border)	W ≥ 50, R ≥ 15	Warning and regulatory signs
White on Brown	W ≥ 150, Br = 7	Post-mounted signs
Black on Yellow (With Red Border)	Y ≥ 100, R ≥ 30	Road work signs
Red on Blue	R ≥ 50, B ≥ 15	No parking, no stopping signs

Backing for retroreflective sheeting *Should* meet ASTM D4956 class 1 requirements, providing pressure-sensitive adhesion to smooth, clean surfaces with no heat, solvent, or other preparation needed. Table 3-4 shows the minimum retro-reflectivity levels to be maintained in units of cd/lx/m^2 measured at an observation angle of 0.2° and an entrance angle of - 4.0°.

These materials will likely yield much higher reflectivity levels initially, but over time *Should* degrade to no worse than the levels shown in Table 3-4.

To maintain minimum retro-reflectivity, a method *Should* be in place to maintain the minimum retro-reflectivity levels in Table 3-4 using one or more of the following assessment or management methods:

1. Visual Night-times Inspection - The retro-reflectivity of an existing sign is assessed by a trained sign inspector conducting a visual inspection from a moving vehicle during night-time conditions. Signs that are visually identified by the inspector to have retro-reflectivity below the minimum levels *Should* be replaced.
2. Measured Sign Retro-reflectivity - Sign retro-reflectivity is measured using a retro-reflectometer. Signs with retro-reflectivity below the minimum levels *Should* be replaced.
3. Expected Sign Life - When signs are installed, the installation date is labeled or recorded so that the age of a sign is known. The age of the sign is compared to the

expected sign life. The expected sign life is based on the experience of sign retro-reflectivity degradation in a geographic area compared to the minimum levels. Signs older than the expected life *Should* be replaced.

4. Blanket Replacement - All signs in an area/corridor, or of a given type, *Should* be replaced at specified intervals. This eliminates the need to assess retro-reflectivity or track the life of individual signs. The replacement interval is based on the expected sign life, compared to the minimum levels, for the shortest-life material used on the affected signs.
5. Control Signs - Replacement of signs in the field is based on the performance of a sample of control signs. The control signs might be a small sample located in a maintenance yard or a sample of signs in the field. The control signs are monitored to determine the end of retroreflective life for the associated signs. All field signs represented by the control sample *Should* be replaced before the retro-reflectivity levels of the control sample reach the minimum levels.
6. Other methods developed based on engineering studies can be used.

More guidance regarding materials specifications of traffic sign face sheeting and backing is provided in SHC 403 (Construction of Highway Facilities).

3.1.3.4. Illumination

Sign illumination may be accomplished through the means shown in Table 3-5.

Light Emitting Diode (LED) units may be used individually within the legend or symbol of a sign and in the border of a sign, except for changeable message signs, to improve the conspicuity, increase the legibility of sign legends and borders, or provide a changeable message. Each sign description in this Chapter will identify specific guidance for using LED's within or in addition to the display itself.

Table 3-5 Illumination of Sign Elements

Means of illumination	Sign Element to be Illuminated
Light behind the sign face	• Symbol or word message • Background • Symbol, word message, and background (through a translucent material)
Attached or independently mounted light source designed to direct essentially uniform illumination onto the sign face	• Entire sign face
Light emitting diodes (LEDs)	• Symbol or word message • Portions of the sign border

Means of illumination	Sign Element to be Illuminated
Other devices, or treatments that highlight the sign shape, color, or message: • Luminous tubing • Fiber optics • Incandescent panels • Luminescent panels	• Symbol or word message • Entire sign face

More details regarding materials of traffic sign face sheeting and backing are provided in SHC 403 (Construction of Highway Facilities).

3.1.3.5. Dimensions

The sign dimensions prescribed in this Manual **shall** be the standard for application on highways within Saudi Arabia, the existing standard sizes **shall** be increased according to the classification of highways. Larger signs are prescribed for freeways and expressways accordingly.

3.1.3.6. Lettering and numbering

All guide and directional signage with directional information (street/highway names, destinations, etc.) **shall** contain both Arabic and English versions of the information.

The Arabic letter style **shall** be Naskh (Figure 3-1). However, in Al Madinah city, Al Madinah font (Figure 3-2) **shall** be used in the guide signs. Proper names, place names and street names in Arabic **shall** be translated to English.

نقـل

Figure 3-1 Naskh Font (Example)

Figure 3-2 Al Madinah Font (Example)

English font **shall** be Transport medium font (for signs with white background, use Transport heavy font - Figure 3-3).

Figure 3-3 Transport Medium Font (Example)

For new signs, numerical legends, including speed limits, route numbering, and distance/height measurements, **shall** utilize Arabic Numerals (western). To maximize visibility and promote simplicity, all numbering on new route emblems, speed limit signs, kilometer postings, distance or clearance signs **shall** utilize Arabic (Western) numbers. Additionally, all distance, weight or height measures **shall** utilize Arabic (Western) numerals with English characters such as "km" (kilometers), "m" (meters), "kg" (kilograms) and "t" (tons).

All Arabic letters and numbers depicted on the figures throughout this manual are for illustration purposes only.

3.1.3.7. Sign borders

Except for warning signs or as noted below, all signs **shall** have a border the same color as the legend. The corners of the sign border **shall** be rounded. Where practicable, the corners of the sign panels *Should* also be rounded to fit the border.

1. Borders on Warning signs **shall** be red and **shall** have the dimensions to approximate the widths illustrated for each sign.
2. Borders on Regulatory signs **shall** be red except for the Stop sign (R1-1), which **shall** be white and the No Entry sign, which has no border.
3. Mandatory signs do not have a border.
4. White on blue or green advance direction signs and direction signs **shall** have a white border. A black border **shall** be used on advance direction and direction signs with a white background.

The border widths *Should* generally not exceed the stroke-width of the Arabic lettering of the sign; however, a minimum border width of 30 mm *Should* be used.

For signs exceeding 2 x 3 m in size, the border *Should* be 50 mm wide or on larger signs, the border *Should* be 75 mm wide.

3.1.3.8. Enhanced conspicuity for standard signs

Based upon engineering judgment, where the improvement of the conspicuity of a standard regulatory, warning, or guide sign is desired, any of the following methods may be used, as appropriate, to enhance the sign's conspicuity (see Figure 3-4):

1. Increasing the size of a standard regulatory, warning, or guide sign.
2. Doubling-up of a standard regulatory, warning, or guide sign by adding a second identical sign on the lefthand side of the roadway.
3. Adding a solid yellow or fluorescent yellow rectangular "header panel" above a standard regulatory sign, with the width of the panel corresponding to the width of the standard regulatory sign. A legend of "NOTICE," or other appropriate text may be added in black letters within the header panel for a period of time determined by engineering judgment.
4. Adding a NEW plaque above a new standard regulatory or warning sign, for a period of time determined by engineering judgment, to call attention to the new sign.
5. Adding one or more red or orange flags (cloth or retroreflective sheeting) above a standard regulatory or warning sign, with the flags oriented so as to be at 45 degrees to the vertical.
6. Adding a solid yellow, a solid fluorescent yellow, or a diagonally striped black and yellow (or black and fluorescent yellow) strip of retroreflective sheeting at least 7.5 cm wide around the perimeter of a standard warning sign. This may be accomplished by affixing the standard warning sign on a background that is 15 cm larger than the size of the standard warning sign.
7. Adding a warning beacon (see Chapter 5) to a standard regulatory (other than a Stop or a Speed Limit sign), warning, or guide sign.
8. Adding a speed limit sign beacon (see Chapter 5) to a standard Speed Limit sign.
9. Adding a stop beacon (see Chapter 5) to a STOP sign.
10. Adding light emitting diode (LED) units within the symbol or legend of a sign or border of a standard regulatory, warning, or guide sign.
11. Adding a strip of retroreflective material to the sign.
12. Using other methods that are specifically allowed for certain signs as described elsewhere in this Manual.

Sign conspicuity improvements can also be achieved by removing non-essential and illegal signs from the right-of-way, and by relocating signs to provide better spacing.

- The NEW plaque **shall** not be used alone.
- Strobe lights **shall** not be used to enhance the conspicuity of highway signs.

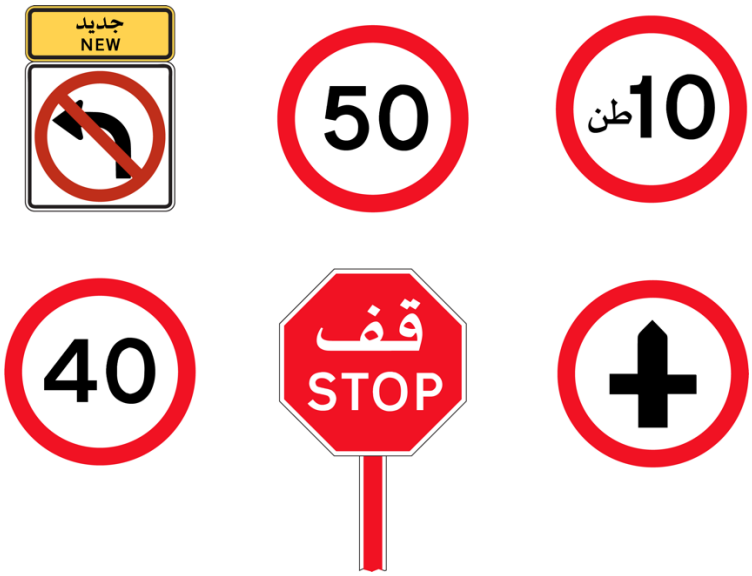


Figure 3-4 Examples of Enhanced Conspicuity for Signs

3.1.4. Location and Placement

3.1.4.1. Standardization of location

Standardization of location for locating signs cannot always be attained in practice. However, the general rule is to locate signs on the right-hand side of the roadway where the driver is looking for the signs. On wider facilities, or where some degree of land-use control is desirable, or where space is not available at the roadside, overhead signs are often necessary.

- Supplementary signs may be helpful at times if the initial signs are not in a direct line of sight for the driver. A supplementary Warning sign **shall** be located on the left median of a divided highway or on the left of a one-way roadway where the view of the standard sign in the normal location may be obstructed by traffic, or the width of the cross section is greater than 2 traffic lanes.
- Signs *Should* not obscure each other or be hidden from view by other non-obstruction such as trees or shrubs or any objects. Signs *Should* not block the view of a driver approaching an intersection to traffic approaching from an intersecting street.
- Spacing between signs must be sufficient to allow time for the driver to make the required decisions safely.
- Where divided highways are separated by median, large regulatory signs that determine the direction of the traffic movement *Should* be installed in the middle of the median's head, small signs may be installed at a low level, the height *Should* not be less than 1,200 mm.
- If median width at the median opening itself of 9.0 m or more, median openings *Should* be signed as two separate intersections.

Standard lateral and vertical positioning of typical signs are illustrated in from Figure 3-5 to Figure 3-15 in conjunction with Table 3-6.

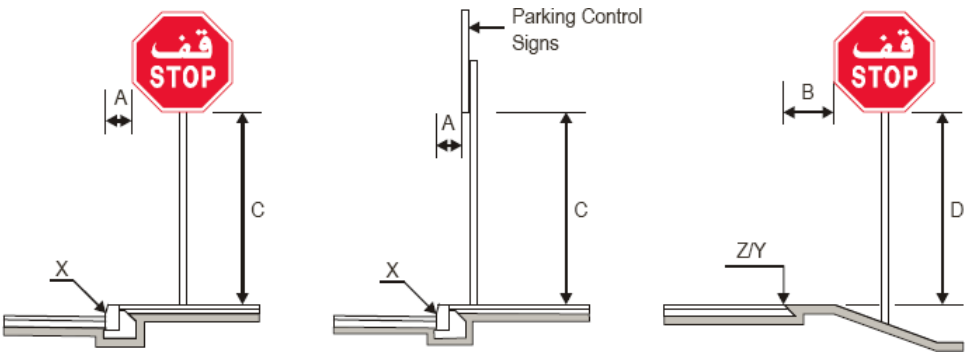


Figure 3-5 Lateral and Vertical Positioning of Regulatory and Warning Signs (Detail A. Standard Regulatory Signs)

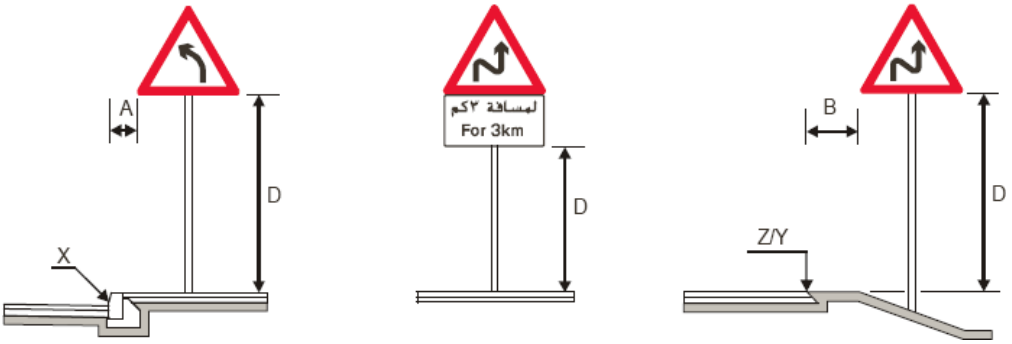


Figure 3-6 Lateral and Vertical Positioning of Regulatory and Warning Signs (Detail B. Standard Advance Warning Signs)

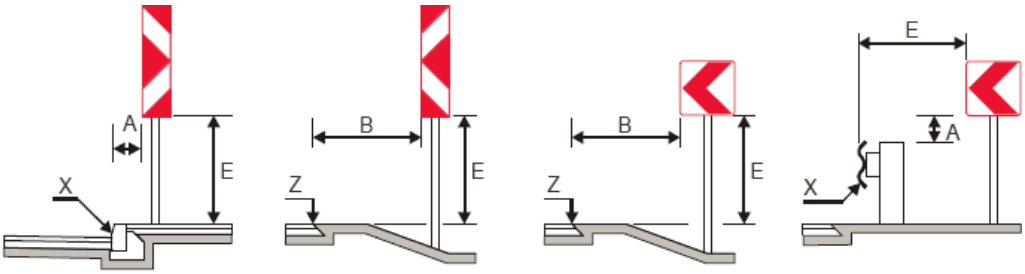


Figure 3-7 Lateral and Vertical Positioning of Regulatory and Warning Signs (Detail C. Hazard Warning Signs)

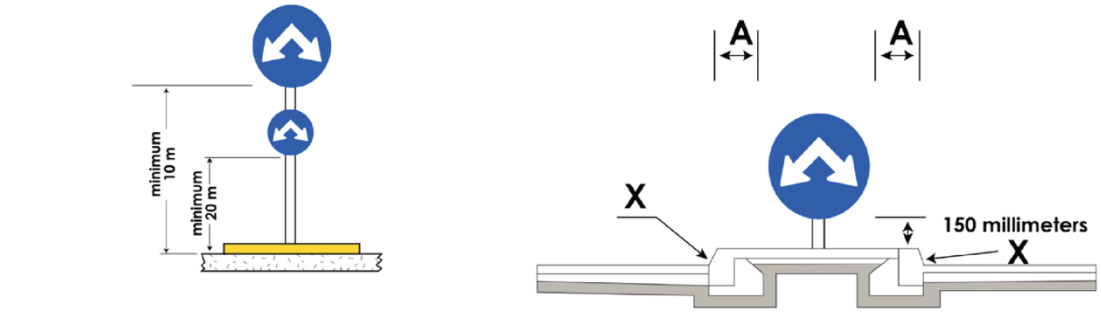


Figure 3-8 Lateral and Vertical Positioning of Regulatory and Warning Signs (Detail D. Gore Hazard Marker)

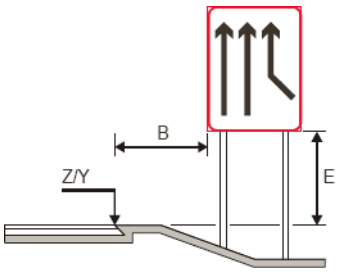


Figure 3-9 Lateral and Vertical Positioning of Regulatory and Warning Signs (Detail E. Diagrammatic Warning Sign)

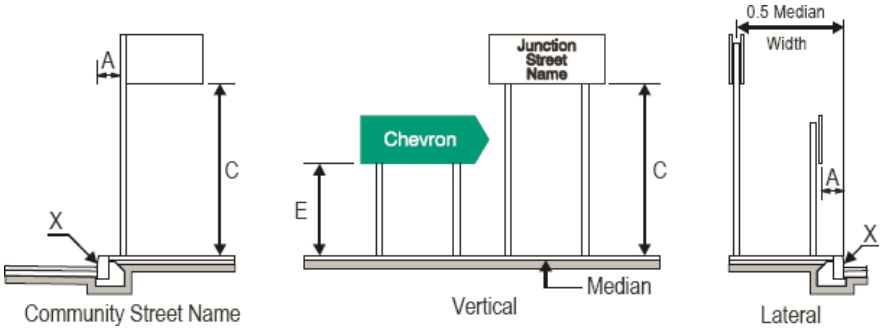


Figure 3-10 Lateral and Vertical Positioning of Guide and Informative Signs (Detail A. Street Name and Action Direction Signs)

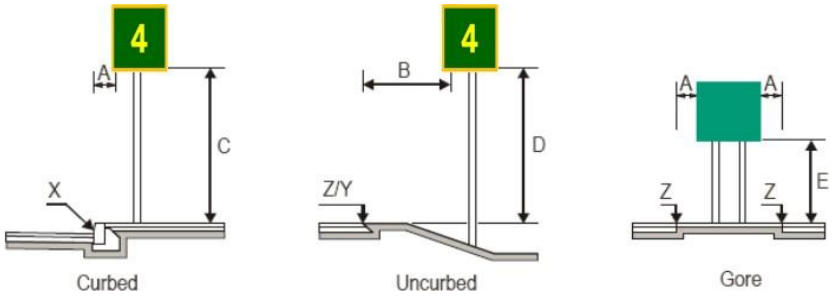


Figure 3-11 Lateral and Vertical Positioning of Guide and Informative Signs (Detail B. Route Marker and Gore Exit Direction Signs)

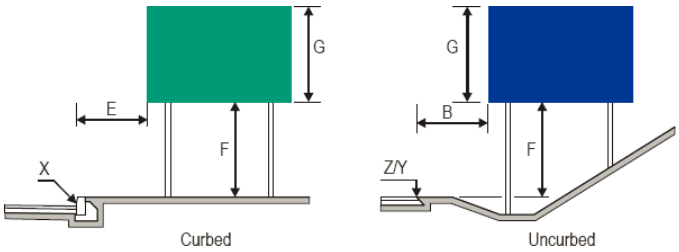


Figure 3-12 Lateral and Vertical Positioning of Guide and Informative Signs (Detail C. Guide and General Information Signs (Post-Mounted))

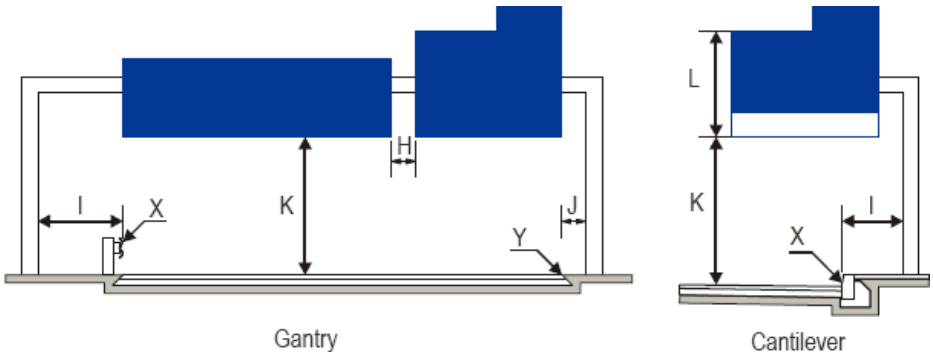


Figure 3-13 Lateral and Vertical Positioning of Guide and Informative Signs (Detail D. Overhead Guide Signs)

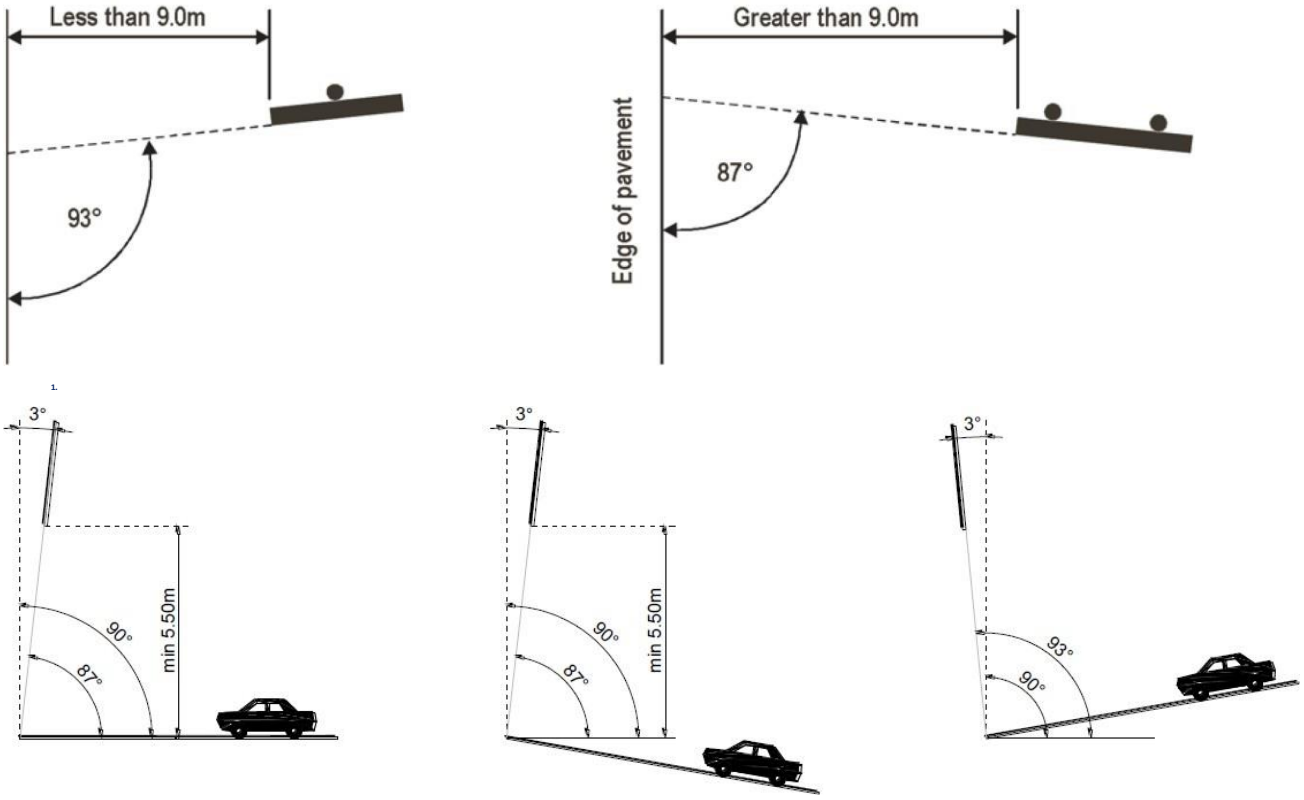


Figure 3-14 Typical Sign Orientation Angle

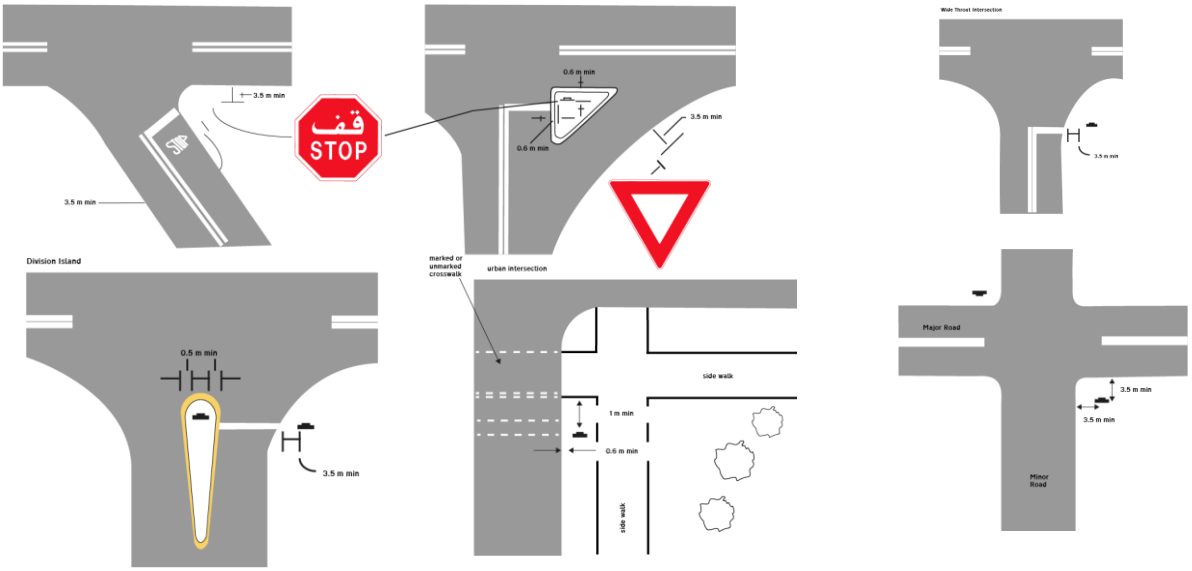


Figure 3-15 Typical Locations for Stop and Yield Signs

Table 3-6 Lateral and Vertical Positioning of Traffic Signs (Refer to Figure 3-8 - Figure 3-15)

Roadway Type	Dimension	Minimum (mm)	Maximum (mm)	Remarks
Freeway Expressway	A	600	3,000	
	B	3,600	9,000	
	C	2,100	2,500	See Notes 5, 6, and 7
	D	1,600	2,500	See Notes 7, 8, and 9
	E	500	1,600	See Notes 5, 6, and 8
	F	2,100	2,500	See Note 5
	G	–	6,000	See Note 10
	H	50	–	
	I	1,000	–	See Note 11
	J	9,000	–	See Note 13
	K	5,500	6,500	See Note 12
	L	1,800	4,200	See Note 10
Arterial Collector Local	A	450	1,000	
	B	600	2,000	
	C	2,100	2,500	See Notes 5, 6, and 7
	D	1,900	2,500	See Notes 7, 8, and 9
	E	1,200	1,600	See Notes 5, 6, and 8
	F	2,100	2,500	See Note 5
	G	–	6,000	See Note 10
	I	600	–	See Note 11
	K	5,500	6,500	See Note 12
	L	1,800	4,200	See Note 10

Notes:

1. Dimension letters refer to Figure 3-8 - Figure 3-13.
2. If no dimension value is given in the table this means that the dimension concerned is variable.
3. Lateral dimension reference points are defined as follows:
   X – Face of curb, guardrail, or barrier.
   Y – Edge of pavement
   Z – Edge of shoulder
4. For large, multiple signs with a breakaway post system, the minimum clearance between the underside of the sign and the ground below it **shall** be 2,250 mm. This will permit a standard vehicle striking the post to pass under the sign panel.
5. In urban areas (curbed or uncurbed roadways) vertical dimension (e.g., C, D, E, etc.) is the minimum clearance from the bottom of the sign to the ground below.
6. Certain regulatory signs are commonly located in front of drivers as they approach a turn. These signs *Should* be mounted as per dimension "E" rather than "C" if so, doing will not create a visual obstruction.
7. When two signs of different classes are mounted on the same post a regulatory sign *Should* be mounted above an advance warning sign.
8. In rural areas (uncurbed roadways) vertical dimensions are measured up from the near side edge

of pavement elevation (Point Y). If the roadway is superelevated such that it rises in the direction of the sign, the pavement surface slope **shall** be extended to the farthest edge of the sign and the vertical dimension taken from that elevation.

9. The use of a mounting height of less than 2,000 mm is not recommended for Dimension "D" for signs with a single support unless the support is provided with a breakaway system.
10. The maximum value stated may be exceeded but individual detailed structural designs **shall** be provided for all support structures.
11. When posts are required to be located behind a flexible beam guardrail, the minimum dimension **shall** be checked for compatibility with the maximum deflection of the railing being used.
12. The minimum dimension given is the point of minimum clearance between the bottom of the sign support structure and the pavement surface (including *should*er if sign is over *should*er) vertically below. Minimum clearance will be 5,500 mm for both gantries and cantilevers signs.
13. Optimal clear zone distance shown with no barriers. For bridges and special cases, the Authorized Organization *Should* review and, if appropriate, approve use of narrower dimensions.

3.1.4.2. Overhead sign installations

Overhead signs have value at many locations. The following conditions provide a basis for justifying the erection of overhead sign displays:

1. Traffic volume is at or near capacity for highways with two or more lanes.
2. Complex interchange design.
3. Three or more lanes in each direction.
4. Restricted sight distance.
5. Multi-lane exits.
6. Large percentage of trucks.
7. Street lighting background.
8. High speed traffic.
9. Consistency of sign message location through a series of interchanges.
10. Insufficient space for ground mounted signs.
11. Intersection of one major highway with another.

One or more of the conditions listed above do not in themselves automatically justify the use of overhead signs, close coordination between design and operation may be required at the design stage to identify the most critical case.

- Gantries for traffic overhead signs **shall** be positioned as specified in the contract specific gantry schedule and signs **shall** be mounted on gantries as specified within the contract specified drawings.
- Overcrossing structures may serve as support structures for overhead signs. Use of such structures eliminates the need for foundations, sign supports, and protecting barriers along the roadside. However, use of bridges for sign supports depends on the policies of the responsible Authority of the traffic control devices and may not be appropriate for existing bridges that have not been designed with the weight and placement of signage on their facias or structures.

Further information regarding Gantry signs and examples of Gantries and Cantilevers installation details can be found in SHC 403 (Construction of Highways facilities).

3.1.4.3. Mounting signs

- Sign supports **shall** be of a suitable breakaway or yielding design.
- Overhead sign supports are non-breakaway type and **shall** be protected by the appropriate barriers (Refer to SHC 304 (Highway Facilities and Utilities Design – Passive Safety Systems Design).
    - Signposts, foundations, and mountings **shall** be constructed to hold signs in a proper and permanent position (Refer to SHC 403 (Construction of Highway Facilities)).
- Deaths or injuries to road users can be reduced using passively safe signposts in appropriate locations. For passive safety standards, one **shall** refer to SHC 304 (Highway Facilities and Utilities Design – Passive Safety Systems Design)).
- A warning sign, or signs, **shall** not be mounted on the same post with either the Stop or Yield sign. The separation between multiple signs installed on a single post **shall** be as shown in Figure 3-16.
- Signposts *Should* be designed to accommodate the total area of signs attached to them. Purpose made metal posts *Should* preferably be tubular and of uniform diameter along their length.
- Signposts *Should* not project above the top of the sign or a lighting unit. For very large signs, i.e., directional guide signs wider than 4 m, used on high-speed roadways, concrete or steel posts will need to be specially designed. These signs will need to be framed or strongly braced (Refer to SHC 304 (Highway Facilities and Utilities Design - Passive Safety Systems Design)).
- Combinations of signs that may be mounted together *Should* be placed from top to bottom in the following order:
    - Stop or Yield, or any triangular warning sign or signs.
    - Posted speed signs.
    - Other circular signs.
    - Rectangular signs.

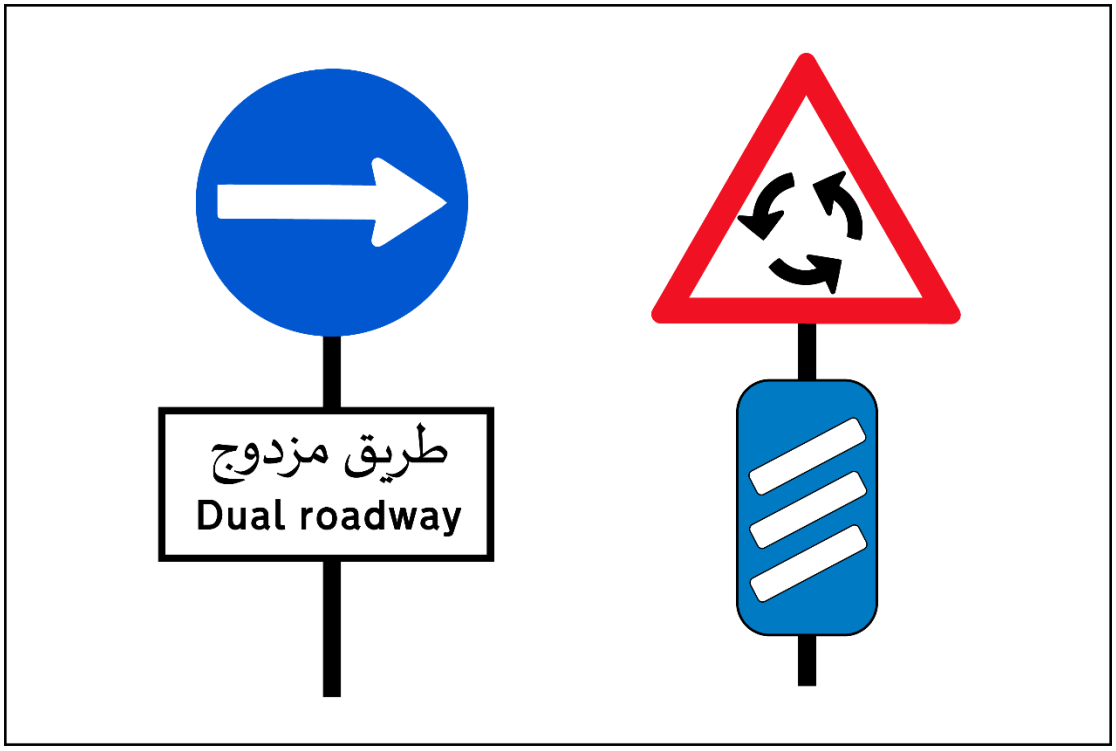


Figure 3-16 Separation between Multiple Signs Installed on a Single Post

- In urban areas, signs may be placed on supports such as traffic signals, streetlights, and utility poles.
- Overhead sign supports **shall** not be erected in gore areas or other exposed locations.
- If a supplementary plate is required for a sign, the combination of sign and plate may be regarded as one sign. However, three signs may be mounted on one post, provided no sign requires a supplementary plate.

3.1.4.4. Lateral and vertical clearance

- Signs *Should* have the maximum practical lateral clearance from the edge of the traveled way, to increase safety of motorists who may accidentally run off the road striking sign supports. Breakaway or yielding supports **shall** be used.
- Normally, signs *Should* not be closer than 2.0 m from the edge of the shoulder or, if no shoulder exists, 3.5 m from the edge of the traveled way. Large Informative signs *Should* be placed preferably 9.0 m or more from the nearest traffic lane. In urban areas, 600 mm is recommended as the minimum clearance from the curb face.
- In many instances, the location of Informative and Warning signs may be shifted to take advantage of existing roadway devices, such as guardrail or overcrossing structures, to minimize the exposure of sign supports to traffic.
- In rural areas, signs erected at the side of the highway **shall** be mounted at a height of at least 1.5 m measured from the bottom of the sign to the nearest edge of the pavement.
- In business, commercial, and residential areas where parking and/or pedestrian movement is likely to occur or the driver's view is obstructed, the clearance between the bottom of the sign and the pavement **shall** be at least 2.0 m.

- On major highways, the advance direction, direction, and confirmation signs (side-mounted) **shall** be erected with the clearance between the bottom of the sign and the pavement being 2.0 m.
- Minimum clearance **shall** be 5.5 m for both gantries and cantilevers signs as provided in SHC 301 (Highway Geometric Design) as well as SHC 310 (Bridges and Tunnels Design).
- Overhead sign supports **shall** not be erected in gore areas or other exposed locations. Where desirable or necessary, impact attenuators *Should* be placed around the base of the overhead sign structure.

3.1.4.5. Position

- A Warning sign **shall** be placed in advance of the condition to which it calls attention.
- A Regulatory sign **shall** be placed where its mandate or prohibition applies or begins.
- Informative sign **shall** be placed, where needed, to keep drivers well informed as to their route and destination.
- Detailed standards for sign locations are given in sections of this Manual dealing with individual signs or classes of signs.

3.1.4.6. Orientation

- For an overhead mounted sign, the sign face **shall** be provided at a 3-degree angle towards the roadway to provide the optimal visibility for approaching traffic (see Figure 3-17).

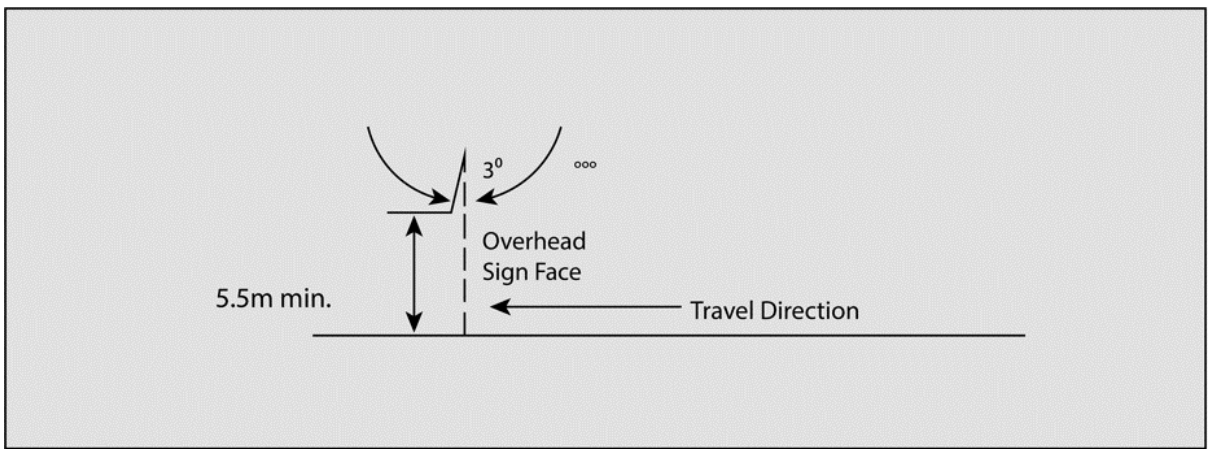


Figure 3-17 Orientation of Overhead Mounted Sign

- Where mirror reflection (specular glare) is encountered, signs *Should* be turned slightly away from the roadway to minimize this effect.
- On a straight length of roadway, the horizontal axis of a sign *Should* be set at an angle of 93 degrees away from the alignment of the right-hand side of the roadway when offset 4.5 to 8.9 m, and at an angle of 87 degrees away from the alignment of the right-hand side of the roadway when offset is greater than 9.0 m (Figure 3-18).

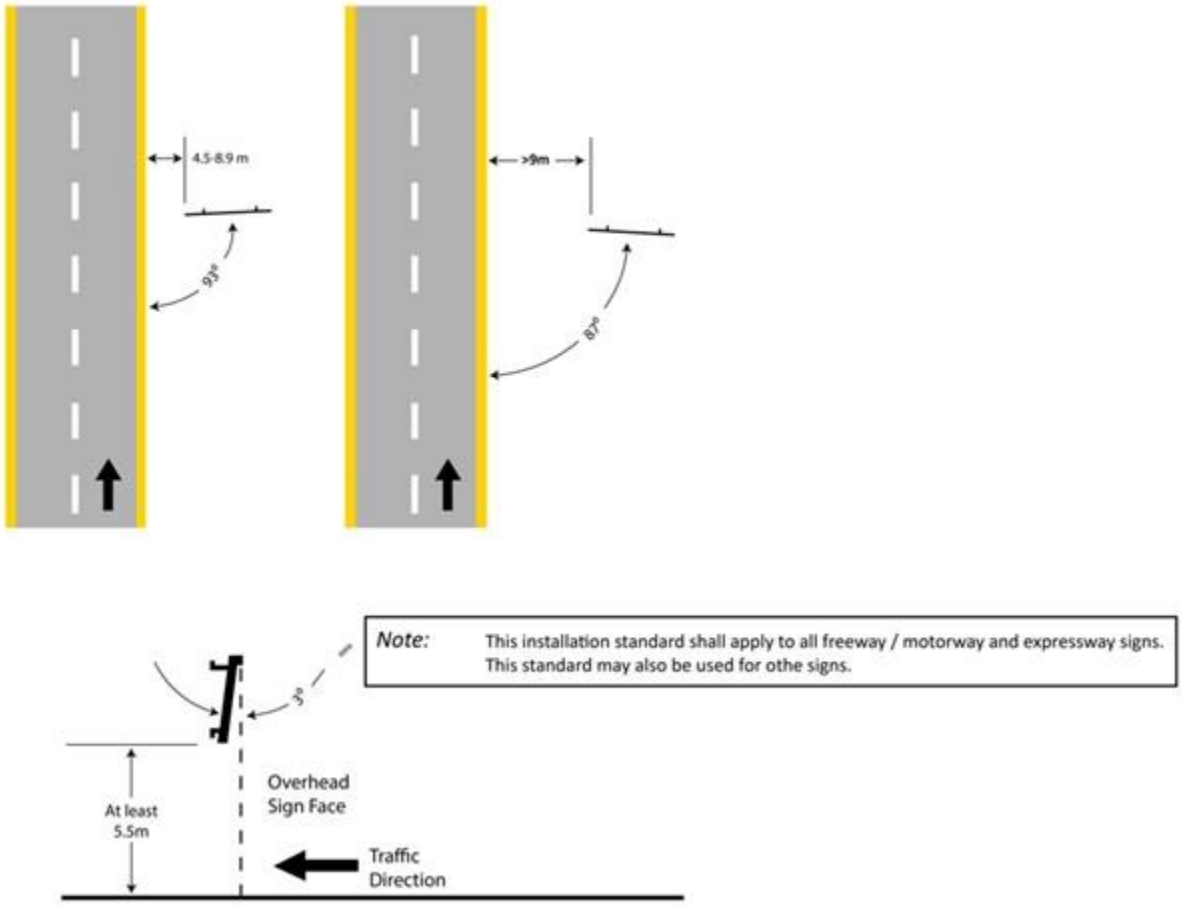


Figure 3-18 Orientation of Sign on Straight Length of Roadway

- Applying this principle on roadways adjacent to each other (e.g., a service roadway next to the highway), can result in the sign being visible by both streams of traffic although the sign is aimed at one.
- Care *Should* be taken that the sign is only visible to the intended traffic stream.
- Generally, for a right-hand curve, a sign *Should* be set 93 degrees to a line tangential to the right-hand edge of the roadway at the point where the sign is erected (Figure 3-19).

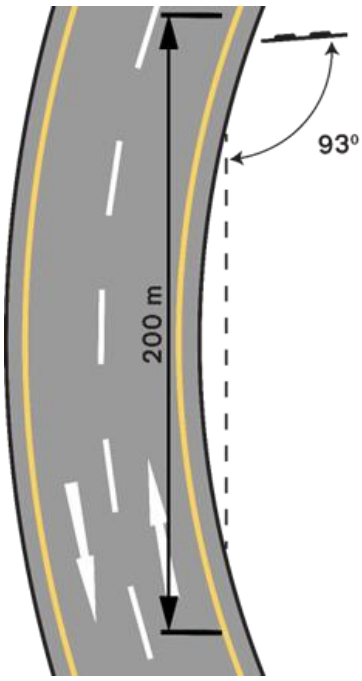


Figure 3-19 Orientation of Sign on a Curved Roadway

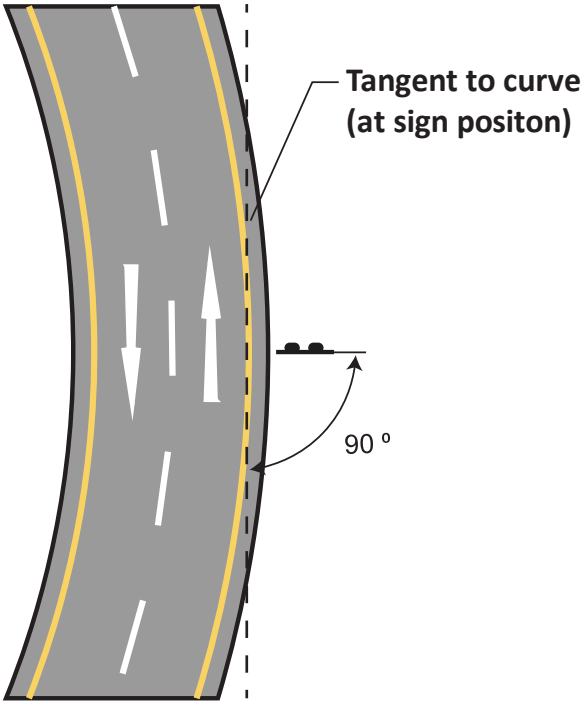


Figure 3-20 Orientation of Sign on a Curved Roadway

- On some curves, compromise solutions may have to be adopted. Generally, for a left-hand curve, a sign *Should* be set at an angle of 90 degrees to a line tangential to the right-hand edge of the roadway at the point where the sign is erected (Figure 3-20).

3.1.4.7. Sign backdrops

When setting up new traffic signs, these points *Should* be considered:

1. The effectiveness of signs may be lost because of their setting. Smaller signs may fail to stand out against either multi-colored or variegated background.
2. Advertisements located near, or behind signs, may prove distracting. Flashing or brightly illuminated advertisements could provide a major distraction for road users so that they miss signs.
    a. In cases where new advertisements have been positioned close to existing signs, it may be possible to relocate the advertising signs to a more suitable location.
    b. In situations where it is not possible to relocate a sign to avoid either a poor or a distracting background, consideration *Should* be given to using a blue or grey backing board of an appropriate size to partially screen the background.

3.1.4.8. Foundations of signs

The foundations of signs will follow the guidelines described in SHC 403 (Construction of Highways).

3.1.4.9. Maintenance

- All traffic signs **shall** be kept in proper position, clean, and legible at all times. Damaged signs **shall** be replaced without undue delay (Refer to SHC 503 (Highway Facilities Maintenance and Management Systems)).
- Weeds, trees, shrubbery, other signs, and parked construction and maintenance equipment and materials **shall** not obstruct sign faces.

3.2. Standard Regulatory Signs

Regulatory signs inform highway users of various restrictions indicating the applicability of legal requirements which would not otherwise be apparent. These signs **shall** be erected whenever needed to fulfill this purpose and **shall** be erected at those locations where restrictions apply. The sign message **shall** clearly indicate the requirements imposed by the restriction and **shall** be easily visible and legible to the vehicle operator. Regulatory signs *may* be accompanied by an informational plate, in Arabic, placed below the symbol sign. These signs are classified in the following groups:

- Right-of-way series (Stop Sign and Yield Sign).
- Speed series.
- Movement and Exclusion series.
- Mandatory series.
- Parking series.

The following Regulatory signs **shall** be round:

1. Speed, Movement, Exclusion and Parking series signs have a black legend on a white background and a red border. A red diagonal slash indicates a total prohibition for the condition illustrated. No red slash indicates only the condition shown.
2. Mandatory series signs have a white legend on a blue background.
3. Special Prohibitions Imposed on Moving Vehicles signs have a black rim containing a dark gray diagonal band and message. The remainder of the background is white.

The exceptions to the standard shape and color are with the Stop sign and the Yield sign. The Stop sign is an octagonal shape having a red background with white border and message. The Yield sign is an equilateral inverted triangle (with one point downward). The background color is white, and the border is red.

All Regulatory signs **shall** be reflectorized or internally illuminated to show the same shape and color, both by day and night. Regulatory signs **shall** meet general dimension criteria presented in Table 3-7 except as noted within the specific sign descriptions below.

When a speed limit sign is reducing the speed limit from a higher value, the lower limit sign **shall** be sized according to the higher speed limit, which is the speed at which the sign will be approached, i.e. the sign size is based on the approach speed not the speed shown on the sign.

Regulatory sign sizes refer to a circle diameter. For the Stop sign the diameter represents an inscribed circle. Lower range of dimensions for 80 km/h speed **shall** be used for arterial or lower classification.

Table 3-7 Regulatory Sign Size Criteria

85th Percentile Approach Speed (km/h)	**Regulatory Sign Size (mm)**	**Attention and Diagrammatic Sign Size (mm)**	**Required Minimum Clear Visibility (m)[1]**
45	600	900 (W) x 1,200 (H)	60
60	750	1,200 (W) x 1,600 (H)	60
80	900	1,200 (W) x 1,600 (H)	75
100	1,200	1,800 (W) x 2,400 (H)	100
100 and above	1,500	2,250 (W) x 3,000 (H)	120
[1]Slender obstructions such as traffic signal posts and lamp columns may be ignored.			

3.2.1. Stop Sign (R1-1)

Stop sign (Figure 3-21 Stop Sign (R1-1)) **shall** be octagonal and **shall** bear the word message, Stop, in Arabic and in English. This sign is intended for use where traffic is required to stop.

A Stop sign *Should* be warranted at an intersection where one or more of the following conditions exist:

1. Intersection of a less important road with a main road where application of the general right-of-way rule is unduly hazardous.
2. Unsignalized intersection on a street having signals at other nearby intersections.
3. Other intersections where a combination of high speed, restricted view, and serious crash record indicate a need for control by the Stop sign.
    a. Stop signs **shall** not be erected at intersections where traffic control signals are operating. Stop signs may, however, be used to control unsignalized, separated right-turn lanes.
    b. Stop signs **shall** not be erected at intersections in a random manner. Allowing Stop signs at such crossings tends to lessen compliance at locations where the signs are completely compatible with the condition they are covering.
    c. Portable or part-time Stop signs **shall** not be used, except for maintenance or emergency purposes.
    d. Stop signs **shall** not be used for speed control.

Figure 3-21 Stop Sign (R1-1)

3.2.2. All Way Supplemental Plate (R1-2SP)

This way of signage for intersections *Should* be avoided and only used for a short period of time until proper control is implemented at the intersection (e.g., traffic signals). The decision to install multi-way stop control (requiring the All Way supplemental plate below each stop sign) *Should* be based on an engineering study. The following criteria *Should* be considered in the engineering study for a multi-way Stop sign installation:

1. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.
2. Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.
3. The vehicular volume entering the intersection from the major street approaches (total of both approaches) meets one or more of the following:
    a. Averages at least 300 vehicles per hour for any 8 hours of an average day; and
    b. Combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour.

4. If the 85th-percentile approach speed of the major-street traffic exceeds 70 km/h, the minimum vehicular volume warrants are 70 percent of the values provided in "3" above.
5. If all criteria in bullets "2" and "3" are found to be 80 percent of the minimum values shown, bullet "4" need not be considered in warranting the Stop or Yield signs.
    a. All Way supplemental plate (R1-2SP) **shall** be mounted below each Stop sign Only at intersections where all approaches are controlled by Stop signs, with the text "All Way" in the equivalent Arabic as well as English (Figure 3-22).
    b. Signs **shall** meet the sign installation requirements of Section 3.1.4.1, meeting at least the minimum clearance requirement for Arterial/Collector/Local routes as stipulated in Section 3.1.4.1.

Figure 3-22 All Way Supplemental Plate (R1-2SP) and the Placement Beneath Stop Sign (R1-1)

3.2.3. Yield Sign (R2-1)

Yield Sign (R2-1, Figure 3-23 Yield Sign (R2-1)) indicates the approaching driver must yield to traffic on other approaches to an intersection. The sign has a unique shape of the inverted triangle and **shall** not require any text to describe its purpose. Vehicles controlled by a Yield sign **shall** stop or slow when necessary to avoid interference with traffic which has the right-of-way. The Yield sign may be warranted:

1. On a minor road at the entrance to an intersection where it is necessary to assign right-of-way to the major road (but a stop is always not necessary) and where the safe approach speed on the minor road exceeds 20 km/h.
2. At roundabouts where traffic in the roundabout has the right of way.
3. At crosswalks (where a supplementary plate indicating pedestrians -see Figure 3-24- or school children crossing is provided, shown as (R2-2SP), and mounted below Yield sign (R2-1).
4. On the entrance ramp to an freeways, expressway, or arterial street or highway, where the entering traffic must merge immediately with oncoming traffic.

5. To control vehicles on a separate or channelized right-turn lane, without an adequate acceleration lane.
6. At any intersection where a special problem exists with merging or traffic conflicts and an engineering study indicates the problem can be corrected by the Yield sign.
7. "Yield" text in Arabic and block English text may be provided as legend in a supplemental plate as needed for motorist understanding of the sign.
    a. Yield sign **shall** be used before marked pedestrian crossings that are not otherwise controlled by Stop sign or traffic signals, and **shall** be used in connection with the pedestrian crossing markings.
    b. Stop or Yield sign may be installed at the entrance to the first roadway of a divided highway, and a Yield sign may be installed at the entrance to the second roadway. At the second crossroad of a divided highway, where the median width at the intersection is 10 m or greater.

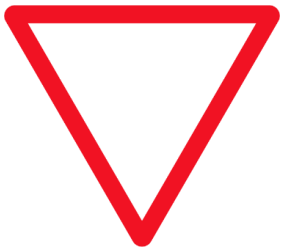


Figure 3-23 Yield Sign (R2-1)

Figure 3-24 Sign R2-1 with Pedestrian Plate (R2-2SP)

3.2.4. Maximum Speed Limit Sign (R3-Series)

The Maximum Speed Limit sign (R3-1, Figure 3-25) **shall** display the limit established by the proper authority, after an engineering and traffic investigation has been made in accordance with established traffic engineering practices. This sign gives notification of a speed limit. A number **shall** appear on the sign to indicate the maximum speed permitted (in km/h) but always ending in numeral zero or five.

- The following factors *Should* be considered to determine the proper numerical value for a speed limit, based on an engineering and traffic investigation:

  - Road surface characteristics, shoulder condition, grade, alignment, and sight distance.
  - The 85th percentile speed and operating speed.
  - Roadside development and culture, and roadside friction.
  - Safe speed for curves or hazardous locations.
  - Parking practices and pedestrian activity.
  - Reported crash experience for a recent 12-month period.

- Exit ramp speed limit signs are intended for use where engineering investigations of roadway, geometric, or operating conditions show the necessity of advising drivers of the maximum recommended speed on an exit ramp. The sign *Should* be posted along the deceleration lane or along the ramp, so that it is visible in time for the driver to make a safe slowing and exiting maneuver. Where an additional speed indication is needed on the ramp well beyond the gore, a standard Warning sign with a Suggested Speed plate is to be used.
- To maximize visibility, numbers **shall** be provided in only Arabic numerals (Western).
- (R3-2) sign shall be used to indicate a speed limit applicable only to passenger vehicles (see Figure 3-26).
- (R3-3) sign **shall** be used to indicate a speed limit applicable only to trucks or to vehicles weighing more than a specified amount (Figure 3-27).
- (R3-4) sign **shall** be used to indicate a speed limit applicable only for Buses (Figure 3-28).
- A combined maximum speed limit sign may be used to indicate a speed limit applicable for private vehicles, buses, and trucks. The sign **shall** have a white border on a blue rectangular background (R3-5, see Figure 3-29).

Figure 3-25 Maximum Speed Limit (R3-1)

Figure 3-26 Maximum Speed Limit for Passenger Vehicle (R3-2)

Figure 3-27 Maximum Speed Limit for Trucks (R3-3)

Figure 3-28 Maximum Speed Limit for Buses (R3-4)

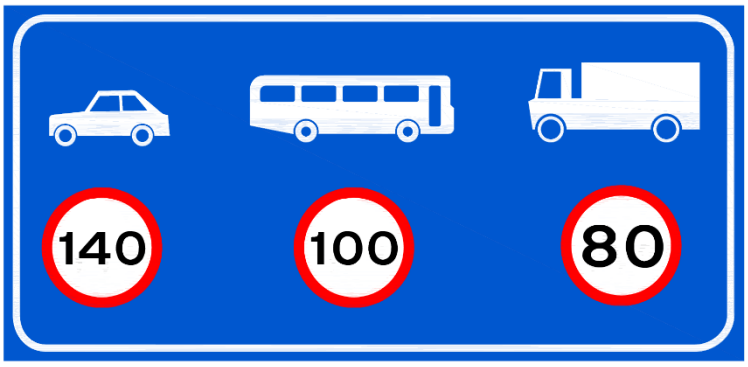


Figure 3-29 Combined Maximum Speed Limit Signage (R3-5)

3.2.5. Night Speed Limit Sign (R3-6N)

Night Speed Limit (Figure 3-30) **shall** be installed only as temporary measure, where it is required, because of existing conditions of the road, mitigating safety at night. The drivers of vehicles **shall** not travel at a speed at night that is above that indicated in kilometers per hour by means of a number on such a sign.

- Sign R3-6N **shall** be a rectangular sign with a black background and white border, of a width identical to the Maximum Speed Limit, below which the sign **shall** be mounted. The speed limit graphic of a white circle with red border and black legend **shall** be provided on the black sign lank. Above the speed limit symbol, Arabic and English text showing "Night" **shall** be provided as white legend.
- The minimum distance above the ground in which the sign is mounted **shall** be 2,000 mm from the bottom of the sign.

- Night Speed Limit sign R3-6N **shall** only be used on unlighted roads as directed by the concerned Authority.
- R3-6N provides a night speed limit applicable as directed by the concerned Authority for unlighted roads, which will be mounted below the Maximum Speed Limit R3-1, where the conditions of night driving (i.e., worn or non-reflective line markings) make the posted speed of the road, unsafe during the night.

Figure 3-30 Night Speed Limit Sign (R3-6N)

3.2.6. Maximum Speed Limit for Highways under Surveillance Sign (R4-Series)

For highways under surveillance, a combined speed limit sign that include photo enforced sign **shall** be used to indicate a speed limit applicable for private vehicles, buses, and trucks. The sign **shall** have a black border on a yellow rectangular background (R4-1, Figure 3-31).

Photo enforced sign can be mounted below a maximum speed limit sign to advise road users that the regulation is being enforced by photographic equipment. If used below the sign, the photo enforced sign **shall** be a square with a black symbol and border on white background (R4-2, Figure 3-32).

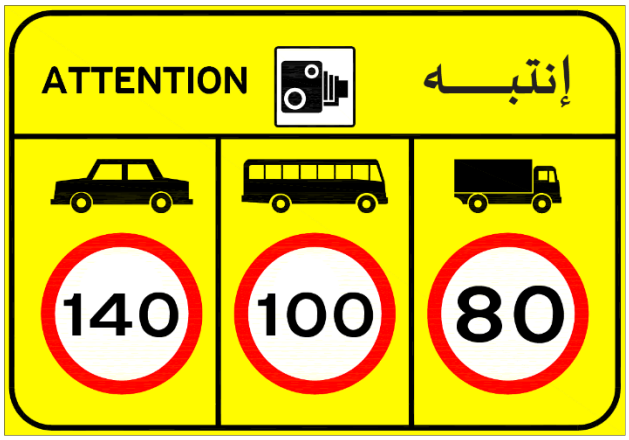


Figure 3-31 Combined Speed Limit Signs with Photo Enforced Sign (R4-1)

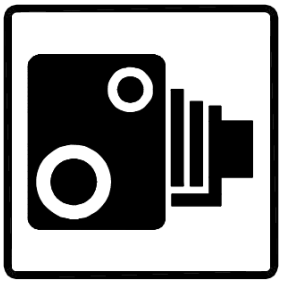


Figure 3-32 Photo Enforced Sign (R4-2)

3.2.7. Truck Speed Limit Sign (R5-Series)

When a special speed limit applies to goods transport trucks or vehicles weighing more than (x) tons on any one axle, the truck limit word message or a similar message **shall** be displayed below the speed limit on the same sign for the goods transport trucks (R5-1, Figure 3-33), and a sign R25-1 **shall** be combined with the truck speed limit for overweight trucks on any one axle (R5-2), as indicated in Figure 3-34.

Figure 3-33 Truck Speed Limit (R5-1)

Figure 3-34 Truck Speed Limit and Vehicles Weighing More Than (x) Tons on Any One Axle (R5-2)

3.2.8. Compulsory Minimum Speed and End of Compulsory Minimum Speed Signs (R6-Series)

This sign is placed at the entrance of the highway notifying drivers to travel at not less than the speed specified (R6-1, Figure 3-35). The End of Compulsory Minimum Speed sign means the compulsory minimum imposed by sign R6-1 is no longer in effect.

- This sign is identical to sign R6-1, except that it **shall** be crossed by an oblique red bar running from the upper right edge to the lower left edge (R6-2, Figure 3-36).

Figure 3-35 Compulsory Minimum Speed Sign (R6-1)

Figure 3-36 End of Compulsory Speed Limit Sign (R6-2)

3.2.9. No Straight, Left Turn, Right Turn, U-Turn and Combination of Left and U-Turn Signs (R7-Series)

The R7-series **shall** be used to give notification that either straight-through movement (Figure 3-37) or turning is prohibited (,left, right, U-turn or both left and U-turns – see Figure 3-38 to Figure 3-41). The turn arrow appears with an oblique red bar. No U-Turn Signs (Figure 3-40) **shall** be used at or between intersections on highways, where such a maneuver is prohibited by regulation.

Figure 3-37 No Straight Through Sign (R7-1)

Figure 3-38 No Left Turn Sign (R7-1L)

Figure 3-39 No Right Turn Sign (R7-1R)

Figure 3-40 No U-Turn Sign (R7-2)

Figure 3-41 No Left Turn and U-Turn Sign (R7-3)

3.2.10. Mandatory Movement (Lane-Use Control) Signs (R8-Series)

Signs **shall** have white symbols on a blue background. Mandatory signs **shall** be placed in the immediate vicinity of the point where the obligation begins and may be repeated if deemed necessary. These signs **shall** indicate the directions to be followed at an intersection.

The Mandatory Movement sign **shall** show a single arrow where a single movement is allowed, a straight-through and left/right/U-turn arrows where either of the referenced movements is permissible and also a left and right arrow where either of the referenced movements is permissible (See Figure 3-42 to Figure 3-49).

Overhead Mandatory Movement signs may be used to illustrate a specific condition which may not be visible to motorists. The Mandatory Movement signs are not to be used for lane control. This control, particularly the multiple-lane turn, is needed where volumes are high and an overhead installation can be justified based on traffic volume, visibility and geometric requirements. Use of an overhead sign for one approach lane does not always mean installation of overhead signs for the other lanes of that approach is needed. A mandatory movement (R8) sign face is shown with the lane in which the mandatory movement is required. When post-mounted Mandatory Movement signs are used approaching intersections, one sign (i.e., R8-1L or R8-1R) *Should* be placed at the intersection.

A lane control sign (see below) *Should* be placed at an adequate distance in advance of the intersection so motorists can select the appropriate lane before encountering the back of a typical traffic queue at the particular location. This *Should* typically be no less than 150 m prior to the intersection. Roadway arrow markings *Should* be used to supplement post-mounted signs and may be used with overhead signs.

Figure 3-42 Mandatory Straight-through Movement Sign (R8-1)

Figure 3-43 Mandatory Movement Towards Left Sign (R8-1L)

Figure 3-44 Mandatory Movement Towards Right Sign (R8-1R)

Figure 3-45 Mandatory U-Turn Movement Sign (R8-2)

Figure 3-46 Mandatory U-Turn or Movement Towards Sign (R8-3)

Figure 3-47 Mandatory Movement Towards Right or Left Sign (R8-4)

Figure 3-48 Mandatory Straight-through or Towards Left Movement Sign (R8-5L)

Figure 3-49 Mandatory Straight-through or Towards Right Movement Sign (R8-5R)

3.2.11. Mandatory U-Turn Sign (R8-2) with Supplementary Plate (R8-2SP)

1. Sign R8-2 **shall** be used where it is necessary to notify the driver of a vehicle on a dual carriageway that a U-turn from the location where the sign is posted may be make.
2. U-TURN sign R8-2 **shall** be located on the median on the near side next to the leftmost lane.
3. Sign R8-2 **shall** be augmented by a Qualification Plate showing a goods vehicle (truck) symbol and red prohibition slash if the U-Turn permission specifically excludes trucks. In this application, the Qualification Plate (Sign R8-2SP) **shall** be mounted directly under it (see Figure 3-50).

Figure 3-50 Combination Sign R8-2 / Qualification Plate R8-2SP (U-Turn Permitted Except for Goods Vehicles (Trucks))

3.2.12. Advance Lane Control Signs (R9-Series)

R9-series signs **shall** be used to provide advance assignment of travel lanes as follows:

- R9-1 may contain a large number of variants, but generally refers to the lane use in advance of an intersection, and shows which lanes are to be used for mandatory turning movements. An example is shown in Figure 3-51.
- R9-2 is used for lane control on freeways with specific restrictions on goods vehicles and/or buses. An example is illustrated in Figure 3-52.
- R9-3 is used for defining an additional lane on freeways where specific lanes branch off for lane drops and exits ahead (see Figure 3-53).

Figure 3-51 Typical Application of Advance Lane Use Ahead of an Intersection with Multiple Route Options (Sign R9-1)

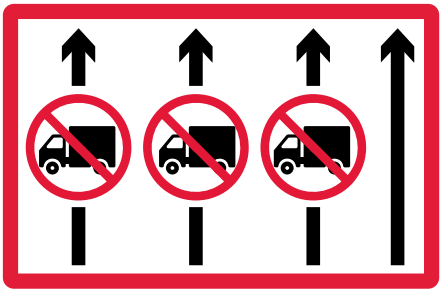


Figure 3-52 Typical Application of Lane Use Restriction Signage (Sign R9-2) Showing All Lanes Ahead with Specific Restrictions (e.g., for Goods Vehicles) Shown Using a No Entry to Goods Vehicle (R16-7) Sign Face Atop Those Lanes Where Such Vehicles are not Permitted

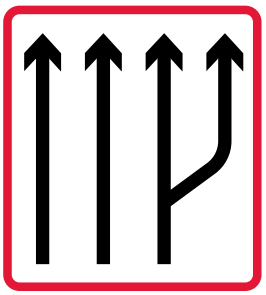


Figure 3-53 Sign R9-3 - Example of Additional Lane Operations Downstream Sign

3.2.13. Advance Intersection Lane Control Sign (R10-series)

Advance Intersection Lane Control (R10-1, R10-2, and R10-3 -see Figure 3-54, Figure 3-55 and Figure 3-56-) signs may be used to indicate the configuration of all lanes ahead.

- Where three or more approach lanes are available to Traffic, Advance Intersection Lane Control (R10 series) signs, if used, **shall** be post-mounted in advance of the intersection and **shall** not be mounted overhead.
- The word messages ONLY, OK, THRU, ALL, or HOV 3+ may be used within the border in combination with the arrow symbols of the R10 sign series. The HOV x+ (P28-1) supplemental plaque may be installed at the top outside border of the R10-1 sign over the applicable lane designation on the sign. The diamond symbol may be used instead of the word message HOV. The minimum allowable vehicle occupancy requirement may vary based on the level established for a particular facility.
- An Advance Intersection Lane Control sign may be repeated closer to the intersection for additional emphasis.
- If used, an Advance Intersection Lane Control sign *Should* be placed at an adequate distance in advance of the intersection so that road users can select the appropriate. If used, the Advance Intersection Lane Control sign *Should* be installed either in advance of the tapers or at the beginning of the turn lane.

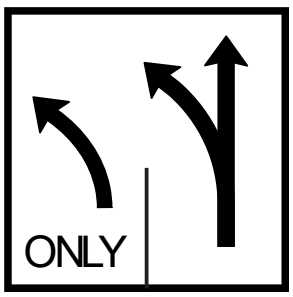


Figure 3-54 Advance Intersection Lane Control Sign (R10-1)

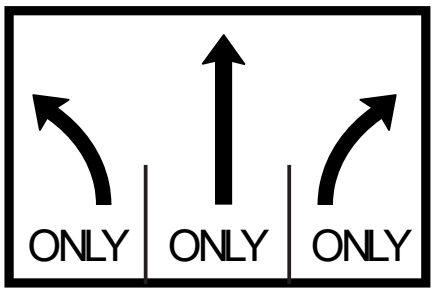


Figure 3-55 Advance Intersection Lane Control Sign (R10-2)

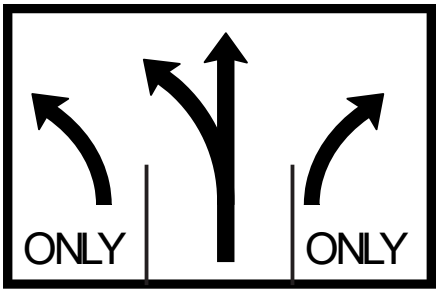


Figure 3-56 Advance Intersection Lane Control Sign (R10-3)

3.2.14. Overtaking Prohibited Sign (R11-1)

This sign **shall** be used to give notification of the general rules on overtaking established by the regulations of the Kingdom of Saudi Arabia. In addition, it shows that the overtaking of power-driven vehicles other than two-wheeled mopeds and two-wheeled motorcycles without side cars is prohibited. Silhouettes illustrate two vehicles side by side, the one on the right side in black and the other on the left side (passing side) in red (see Figure 3-57).

Figure 3-57 Overtaking Prohibited (R11-1)

3.2.15. Overtaking by Trucks Prohibited Sign (R12-1)

This sign **shall** be used to give notification that trucks are prohibited from overtaking other vehicles. Silhouette illustrates two vehicles side by side, a smaller vehicle and a truck. The small vehicle on the right side is in black, and the truck on the left side (passing side) is in red (Figure 3-58).

Figure 3-58 Overtaking by Trucks Prohibited Sign (R12-1)

3.2.16. Priority for Oncoming Traffic Sign (R13-1)

This sign, which is depicted in Figure 3-59, **shall** face traffic which does not have priority. It **shall** mean that entry into the narrow section is regulated so long as it is possible to pass through that section without requiring oncoming vehicles to come to a stop.

- The arrow indicating the direction having priority **shall** be black and appear larger and thicker, and the arrow indicating the other direction **shall** be red.
- On a narrow section of road where passing is difficult or impossible, traffic may have to be regulated. If drivers can clearly see the whole length of the section, by night and day, such regulations may be carried out by giving a priority to traffic moving in one direction rather than by installing traffic signals.

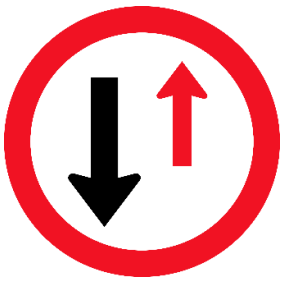


Figure 3-59 Priority for Oncoming Traffic (R13-1)

3.2.17. Trucks Keep Right Sign (R14-Series)

If an extra lane has been provided for trucks and other slow-moving traffic, a Slower Traffic Keep Right (R14-1) sign (Figure 3-60), Trucks Keep Right Sign (R14-2) sign (Figure 3-61), or other appropriate sign **shall** be installed at the beginning of the lane.

- The Trucks Keep Right (R14-2) sign may be used on multi-lane roadways to reduce unnecessary lane changing.
- If an extra lane has been provided for trucks and other slow-moving traffic, a Lane Ends sign *Should* be installed in advance of the point where the extra lane ends. Appropriate pavement markings *Should* be installed at both the upstream and downstream ends of the extra lane.

Figure 3-60 Trucks Keep Right Sign (R14-1)

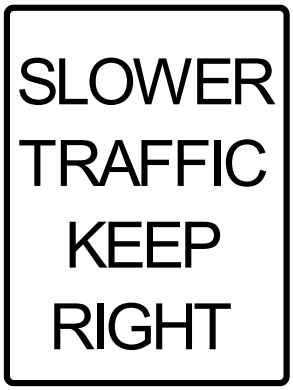


Figure 3-61 Slower Traffic Keep Right Sign (R14-2)

3.2.18. Pass This Side Sign & Pass Either Side Sign (R15-series)

R15-series signs (Figure 3-62, Figure 3-63 and Figure 3-64) **shall** be placed on an island or before an obstacle on the highway, requiring that vehicles must pass on the sides of the island or obstacle indicated by the arrow(s).

- These signs **shall** have a standard size of at least 900 mm on local roads. On expressways and arterial highways, the size **shall** be 1,200 mm. A smaller size of 600 mm is permissible for use on narrow medians at median openings to serve entering cross traffic and to remind drivers of the regulation.
- These signs *Should* be used at the ends of medians, parkways, loading islands, refuge islands, traffic islands, and at underpass piers where traffic is required to keep to the right (or left).
- On a median, the Pass This Side or Pass Either Side signs *Should* be mounted not more than 15 m beyond the approach end. On a pedestrian island or intersection channelizing island, it *Should* be mounted at the approach end or as close as practicable. The sign *Should* be mounted on the face of or just in front of a pier or other obstruction in the center of the roadway.
- The Pass This Side or Pass Either Side signs may not always be necessary at intermediate ends of divisional islands, and medians. A certain amount of flexibility must be allowed in the mounting height for Pass this Side or Pass Either Side signs.

- Where the obstruction is in or so near the lane of traffic that a sign at a normal minimum height may be normally obscured by vehicles, a second sign of the same design may be mounted above the standard sign with its bottom edge at a height of 2.5 to 3 m above the pavement. In this case the lower sign may be placed somewhat below the normal minimum height.
- A Pass This Side sign with the arrow pointing downward and left may be used.

Figure 3-62 Keep Right of the Obstacle (R15-1)

Figure 3-63 Keep Left of the Obstacle (R15-2)

Figure 3-64 Pass Either Side (R15-3)

3.2.19. Entry Prohibited Sign (R16-1)

This sign, which is shown in Figure 3-65, gives notification that entry by all vehicles is prohibited. To prohibit traffic from entering a restricted road section, the Entry Prohibited sign Should be conspicuously placed in the most appropriate position at the exit from a one-way roadway or ramp. The sign Should normally be mounted on the right- hand side of the roadway, but a second sign on the left-hand side of the roadway may be justified for additional emphasis.

- This sign **shall** be a red disk (circle) with a white horizontal bar.
- This sign gives notification that entry by all vehicles is prohibited.
- Where the sign faces through traffic, it **shall** be preceded by an Advance Road Closed Warning sign, and if applicable, an Advance Detour Warning sign.
- The Entry Prohibited sign Should be used to mark roads closed to all traffic (except authorized vehicles) because of work area operations or a temporary emergency. It Should not be used where traffic is maintained, or a route is detoured several kilometers in advance of the actual construction or blockage.

Figure 3-65 Entry Prohibited Sign (R16-1)

3.2.20. Closed to All Vehicles in Both Directions Sign (R16-2)

This sign is an open circle and bears no symbols. This sign gives notification that all vehicular traffic is prohibited in both directions (Figure 3-66).

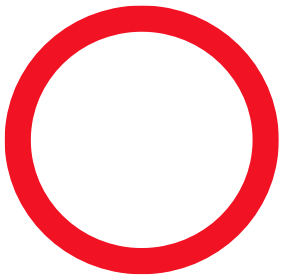


Figure 3-66 Closed to All Vehicles in Both Directions Sign (R16-2)

3.2.21. No Entry to Automobiles (R16-3)

This sign gives notification that automobiles are prohibited on a particular route or access road. Silhouette indicates vehicle whose entry is prohibited (Figure 3-67).

Figure 3-67 No Entry to Automobiles Sign (R16-3)

3.2.22. No Entry by Motorcycles Sign (R16-4)

This sign gives notification that entry by all motorcycles is prohibited. Silhouette indicates vehicle whose entry is prohibited (Figure 3-68).

Figure 3-68 No Entry by Motorcycles Sign (R16-4)

3.2.23. No Entry by Cycles Sign (R16-5)

This sign gives notification that entry by all bicycles is prohibited. Silhouette indicates conveyance whose entry is prohibited (Figure 3-69).

Figure 3-69 No Entry by Cycles Sign (R16-5)

3.2.24. No Entry by Mopeds Sign (R16-6)

This sign gives notification that entry by mopeds is prohibited. Silhouette indicates vehicle whose entry is prohibited (Figure 3-70).

Figure 3-70 No Entry by Mopeds Sign (R16-6)

3.2.25. No Entry by Truck Sign (R16-7)

This sign gives notification that entry by goods vehicles is prohibited (Figure 3-71). Silhouette indicates vehicle whose entry is prohibited. A red slash is used to describe that the vehicles that are prohibited. Specific prohibition criteria may be shown on a supplemental plate beneath the sign using Arabic numerals and SI units which may show the following restrictions:

1. Hours of truck prohibition (if part time) (R17-1SP).
2. Weight limit (typically gross vehicle weight) (R17-2SP).
3. Truck height (R17-3SP).
4. Truck length (R17-4SP):
    a. R-17-series signs may be used in lieu of the R16-7 sign with supplemental plate (see Figure 3-72), particularly if the height restrictions (covered by sign R29-1) and length restrictions (covered by R28-1) would apply to other vehicles, e.g., buses.

Figure 3-71 No Entry to Trucks Sign (R16-7)

Figure 3-72 Example of Supplementary Plates for No Entry to Truck (Supplementary Plates R17-1SP, R17-2SP, R17-3SP, R17-4SP Accordingly)

3.2.26. No Entry by Truck with Trailer (R16-8)

This sign **shall** be used to give notification that entry by any power-driven vehicle drawing a trailer other than a semi-trailer or a single axle trailer is prohibited. Silhouette **shall** be used to

indicate vehicle whose entry is prohibited (Figure 3-73). Specific prohibition criteria may be shown on a supplemental plate beneath the sign using Arabic numerals (western) and SI units which may show the following restrictions:

1. Hours of truck prohibition (if part time).
2. Weight limit (typically gross vehicle weight).
3. Vehicle height.
4. Vehicle length.

A red slash **shall** be used to describe the vehicles that are prohibited.

Figure 3-73 No Entry by Truck with Trailer (R16-8)

3.2.27. No Entry by Inflammable Goods Sign (R16-9)

This sign, as shown in Figure 3-74, prohibits the driver of a vehicle transporting inflammable goods, including inflammable gases in portable cylinders, from proceeding beyond the sign and **shall** be used in advance of any area, such as a bridge or tunnel, where transported inflammable goods represent a particular hazard. The sign **shall** be located on the right of the roadway at the point from which the prohibition is required to apply, and at one of the following:

1. In an advanced location (minimum 500 m from the restriction point), with a SUPPLEMENTAL PLATE (R16-9SP, Figure 3-75) providing a distance to the turnaround or alternate route location.
2. Included as part of a COMBINED RESTRICTION Sign which addresses other restrictions for the roadway, bridge, or tunnel ahead (Figure 3-76).
    - NO INFLAMMABLE GOODS sign R16-9 **shall** have a white background, a black icon, a thick red diagonal line, and a thick red border. The detail of the flame within the truck icon on the legend **shall** be red and yellow.
    - The location of the sign *Should* permit vehicles carrying inflammable goods to take an alternative route, other prohibitions may apply at such places.
    - Appropriate Guide Signs may be used to provide alternate routing information in conjunction with the inflammable goods restriction.

Figure 3-74 No Entry by Inflammable Goods Sign (R16-9)

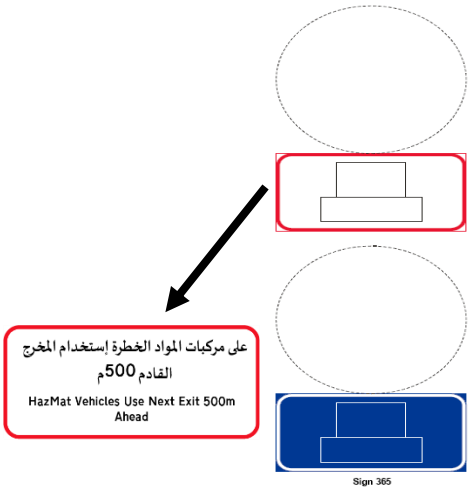


Figure 3-75 Supplementary Plate for No Entry by Inflammable Goods (R16-9SP)

Figure 3-76 Combined Hazard Signs (R30-1)

Further information regarding transporting hazardous materials details can be found in SHC 603 (Road Safety).

3.2.28. No Entry by Taxi Sign (R16-10)

This sign prohibits taxis from proceeding beyond the sign and **shall** be displayed where it is required to prohibit taxi movement or access (Figure 3-77). No Entry by Taxi sign:

- **Shall** have a white background, a black icon, a thick red diagonal line through the icon, and a thick red border.
- *Should* be used in locations where parking and access is set aside for other kinds of vehicles.
- May also be used if a traffic management scheme around transport terminals or modal interchanges requires taxis to be routed in order to separate different classes of vehicles as needed.

Figure 3-77 No Entry by Taxi Sign (R16-10)

3.2.29. No Entry by Pedestrians Sign (R16-11)

This sign **shall** be used to give notification that entry by pedestrians is prohibited. Silhouette indicates a walking pedestrian whose entry is prohibited (Figure 3-78).

Figure 3-78 No Entry by Pedestrians Sign (R16-11)

3.2.30. No Entry by Animal-Drawn Vehicles Sign (R16-12)

This sign **shall** be used to give notification that entry by animal-drawn vehicles is prohibited. Silhouette indicates the type of conveyance and the animal (Figure 3-79).

Figure 3-79 No Entry by Animal-Drawn Vehicles Sign (R16-12)

3.2.31. No Entry by Handcarts Sign (R16-13)

This sign **shall** be used to give notification that entry by handcarts is prohibited. Silhouette indicates the general type of cart (Figure 3-80).

Figure 3-80 No Entry by Handcarts Sign (R16-13)

3.2.32. No Entry by Power-Driven Agricultural Vehicles Sign (R16-14)

This sign **shall** be used to give notification that entry by agricultural vehicles is prohibited. Silhouette indicates a tractor or other agricultural vehicles (Figure 3-81).

Figure 3-81 No Entry by Power-Driven Agricultural Vehicles Sign (R16-14)

3.2.33. No Entry by Power-Driven Vehicles Sign (R16-15)

This sign **shall** be used to give notification that entry by power-driven vehicles is prohibited (Figure 3-82). Silhouette indicates the classes of vehicles in this category. Signs showing more than two silhouettes may not be set up outside built-up areas.

Figure 3-82 No Entry by Power-Driven Vehicles

3.2.34. No Entry by Power-Driven Vehicles or Animal-Drawn Vehicles Sign (R16-16)

This sign **shall** be used to give notification that entry by power-driven or animal-drawn vehicles is prohibited (Figure 3-83). Silhouette indicates classes of vehicles and conveyances in this category, Signs showing more than three silhouettes may not be set up in built-up areas.

Figure 3-83 No Entry by Power-Driven Vehicles or Animal-Drawn Vehicles (R16-16)

3.2.35. No Entry by Buses (R16-17)

This sign **shall** be used in locations where road geometrics may not permit bus access, or where parking is set aside for other kinds of vehicles (Figure 3-84). Sign No Entry for Buses (R16-17) may also be used if a traffic management scheme around transport terminals or modal interchanges requires buses to be routed in order to separate different classes of vehicles as needed.

Figure 3-84 No Entry for Buses (R16-17)

3.2.36. Use of Audible Warning Devices Prohibited Sign (R16-18)

This sign, if not placed near the sign identifying the built-up area, **shall** be accompanied by an additional panel showing the distance over which the prohibition applies. Silhouette illustrates a horn device with an oblique red bar (Figure 3-85).

Figure 3-85 Use of Audible Warning Devices Prohibited Sign (R16-18)

3.2.37. One-Way Sign (R18-Series)

One-way signs indicate to drivers of vehicles that the only permitted direction of travel, in the road or portion of road on which they are erected, is in the direction indicated by the arrow on the sign. Signs R18-1, R18-2 and R18-3 (Figure 3-86) may be displayed to indicate directions straight ahead, to the right, or to the left, respectively.

- One-way signs **shall** have a blue background with a white legend and a thin white border.
- When used to indicate the direction of travel in an intersecting street, signs R13-2 and R13-3 **shall** be located on both sides of the intersecting street so that both signs can be seen clearly by drivers on the oncoming approach to the one-way street. For roads indicating one-way straight-ahead travel, Sign R18-1 **shall** be located on the right side of single-lane one-way streets and on both sides of one-way streets with two or more lanes.
- One-Way signs may be used in conjunction with NO ENTRY sign R16-1 in networks of intersecting one-way streets.
- In some situations, Mandatory Movement (R8) signs (see below) may be used in place of or in addition to the R18 One-Way signs to delineate a one-way road system.

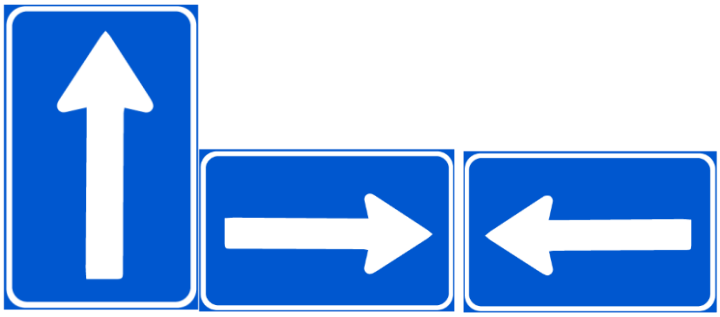


Figure 3-86 One-Way Signs – Straight, Right or Left Way (R18-1, R18-2 and R18-3)

3.2.38. Roundabout Sign (R19-1)

This sign shows the prescribed direction of movement of traffic at a roundabout and **shall** be placed underneath a Yield sign at the entrance to the roundabout when such controls are used (Figure 3-87).

- If the roundabout is signalized, the sign *may* be placed on the right-hand signal pole prior to entering the roundabout, provided it complies with the lateral and vertical positioning requirements set out within this volume.

Figure 3-87 Roundabout Sign (R19-1)

3.2.39. Parking Signs (R20-Series)

(R20-1) and (R20-2) signs indicate where parking is available: on the street, off the street and any parking with special instructions (Figure 3-88).

Prohibited parking signs are installed in areas along a roadway or within a parking area where parking is prohibited. Sign R20-3 (Figure 3-89) **shall** be used to prohibit parking at specific locations along a roadway or parking area.

Figure 3-88 Parking Area Signs (R20-1 and R20-2)

Figure 3-89 Parking Prohibited Signs (R20-3)

3.2.40. Parking for Disabled Persons Signs (R20-5)

- Sign R20-5 **shall** have a blue background, a blue border, and a white icon, as shown in Figure 3-90.
- It **shall** be located on the sidewalk in the center of the length or width of the parking bay.
- In the case of paid waiting parking, a supplementary sign **shall** be added below the main waiting sign to determine the fare through an appropriate text message such as "3 Riyals (SAR) per hour."
- In cases where it is permitted to wait for a specific time of the day rather than all hours of the day, a supplementary sign **shall** be used under the main sign indicating the time limits for the application of the sign.
- In the case of using supplementary panels, the font size for the Arabic language *Should* not be less than 100 mm.

Figure 3-90 Parking for Disabled Sign (R20-5)

3.2.41. Parking Prohibition and Parking Restriction Signs (R21-series)

These signs **shall** be used to identify where parking and stopping is not permitted or is restricted. The signs utilize blue backgrounds with red borders and either a single diagonal (upper left to lower right) line (R21-1 Parking Restriction, see Figure 3-91) or two crossed diagonal lines (R21-2, Parking and Stopping Prohibition, see Figure 3-92).

- The R21-2 prohibits drivers stopping their vehicles unless in an emergency or directed by the Traffic Police.

- The R21-1 sign **shall** be used when the purpose is to prohibit drivers from parking their vehicle at any time along the side of the road in which the sign is mounted except for pick-up or discharge activities.

Example of no stopping zone signage is shown in Figure 3-93. Example of sign regarding no parking zone with enforcement period is illustrated in Figure 3-94.

Figure 3-91 Parking Restriction Sign (R21-1)

Figure 3-92 Parking and Stopping Prohibition Sign (R21-2)

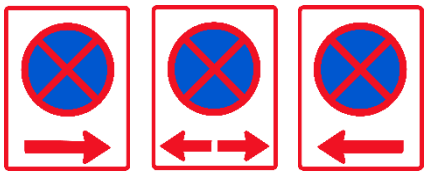


Figure 3-93 No Stopping Zone Signage Example

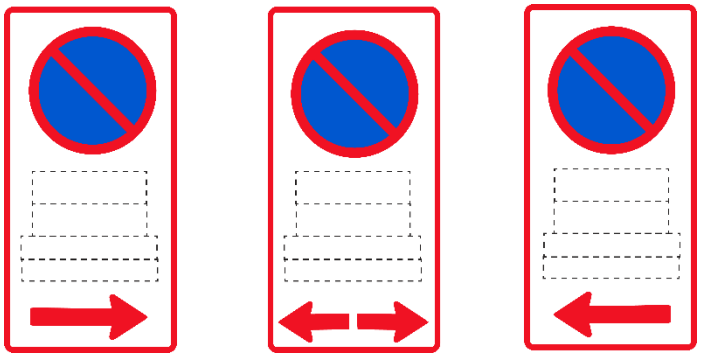


Figure 3-94 Examples of No Parking Zone with Enforcement Period

3.2.42. Clearway and No Stopping Signs (R21-3SP, R21-2)

R21-2 prohibits drivers stopping their vehicles unless in an emergency or directed by the Traffic Police.

- It is provided at the commencement of the Clearway, where it is supplemented by R21-3SP (Figure 3-95), and repeated at intervals not greater than 700 m until the termination of the Clearway, where it is supplemented by plate (End).
- The repeater signs are smaller than the prime signs, as detailed in Figure 3-96. These signs are installed on both sides of the roadway.
- The diameters for both prime and repeater sign in mm is shown in Table 3-8.

Figure 3-95 Clearway Sign (R21-3SP)

Figure 3-96 Clearway and No Stopping Signs (R21-3SP, R21-2)

Table 3-8 Prime Sign Diameter and Repeater Sign Diameter

Prime Sign Diameter (mm)	Repeater Sign Diameter (mm)
600	450
750	600
900	750
1,200	900

3.2.43. Parking Time Limit Signs (R22-Series)

Signs R22-1, R22-2 and R22-3 (Figure 3-97) **shall** be used to denote a parking area that is limited by stay limit (e.g., 2 hours) or by time-of-day it is available for use (e.g., 08:00-21:00). Signs **shall** be located as follows:

- Signs R22-1 and R22-3 **shall** be located at each end of a row of parking bays with the same time limit, with the sign face parallel to the curb line or edge of roadway.

- Sign R22-2 **shall** be located at intermediate intervals between signs R22-1 and R22-3 if there is more than 40 m between the two end signs. For longer parking zones, Sign R22-2 **shall** be located at 40 m intervals.
- Signs **shall** be rectangular (vertical orientation) with green border, with the upper portion of the sign having a blue square with white "P" (parking symbol), the middle portion showing green time limit or stay limit text (Arabic and English), and the lower portion showing a right arrow (sign R22-1), left arrow (sign R22-3), or dual arrows in each direction (Sign R22-2).
- The messages of the PARKING TIME LIMIT signs R22-1, R22-2 and R22-3 may be varied. The duration of stay limit or the time-of-day limit may be omitted if one or other is not appropriate to the circumstances of the parking area.
- For parking that is dedicated for goods vehicles, PARKING TIME LIMIT signs R22-1, R22-2 and R22-3 may be accompanied by the Supplementary Plate R22-1SP (Figure 3-98).

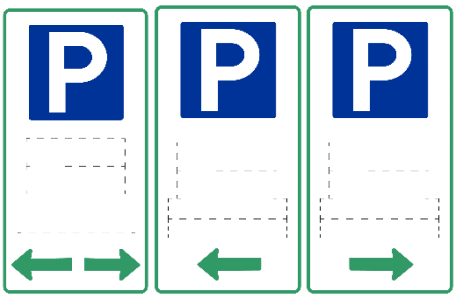


Figure 3-97 Parking Time Limit Sign (R22-1, R22-2, R22-3 Respectively)

Figure 3-98 Supplementary Parking Time Limit Sign (R22-1SP)

3.2.44. No Waiting

Sign R21-1 prohibits waiting at specific locations on the roadway.

- Sign R21-1 **shall** be a single size of 200 mm. Sign R21-1 is used in combination with either sign R20-7SP or sign R20-8SP at locations where waiting is prohibited.
- This sign **shall** be shown in both Arabic and English text.
- In locations where the prohibition of waiting is continuous, the "At any time" legend **shall** be shown on sign R20-7SP and **shall** be erected with sign R21-1 above it.
- This sign **shall** be shown in both Arabic and English text.

- Where waiting is prohibited only during certain hours of the day, days of the week, or for a consecutive number of months, the time restriction that is in force is displayed on sign R20-7SP and **shall** be erected with sign R21-1 above it.
- Signs R21-1, R20-7SP, and R20-8SP **shall** be provided at the end points of the waiting restriction with the sign displaying a single arrow to indicate the direction in which the restriction applies. An example of the use of signs R21-1, R20-7SP, and R20-8SP as shown in Figure 3-99.

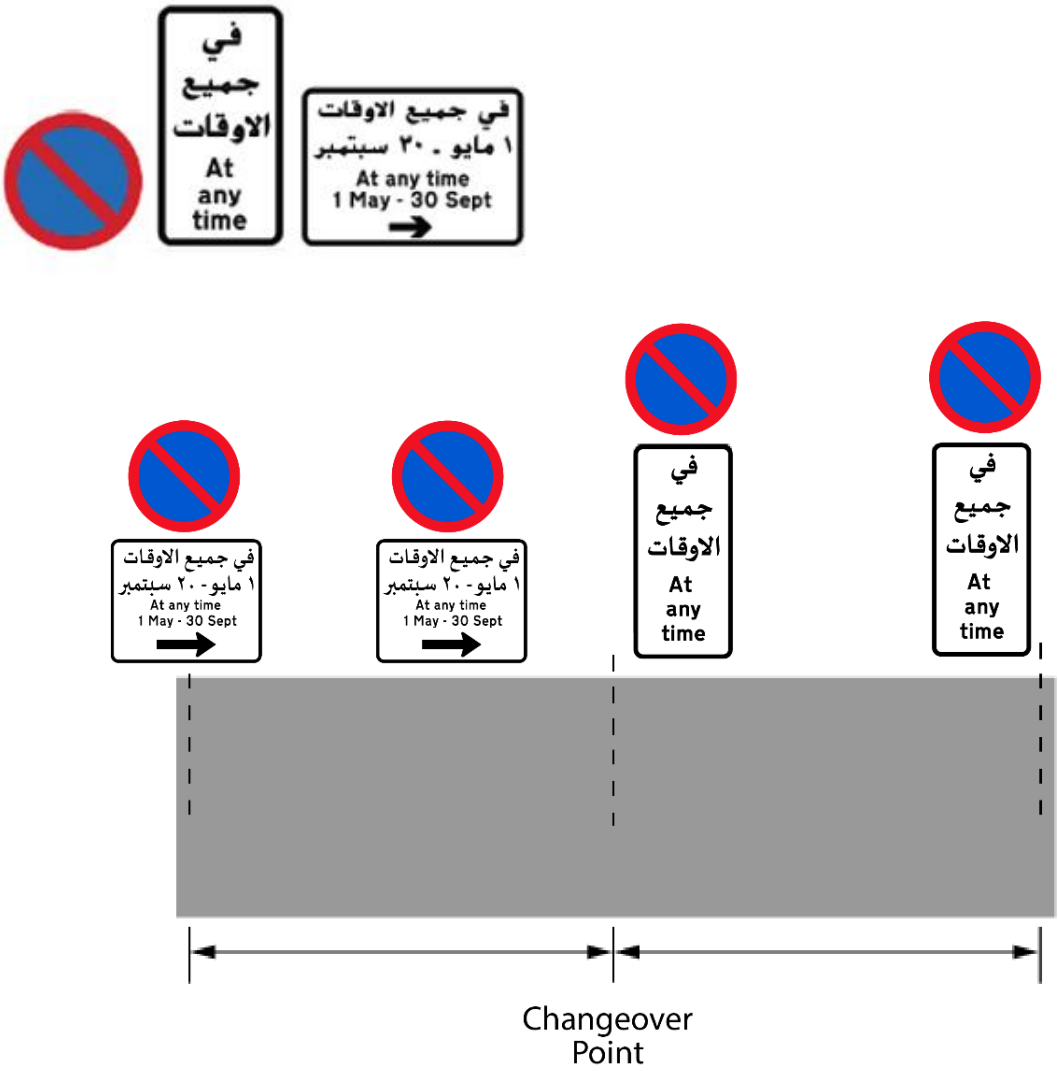


Figure 3-99 Examples of Prohibition of Waiting Signs

3.2.45. Pay-and-Display Parking Signs (R23-Series)

Signs R23-1, R23-2, and R23-3 (Figure 3-100) indicate to drivers of vehicles using the parking area designated by the sign that they *Should* pay the appropriate tariff at the designated payment point and *should* affix the ticket/notice received on the inside of the windscreen of the vehicle so that it can be observed from outside the vehicle applied.

- Signs R23-1, R23-2 and R23-3 **shall** be used to denote pay-and-display parking spaces. Each sign **shall** be located as follows:
    - Signs R23-1 and R23-3 **shall** be located at each end of a row of parking bays served by a "PAY-AND-DISPLAY" payment point, with the sign face parallel to the curb line or edge of roadway. The arrows on the signs will indicate the point from which the "PAY-AND-DISPLAY" criteria applies and will generally point towards the payment point.
    - PAY-AND-DISPLAY PARKING sign R23-2 **shall** be located at intermediate intervals between PAY-AND-DISPLAY PARKING signs R23-1 and R23-3 only if more than one payment point is provided within a row of parking spaces. If this is the case, Sign R23-2 **shall** be provided approximately halfway between the pavement points.
- Signs R23-1, R23-3 **shall** be rectangular (vertical orientation) with green border, with the upper portion of the sign having a blue square with white "P" (parking symbol), the middle portion showing a green-and-blue pay and display graphic, and the lower portion showing a right arrow (sign R23-1), left arrow (sign R23-3), and dual arrows in both directions (sign R23-2). All arrows **shall** be green. The dimensions for these **shall** be as shown in the Standard Drawings.
- Sign R23-2 **shall** be large size regulatory sign that consists of the following elements:
    - A white rectangular sign with turquoise border and turquoise text, along with curb color coding containing the appropriate information.
    - Three levels of parking status as follows:
        - Black/yellow colors to left with text to the right (left-justified for both Arabic and English), stating "No Parking (24 Hours)".
        - Black/turquoise colors to left with text stating "Standard" (indicates normal rates for parking).
        - White/turquoise colors to left with text stating "Premium" (indicates higher rates for parking in prime locations near major building access points) "Paid Parking Hours" heading with hours of service shown below. Depending on location, hours may differ, so that actual hours' display may be a plate insert mounted on top of the sign surface.

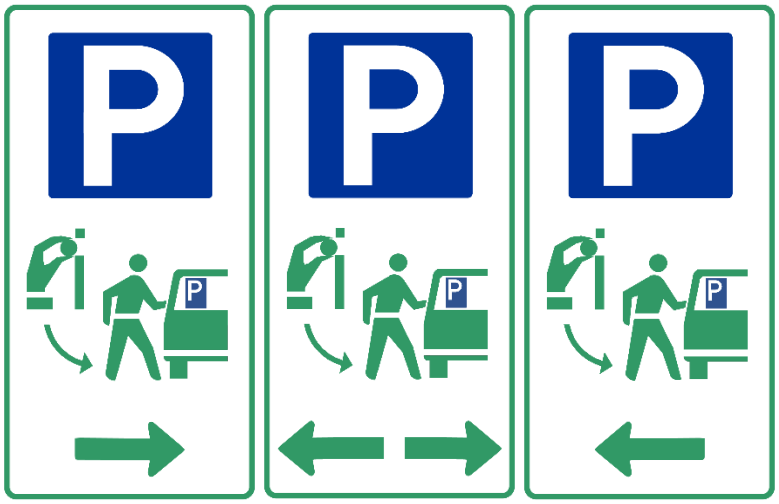


Figure 3-100 Pay-and-Display Parking Signs (R23-series)

3.2.46. Examples of No Stopping / Parking Signage

Figure 3-101 illustrates the configuration of disabled and timed parking schemes within the same city block.

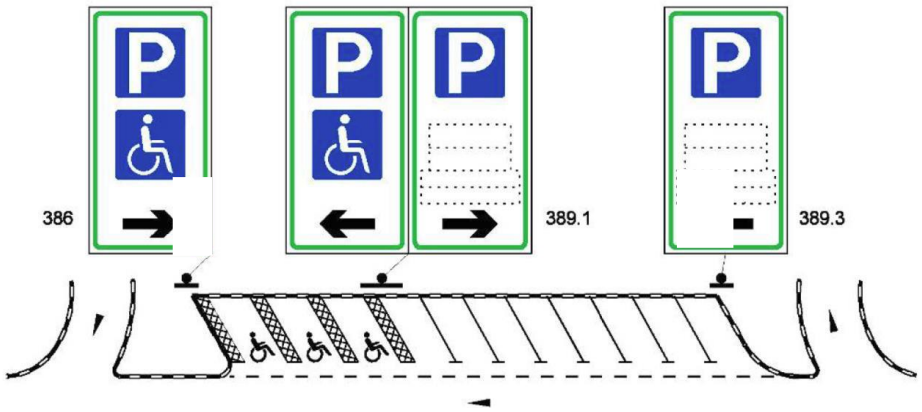


Figure 3-101 Example of Disabled and Timed Parking Schemes

Figure 3-102 illustrates a parking zone of more than 80 m in length, illustrating the use of intermediate parking zone signs as well as No Stopping signs on either side of the parking zone.

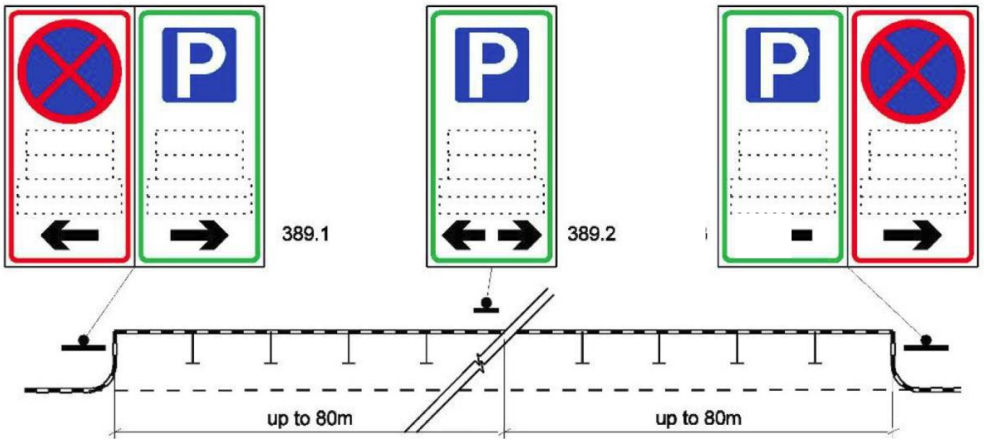


Figure 3-102 Parking Zone 80 m or More with No Stopping Zone on Either Side

3.2.47. Gross Vehicle Weight Restriction (R24-1)

This sign **shall** be used to give notification of prohibition of vehicles exceeding ('x') tons Gross Vehicle Weight (GVW). The sign **shall** illustrate the number of tons and an insignia for tons (Figure 3-103).

Figure 3-103 Maximum Weight Restriction for Vehicles Sign (R24-1)

3.2.48. Axle Weight Restriction Sign (R25-1)

The sign **shall** be used to give notification of prohibition of vehicles having a weight exceeding ('x') tons on any one axle. The sign **shall** illustrate an axle, a downward arrow, the number of tons and an insignia for tons (Figure 3-104).

Figure 3-104 Axle Weight Restriction Sign (R25-1)

3.2.49. Narrow Vehicle Clearance Restriction (R26-1)

This sign **shall** be used to give notification of prohibition of vehicles with widths exceeding ('x') meters (Figure 3-105). The sign illustrates the number of meters, and that the measurement is horizontal. This sign:

- *Should* be placed at entrances to facilities with horizontal clearance restrictions.
- *Should* be placed at each relevant structure with horizontal clearance restrictions.

Figure 3-105 Narrow Vehicle Clearance Restriction Sign (R26-1)

3.2.50. Vehicle Height Restriction (R27-1)

This sign **shall** be used to give notification of prohibition of vehicles with heights exceeding ('x') meters and illustrates the maximum height in meters (Figure 3-106).

- This sign *Should* be placed at entrances to facilities with vertical clearance restrictions, Also, this sign *Should* be placed at each relevant structure with vertical clearance restrictions.

Figure 3-106 Vehicle Height Restriction Sign (R27-1)

3.2.51. No Entry by Vehicles or Combinations of Vehicles Exceeding ('x') Meters in Length Sign (R28-1)

This sign **shall** be used to give notification of prohibition of vehicles or combinations of vehicles exceeding ('x') meters in length (Figure 3-107). The sign **shall** illustrate a vehicle, dimension, and that the measurement is horizontal.

Figure 3-107 Vehicle Length Restriction Sign (R28-1)

3.2.52. Maximum Height Limit for Highways Allowing Overheight Vehicles Sign (R29-1, R30-1)

Maximum Height Limit sign R29-1 **shall** be used only where vehicles exceeding KSA's legal vehicle height limit may use the road on an exceptional basis.

- Sign **shall** be placed where it is known by the owning agency that tall truck traffic may enter the road.
- Sign **shall** be located on both the right and left sides of the roadway.
- The height indicated within the sign **shall** be at least 100 mm less than the actual minimum clearance measured under the structure. The height **shall** be expressed on the sign to the next lowest one decimal place of a meter.
- Maximum Height Limit sign R29-1 *Should* have a white background, a black border, and a black and red legend consistent with sign R27-1.
- Sign R29-1 **shall** not be used as an advance warning sign. The sign **shall** always be preceded by an advance warning or expanded warning / guide sign as needed to assure maximum visibility and driver target value.
- Sign R29-1 incorporates sign R27-1 into a larger sign and includes an iconic symbol and text to increase visibility and reinforce the sign's message.
- Combined Hazard Sign R29-1 may contain up to a specified maximum number of restrictions related to a road, bridge or tunnel facility, along with an English and Arabic text message advising of appropriate action. The specified maximum number of restrictions applicable will be as per the review and approval of the responsible authority (Figure 3-108).

Figure 3-108 Maximum Height Limit for Highways Allowing Overheight Vehicles Sign (R29-1)

- Combined Restriction Sign R30-1 (Figure 3-109) can contain up to a specified maximum number of restrictions related to a road, bridge or tunnel facility, along with an English and Arabic text message advising of appropriate action. The specified maximum number of restrictions applicable will be as per the review and approval of the responsible authority.

Figure 3-109 Example of Combined Hazard Signs (R30-1)

3.2.53. Required Stop at Customs (R31-1)

This sign **shall** be used to give notification of the proximity of a custom house at which a stop is compulsory (Figure 3-110).

- The word "Customs" *Should* appear, preferably in Arabic and English or more languages depending on needs at any given entry point.
- This sign may also be used to notify drivers that passing without stopping is prohibited for other reasons. In these cases, the word "Customs" **shall** be replaced by another brief inscription indicating the reason for the required stop.

Figure 3-110 Required Stop at Customs Sign (R31-1)

3.2.54. Bus Stop Sign (R32-1)

This sign **shall** be used to indicate the location of a bus stop such that other vehicles are precluded from stopping in this location.
The following are the key requirements for installation:

- Bus Stop sign R32-1 (Figure 3-111) **shall** be located at the edge of the sidewalk so that it can be seen by pedestrians and bus drivers (mounted perpendicular to the curb) and *Should* indicate the position for the driver to stop and passengers to queue.
- Where bus bays are used, BUS STOP sign R32-1 **shall** be placed towards the front of the bay such that the bus can pull fully out of the travelled way and that queuing passengers may board the bus at that point.

The following are the key requirements for appearance:

- Bus Stop sign R32-1 **shall** be a white rectangle sign with the following elements:
    - A bus symbol centered at the top of the sign with the text "BUS STOP" bilingual, in Arabic and English, below. Both symbol and text **shall** be in black. A horizontal line separates the symbol from the text as shown in Figure 3-111.

Figure 3-111 Bus Stop Sign (R32-1)

3.2.55. Pick-Up And Drop-Off Sign (R33-1)

This sign (R33-1, Figure 3-112) indicates to drivers of vehicles that the section of roadway designated by the sign is reserved for stopping to drop-off or pick-up passengers and is not to be used as a parking bay.

This sign is typically placed in an area where passengers are dropped off and picked up from a public transport stop, terminal or station. Drivers **shall** not stand in the stopping area for a

longer time than it takes to drop-off or pick-up passengers. If passengers are not waiting they must move on and make the area available to others. The provision of a drop-off and pick-up area requiring the placing of Pick-Up and Drop-Off sign is only likely to occur as an integrated part of the facilities provided to service larger Public Transport terminals.

- Sign **shall** be placed next to a reserved area for drop-off or pick-up of passengers, where no parking or stopping is otherwise permitted.
- Requirements are as follows for installation.
    - Pick-up and Drop-off sign R33-1 **shall** be located at the edge of the sidewalk so that it can be seen by pedestrians and drivers arriving to pick them up (mounted perpendicular to the curb).
    - Sign R33-1 **shall** be placed to indicate the position for the driver to stop to pick-up passenger(s).
    - Sign **shall** be placed towards the front of the bay such that vehicles can pull fully out of the travelled way, where recessed bays are used.
- Sign **shall** be a white rectangular (vertical orientation) shape with red outline, a black passenger pick-up icon on top, and Arabic and English text below that in black indicating "Pick & Drop Only".
- Sign is typically placed in an area where passengers are dropped off and picked up from a public transport stop, terminal or station. Drivers **shall** not stand in the stopping area for a longer time than it takes to drop-off or pick-up passengers. If passengers are not waiting they must move on and make the area available to others.

Figure 3-112 Pick-Up and Drop-Off Sign (R33-1)

3.2.56. Loading Zone Sign (R34-1)

This sign indicates to drivers of vehicles that loading and unloading of freight and goods is permissible for a maximum period of 1 hour, and only in the bay at which the sign is displayed (Figure 3-113). Use of the bay for stopping, standing, or parking other than for loading or unloading constitutes an offence. Sign **shall** be placed next to a reserved area for loading and unloading of freight and goods, where no parking or stopping is otherwise permitted. This may either be a parking bay or may simply be a curbside along the street. The sign **shall** be

used in conjunction with one of the pertinent No Parking signs R20 series signs and *Should* be mounted on the same post underneath the No Parking sign.

- Sign **shall** be located at the edge of the sidewalk, parallel to the roadway, and central to the bay to which it is applicable.
- Sign **shall** be a white rectangular (vertical orientation) shape with red outline, a black goods vehicle icon on top, Arabic and English text below that in black indicating "Loading and Unloading Only", and text below indicating the maximum time limit (again in red), in a smaller font than the Loading and Unloading text.
- Any variations to this sign must have prior approval from the responsible authority.

Figure 3-113 Loading Zone Sign (R34-1)

3.2.57. Taxi Stop Sign (R35-1)

This sign R35-1 indicates to driver of vehicles that the section of roadway designated is reserved for the stopping or standing of taxis only, and that such section of road **shall** not be used by other vehicles. The space reserved by Taxi Stop (Figure 3-114) **shall** not be used for the parking of taxis. This sign may be used in a dedicated lane or bay at a hotel or airport or other popular pickup points. Any variations to this sign must have prior approval from the or responsible authority. This sign:

- **Shall** be placed next to a reserved area for stopping or standing of taxis only, where no parking or stopping is otherwise permitted.
- **Shall** be located at the edge of the sidewalk, parallel to the roadway, and central to the bay to which it is applicable.
- **Shall** be a white rectangular (vertical orientation) shape with red outline, a black taxi icon on top, and Arabic and English text below that in red indicating "Only".

Figure 3-114 Taxi Stop Sign (R35-1)

3.2.58. Bus Lane Signs (R36-Series)

These signs indicate to drivers that a roadway dedicated for the use of buses or an access to a facility so signed is reserved for Public Transport buses only. Such a facility may be a dedicated bus lane, an out of service holding area, a passenger terminus, or a bus station. Although these facilities may be adjacent to the roadway, they are not always part of the road right of way. Notwithstanding this situation, it is appropriate that signs R36-1 through R36-4 (Figure 3-115 and Figure 3-116) be used to regulate access to such facilities.

- Bus lane signs R36-1, R36-2, R36-3 with R36-4 (optional) **shall** define the presence of a lane only open to buses.
- Each of the signs **shall** function as follows:
    - Start of bus lane Sign R36-1 indicates the start of a bus lane on the right (a left-hand bus lane **shall** be indicated by a mirrored image of the sign symbology, which would be known as Sign R38-1L).
    - Bus lane intermediate Sign R36-2 indicates the continuity of the bus lane on the right (a left-hand bus lane **shall** be indicated by a mirrored image of the sign symbology, which would be known as Sign R36-2L).
    - End of bus lane Sign R36-3 indicates the end of a bus lane on the right (a left-hand bus lane **shall** be indicated by a mirrored image of the sign symbology, which would be known as Sign R36-3L).
    - Bus lane Overhead Sign R36-4 may be used in lieu of Sign R36-2 for overhead mounting along the bus lane corridor.
- Installation Requirements are as follows:
    - Sign R36-1 **shall** be placed on the side of the road where the bus lane is to begin, a minimum 200 m from the beginning of the bus lane.
    - Sign R36-3 **shall** be placed a minimum of 200 m from the end of the bus lane.
    - Sign R36-2 is placed at 250 m intervals on arterial routes.
    - Sign R36-4, if used instead of Sign R36-2, **shall** be placed at the beginning of all bus lane facilities.
- Appearance Requirements are as follows:

- Sign R36-1 to R36-3 **shall** utilize blue rectangular signage with white border and white icons/legend showing lane separation and bus symbols, with Arabic and English text below the bus symbol indicating "BUS LANE".
- Sign R36-4 **shall** be a circular blue display with white icons (bus and downward arrow) and with white text between the bus and down arrow in Arabic and English indicating "BUS LANE".
- Sign R36-4 shall be used in conjunction with supplementary plate R36-1SP ("Only") which is illustrated in Figure 3-117. Supplementary plate R36-1SP shall be shown in both Arabic and English text.

- Signs R36-1, R36-2, and R36-3 **shall** be used in conjunction with channelizing line marking and "Bus" exclusive use lane symbol markings and any other relevant pavement markings determined by the detailed design of the bus reservation lane.
- Bus lanes may be located on the right side of the roadway adjacent to the curb line, or on a dual carriageway road they can be located on the left side adjacent to the median provided the service is essentially non-stop, or the median is wide enough to provide stopping places where passengers can be picked-up or dropped off from the right side of the bus.
- The installation of a bus lane required a detailed engineering design based on the specific site criteria and with particular attention to the requirements for traffic signs, pavement markings, and traffic control signals. In general terms sign R36-2 *Should* be positioned once per section of road between intersecting side roads. If these sections are lengthy, signs *Should* be repeated at 250 m intervals. Sign R36-4 *Should* be repeated at approximately 1,000 m intervals on a left side long distance express bus lane on a highway.

Signs R36-1 - R36-4 a facility that is reserved for Public Transport buses only. Such a facility may be a dedicated bus lane, an out of service holding area, a passenger terminus, or a bus station. Although these facilities may be adjacent to the roadway they are not always part of the road right of way. Notwithstanding this situation, it is appropriate that signs R36-1 through R36-4 be used to regulate access to such facilities.

Figure 3-115 Bus Lane Signs (R36-1, R36-2 and R36-3)

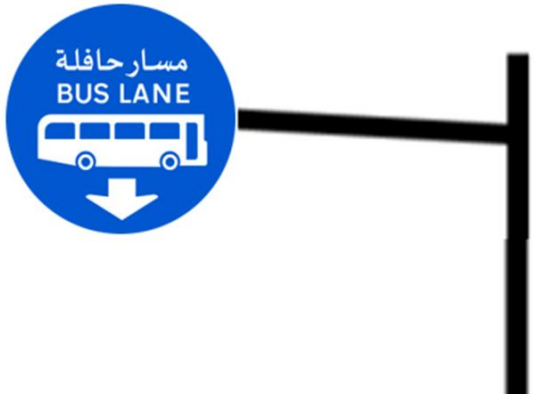


Figure 3-116 Bus Lane Sign (R36-4)

Figure 3-117 Supplementary Plate Sign (R36-1SP)

3.2.59. Entering Neighborhood Sign (R37-1)

Sign R37-1 (Figure 3-118) indicates to drivers of vehicles that they are entering a residential area with pedestrians, including children, and that specific regulations apply. Sign R37-1 *Should* not be installed along through routes which have higher speed limits than typically allowed in the neighborhood as well as reduced restrictions on trucks. The intent of these signs is to discourage traffic (including commercial traffic) through local neighborhoods, unless the driver has a particular residence or justification for being in the neighborhood. This sign **shall** denote the start of a residential, high-pedestrian area with particular vehicle and operating restrictions.

- The following regulations **shall** apply when the subject sign is posted:
    - No goods movements through neighborhood except for local access or delivery.
    - Pedestrians and children in the roadway have right-of-way.
    - Posted Speed 40 km/h or less.
    - Traffic calming tools such as speed humps and mini roundabouts may be found within the neighborhood without prior advance warning signage.
    - Cannot enter the area by vehicle and drive through the area to exit at another point without breaking their journey.
- Sign **shall** be displayed on the right side of all points of access to all residential areas as declared by the responsible agency for the purposes of neighborhood traffic control.
- Sign **shall** have a white background with a black icon and border.

Figure 3-118 Entering Neighborhood Sign (R37-1)

3.2.60. End of All Special Prohibitions Imposed on Moving Vehicles Signs (R38-Series)

The R38-series signs **shall** be used and placed at the point where all special prohibitions imposed on moving vehicles by prohibitory signs cease to apply.

- The sign **shall** have a black rim and bear a diagonal band sloping downward from right to left consisting of parallel black lines. Examples of these signs for ending special prohibitions are shown in Figure 3-119.

Figure 3-119 End of Prohibitions Signs (R38-Series)

3.2.61. Cycle Lane or Path Sign (R39-1)

This sign **shall** be placed at the entrance to a cycle path to notify cyclist they must use the path and **shall** be used to signify the use of a lane reserved for bicyclists only and that *Should* not be used for driving or parking by motor vehicles except where directed by Police or in an emergency where fire and rescue vehicles currently in service need to be provided with adequate clearance to pass other traffic (Figure 3-120).

Figure 3-120 Cycle Lane or Path Sign (R39-1)

3.2.62. Cyclists Dismount (R40-1)

Sign R40-1 *Should* be used where it is necessary to remind cyclists that they are required to dismount when crossing a roadway at an uncontrolled marked pedestrian crossing or a marked pedestrian crossing at a traffic signal (Figure 3-121).

- Sign R40-1 *Should* be located on the right side of the bicycle path at the position where cyclists are required to dismount.
- Sign R40-1 *Should* be used sparingly to reduce sign clutter.
- Sign R40-1 **shall** be shown in both Arabic and English text.

Figure 3-121 Cyclists Dismount Sign (R40-1)

3.2.63. Sign End of Cycle Route (R40-2)

Sign R40-2 marks the location of the end of a cycle route (Figure 3-122).

- R40-2 *Should* be located on the right side of the cycle route at the point where the path ends.
- R40-2 **shall** be in Arabic and English text.

Figure 3-122 End of Cycle Route Sign (R40-2)

3.2.64. Cycles crossing (R40-3)

If bicycle paths cross a roadway, sign R40-3 may be used (Figure 3-123). A distance to the hazard and, where appropriate, an arrow showing the direction of the hazard may be added to the sign.

Figure 3-123 Cycles Crossing (R40-3)

3.2.65. Cycle Route Crossed by Pedestrians (R40-4, R40-5, R40-6)

Signs R40-4, R40-5 and R406 are going to be used where a footpath crosses a cycle route and warns pedestrians that they are about to cross a cycle route (Figure 3-124).

- The text on the sign may be varied to show "LOOK RIGHT" or "LOOK LEFT".
- R40-4 – R40-6 signs *Should* be located on the right side of the pedestrian footway.
- R40-4 – R40-6 signs **shall** be shown in both Arabic and English text.

Figure 3-124 Cycle Route Crossed by Pedestrians (R40-4, R40-5 and R40-6)

3.2.66. Foot Path Sign (R41-1)

This sign **shall** be placed at the entrance to a foot path, notifying pedestrians they must use the path. It also notifies other road users they are not allowed to use the path (Figure 3-125).

Figure 3-125 Foot Path Sign (R41-1)

3.2.67. Path for Riders on Animals Sign (R42-1)

This sign **shall** be placed at the entrance of a path used by animal riders only and notifies other road users they are not permitted to use that path (Figure 3-126).

Figure 3-126 Path for Riders on Animals Sign (R42-1)

3.2.68. Shared or Separated Paths (R-43 series)

Figure 3-127 designates a shared path for cyclists and pedestrians and *Should* be placed at the start of the shared path and *Should* be repeated at regular intervals along the length of the path. For the shared paths repeater signs, a smaller sign size (i.e., 150 mm, 270 mm, or 300 mm) may be used.

Figure 3-128 shows two paths separated by road marking and *Should* be placed at the start of the separated path and *Should* be repeated at regular intervals along the length of the path. For the Separated path repeater signs, a smaller sign size (i.e., 150 mm, 270 mm, or 300 mm) may be used. The sign on Figure 3-128 shows the bicyclist to the left; a sign in the opposite direction would present a mirror image (i.e., bicyclist on the right). Signs with Alternative Pedestrian Symbology are shown in Figure 3-129.

Figure 3-127 Shared or Separated Paths Signs Accordingly (R43-series)

Figure 3-128 Shared or Separated Paths Signs Accordingly (R43-series)

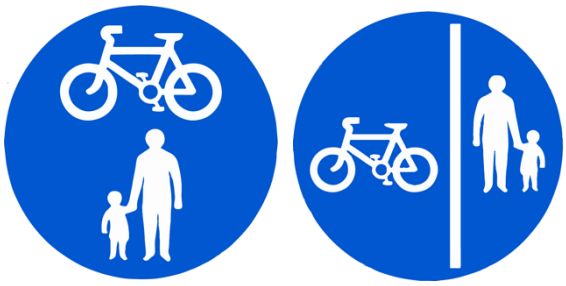


Figure 3-129 R43-Series Signs with Alternative Pedestrian Symbology

3.2.69. No Loading (R44-1SP, R44-2SP)

Sign R44-1SP is used for a 24-hour prohibition, where there is a loading prohibition. If the prohibition only applies for part of the day, the legend includes the time during which the loading restriction applies.

- Where the loading restriction extends for a distance greater than 50 m, the signs **shall** be repeated at intervals of no more than 25 m. Intermediate signs, **shall** include a double arrow.
- The character size of sign R44-1SP and its variant *Should* have an aleph-height of 34 mm (x-height 20 mm). The character size of sign R44-1SP and its variant *Should* have an aleph-height of 34 mm (x-height 20 mm). These signs are mounted parallel to the curb (Figure 3-130). An example of the use of signs R44-1SP and R44-2SP is shown in Figure 3-131.

Figure 3-130 No Loading Sign (R44-1SP and R44-2SP Respectively)

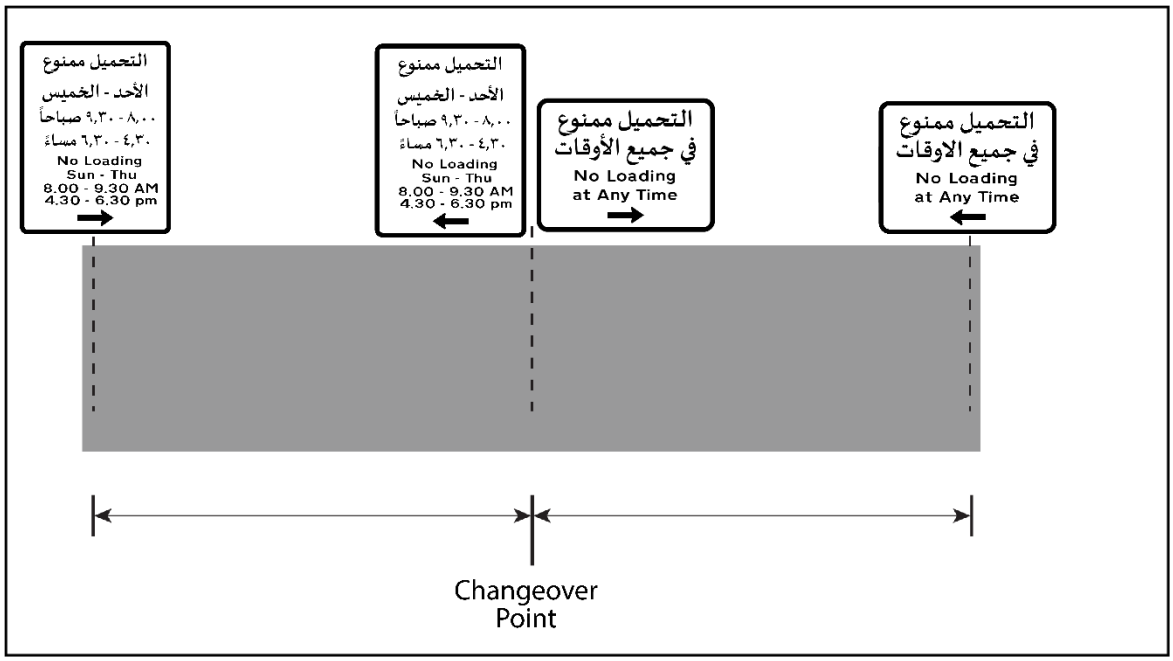


Figure 3-131 Example of Prohibition of Loading Signs

3.2.70. Prohibition of Waiting on Verge or Footway (R44-3SP)

Sign R44-3SP is used in combination with sign R21-2 in certain situations where it is required to prohibit waiting on the verge or footway (Figure 3-132). This sign may indicate "verge," or "footway," or both.

- Sign 44-3SP must be provided at the end points of the waiting restriction, with the signs mounted parallel to the curb. Repeater signs *Should* be provided every 60 m. This sign **shall** be shown in both Arabic and English text.
- The character size of sign 44-3SP *Should* have an aleph-height of between 34 mm (x-height 20 mm) and 68 mm (x-height 40 mm) for signs located on verges and on high-speed roadways.

Figure 3-132 Prohibition of Waiting on Verge or Footway Sign (R44-3SP)

3.2.71. No Waiting Except Taxis, Ambulances, or Police Vehicles (R44-4SP)

Sign R44-4SP (see Figure 3-133) is used in combination with sign R21-2 where the exception for taxis applies for only part of the period that waiting is prohibited. The time period shown on the sign may be varied or omitted. The word "taxis" shown on the sign may change to "ambulances" or to "police vehicles."

- Sign R44-4SP must be provided at the end points of the waiting restriction, with the signs mounted parallel to the curb. Repeater signs *Should* be provided every 60 m.
- This sign **shall** be shown in both Arabic and English text. The character size of sign R44-4SP *Should* have an aleph-height of 34 mm (x-height 20 mm).

Figure 3-133 No Waiting Except Taxis, Ambulances or Police Vehicles Sign (R44-4SP)

3.2.72. No Waiting by Trucks and Buses (R44-5SP, R45-1SP, R45-2SP)

Sign R44-5SP (see Figure 3-134) gives effect to the prohibition of waiting by any truck with a maximum gross weight shown on the sign (e.g. 5T). For the prohibition of waiting by trucks and buses, sign R44-5SP is used in combination with R21-2 and supplementary plate R45-1SP for trucks and R45-3SP for buses accordingly. The time periods shown on the sign may be varied.

- Where the prohibition applies to buses, the supplementary plate R45-2SP for buses **shall** be used or substituted for supplementary plate R45-1SP for trucks.
- Sign R44-5SP **shall** be provided at the end of the waiting restriction, with the signs mounted parallel to the curb. Repeater signs *Should* be provided every 60 m.

- R21-2 *Should* be mounted directly above supplementary plates R45-1SP or R45-2SP (supplementary plates are shown in Figure 3-135). Sign R44-5SP *Should* be mounted directly below the combination of sign R21-2 and supplementary plate R45-1SP or R45-2SP. This sign **shall** be shown in both Arabic and English text. The character size of sign 44-5SP *Should* have an aleph-height of 34 mm (x-height 20 mm).

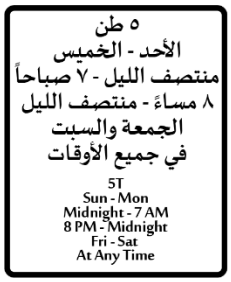


Figure 3-134 No Waiting by Trucks and Buses Sign (R44-5SP)

Figure 3-135 Supplementary Plates (R45-1SP, R45-2SP)

3.2.73. Tow Away Zone (R46-1SP)

Figure 3-136 is used where there is a requirement to indicate a tow away area, for example, where there is a prohibition of waiting or loading or on a clearway where drivers are not permitted to stop their vehicle.

- Sign (R46-1SP) *Should* be located on the right side of the roadway close to commencement of the tow away zone.

Figure 3-136 Tow Away Zone Sign (R46-1SP)

3.2.74. No Blocking Intersection Sings (R47-Series)

R47-1 and R47-2 indicate that blocking an intersection is prohibited (Figure 3-137). This sign may be placed in advance of intersections to notify drivers that they *Should* not enter the intersection until the queue on the receiving lane has cleared.

- This signage *Should* only be placed at intersections that have yellow box markings. This signage **shall** be used with yellow box marking.

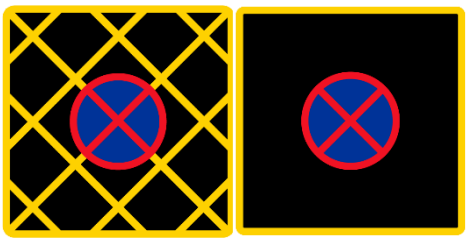


Figure 3-137 No Blocking Intersection Sign (R47-1 and R47-2 Accordingly)

3.2.75. Priority Roadway Signs (R48-Series)

Priority Roadway Signs **shall** be used to notify drivers that, at intersections of a priority roadway with other roadways, the drivers of vehicles moving along or coming from such other roadways are required to give way to vehicles moving along the priority roadway (Figure 3-138).

- Priority Roadway Signs may be set up at the beginning of the roadway and repeated after each intersection; it may also be set up before or at the intersection. Sign R48-1 *Should* be located on the right-hand side of the roadway.
- Priority Roadway Signs "End of Priority Roadway" **shall** be placed at the approach to the point where a priority roadway ceases to have priority over other roadways. Sign R48-2 *Should* be located on the right-hand side of the roadway.
- Priority Roadway Signs **shall** be placed at the point where all special prohibitions imposed on moving vehicles cease to apply. Priority Roadway Signs *Should* be located on both sides of the roadway.

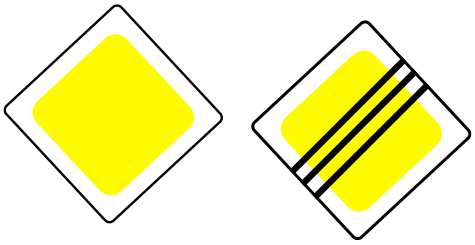


Figure 3-138 Priority Roadway Signs (R48-1 and R48-2)

3.3. Standard Warning Signs

Warning signs **shall** be used when traffic needs to be warned of existing or potentially hazardous conditions on or adjacent to a highway or street. Warning signs require drivers to be cautious and may call for a reduction in speed or a manoeuvre in the interest of their own safety, or that of other drivers and pedestrians.

Use of Warning signs *Should* be kept to a minimum. Unnecessary use of signs to warn of apparent conditions lessens a driver's compliance to warnings truly reflecting dangerous hazards.

Typical locations and hazards that may warrant the use of Warning signs are as follows:

1. Changes in horizontal alignment.
2. Intersections.
3. Advance warning of control devices.
4. Converging traffic lanes.
5. Narrow roadways and roadways with narrow shoulders.
6. Changes in the design features of the roadway.
7. Steep grades.
8. Roadway surface conditions.
9. Accesses from side roads.
10. Miscellaneous roadway elements.

If warnings other than those listed above or illustrated in this Manual are needed, the signs **shall** be the standard shape, colour, and placement of Warning signs.

Warning signs may be accompanied by an informational plate (in Arabic and English) placed below the symbol sign. These supplemental plates may be added to a warning sign to show distances, grades, advisory speeds, or other warning related information.

Standard sign shapes for warning signs **shall** be consistent with those shown in Section 3.1.3.1. The Triangular shape, with the point up, is used exclusively for advance warning signs. The Pointed Rectangle, with the long axis horizontal, is used exclusively for chevron signs. The Rectangle, with the long axis vertical, is used for diagrammatic warning signs. Other shapes **shall** not be used except as approved by Roads General Authority (RGA). The background color is white, with black symbols on the sign face and a red border, except as specified.

- All Warning signs **shall** be fully reflectorized or internally illuminated.
- The minimum (normal) size for each Warning sign is 750 mm. Where conditions of speed, volume, or special hazard require greater visibility or emphasis, larger signs **shall** be used.
- For high-speed highways (e.g., 100 km/h and above) **shall** be a minimum of 1,200 mm (width) by 900 mm (height) and may be larger depending on the road design speed, visibility requirements and content provided. Overhead diagrammatic signs **shall** be a minimum of 2,400 mm by 1,800 mm or larger depending on road design speed, visibility requirements and content provided.
- For high-speed highways (e.g., 100 km/h and above), diagrammatic signs may be utilized for lane use, lane drops or obstruction warnings, utilizing a rectangular shape with white background, red borders, and black symbols.

Warning signs **shall** be erected in accordance with the general requirements for sign positions described in Sections 3.1.4.2, 3.1.4.3, 3.1.4.4, 3.1.4.5, 3.1.4.6 and 3.1.4.7 .

- Since Warning signs are primarily for the benefit of the driver who is unacquainted with the road, special care *Should* be given to the placement of these signs.
- Warning signs *Should* provide adequate time for the driver to perceive, identify, decide, and perform any necessary maneuver. This total time to perceive and complete a reaction to a sign is the sum of the times necessary for PIEV which stands for

Perception, Identification (understanding), Emotion (decision making), and Volition (execution of decision). The PIEV time can vary from about 3 seconds for general warning signs to 10 seconds for high driver judgment condition warning signs.

- Minimum spacing between Warning signs with different messages normally *Should* be based on the PIEV times for driver comprehension and reaction.
- The effectiveness of the placement of any Warning sign *Should* be tested periodically under both day and night conditions.

Table 3-9 lists suggested sign placement distances, which may be used for all roads. The placement of temporary warning signs used in highway construction and maintenance sites is covered in chapter 7 of this manual, and the suggested sign placement distances given in Table 3-9 may not apply to that group of signs. Other miscellaneous Warning signs that advise of potential hazards, but are not related to a specific spot, may be installed in the most appropriate locations since these signs are not covered in Table 3-1. These include types such as camel crossing and soft shoulder.

In some instances, the suggested distances might be revised, or a series of signs erected in order to provide a second reminder of the hazard.

Table 3-9 Warning Sign Sizes and Placement Distance

85th Percentile Speed Approach (km/h)	**Recommended Warning Sign Size (mm)[1]**	**Distance of Sign from Hazard (m)**	**Required Minimum Clear Visibility (m)[2]**
40	750	50 - 100	50
60	900	100 - 200	60
80	1,200	200 - 245	80
100 and above	1,500	245 - 300	100

NOTES:

1. Advance Warning sign sizes refer to the apex-to-apex measurement of the side of the triangular sign. Lower range of dimensions for 80 km/h and 100 km/h speeds is intended for arterial or lower classification.
2. Sizes shown are desirable minimums for ground mounted signs. Larger sign sizes, particularly for warning signs, may be used in especially critical situations.
3. Guidance on the lateral and vertical positions of warning signs is in Section 3.1.4.4.

3.3.1. Dangerous Curve Ahead Sign (W1-Series)

While it is understood that transport jurisdictions do not deliberately design routes to be dangerous or hazardous, it *Should* be from the perspective of road safety to warn of less-than-ideal road geometrics or conditions.

- The curve signs (Signs W1-1L and W1-1R) **shall** be used where engineering investigations of roadway, geometric, and operating conditions show the

recommended speed on a curve to be in the range between 50 and 100 km/h and equal to or less than the established speed limit.

- The sharp curve signs (Signs W1-2L and W1-2R) **shall** be used where engineering investigations of roadway, geometries, and operating conditions show the recommended speed on a sharp curve to be 50 km/h or less and this speed is equal to or less than the established speed limit.
- The dangerous curves sign (Sign W1-3L and W1-3R) is intended for use to mark a succession of two or more sharp curves which may be hazardous due to geography or other conditions, which are separated by tangent distances of less than 175 m.
- The reverse curve sign (W1-4) **shall** be used to mark two curves in opposite directions.
- If the first curve is to the right, a right dangerous curves sign **shall** be used, and if the first curve is to the left, a left dangerous curves sign **shall** be used.
- If the dangerous curves sign is used, it **shall** be erected in advance of the first curve.
- where fewer than five curves occur in succession, one or more curves signs (W1-1) **shall** be used in lieu of the dangerous curves sign (W1-3).

Additional safety may be provided by the use of a suggested speed plate posted below these signs clearly displaying speed limit in Arabic (western) numerals and English SI units. W1-series signs are shown from Figure 3-139 to Figure 3-146.

Figure 3-139 Dangerous Left Curve Ahead Sign (W1-1L)

Figure 3-140 Dangerous Right Curve Ahead Sign (W1-1R)

Figure 3-141 Dangerous Sharp Left Curve Ahead Sign (W1-2L)

Figure 3-142 Dangerous Sharp Right Curve Ahead Sign (W1-2R)

Figure 3-143 Dangerous Reverse Curves Ahead (Left to Right) Sign (W1-3L)

Figure 3-144 Dangerous Reverse Curves Ahead (Right to Left) Sign (W1-3R)

Figure 3-145 Dangerous Sharp Reverse Curves Ahead (Left to Right) Sign (W1-4L)

Figure 3-146 Dangerous Sharp Reverse Curves Ahead (Right to Left) Sign (W1-4R)

3.3.2. Chevron Alignment Sign (W2-1)

The single chevron alignment signs W2-1L, W2-1R **shall** be used to reinforce route alignment (left or right). They are dimensioned at 450 mm in width by 600 mm in height.

- Sign W2-1T (Type A) **shall** be used in Work zones (Figure 3-147).
- Signs W2-1L and W2-1R **shall** be used on permanent routes in non-work areas (Figure 3-148 and Figure 3-149 respectively).
- Both signs **shall** be used to provide additional emphasis and guidance for vehicle operators to changes in the horizontal alignment of the roadway.
- W2-1L and W2-1R signs **shall** be used where advisory speeds on a curve are at least 20 km/h less than the posted speed of the route approaching the curve.

Spacing of W2-1L and W2-1R signs *Should* be as per Table 3-10, based on either speed or curve radius.

W2-1L and W2-1R signs may be utilized where there is less differential between posted and advisory speeds, but where there may be issues with visibility or terrain.

Table 3-10 Chevron Sign Positioning and Spacing

Advisory Speed (km/h)	Curve Radius (m)	Sign Spacing (m)
30 or less	60 or less	12
31 - 50	61 - 120	24
51 - 70	120 - 215	36

Advisory Speed (km/h)	Curve Radius (m)	Sign Spacing (m)
71 - 90	215 - 380	48
Over 90	380 - 1,000	60

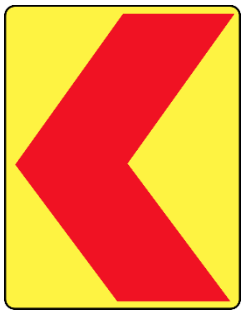


Figure 3-147 Single Chevron Signs – Chevron Alignment (W2-1T)

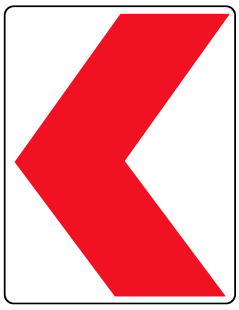


Figure 3-148 Single Chevron Signs – Chevron Alignment (Left) (W2-1L)

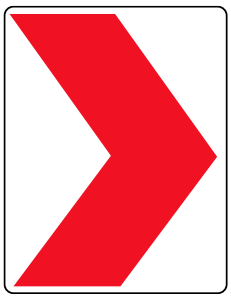


Figure 3-149 Single Chevron Sign - Chevron Alignment (Right) (W2-1R)

3.3.3. Chevron Signs (W2-2, W2-3)

The Chevron series signs **shall** be used to give notice of a sharp change of alignment in the direction of travel (see Figure 3-150). It **shall** not to be used where no change occurs in the direction of travel (ends of medians, center piers, etc.). Both signs **shall** be used to provide additional emphasis and guidance for vehicle operators to changes in the horizontal alignment of the roadway.

1. Chevron signs are to be utilized where advisory speeds at a curve are at least 20 km/h less than the posted speed of the route approaching the curve.
2. Chevron signs *should* be utilized for all sharp or dangerous curves (W1-2 and W1-3 signs) regardless of differential between approaching posted speed and curve advisory speed.
    - This sign **shall** utilize chevron displays on a white background with red border. If there is a need for further contrast in more hilly or rugged terrain, yellow background may be used instead of white.
    - The left (W2-2L) and right (W2-2R) signs **shall** be 1,500 mm wide by 600 mm high and consist of three chevron modules.
    - The two-way chevron sign (located at the head of the T-intersection facing the approach from the side road) **shall** be 3,000 mm by 600 mm. It **shall** consist of three left-facing and three right-facing chevron modules.
    - This sign, when used, **shall** be erected on the outside of a curve (for W2-2L and W2-2R), or directly opposite the entry to a roundabout (for W2-2R) or on the far side of an intersection (for W2-3), in line with and at right angles to approaching traffic.

To be effective, the sign *Should* be visible for at least 150 m and trial runs by day and night may be desirable to determine final positioning.

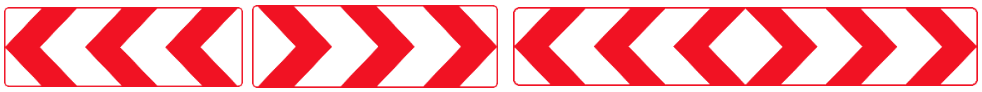


Figure 3-150 Chevron Signs (W2-2L, W2-2R and W2-3)

3.3.4. Truck Rollover Sign (W3-1) with Supplementary Plate W3-2SP

Truck Rollover Sign W3-1 **shall** be provided on highspeed ramps or curves where it is necessary for heavy vehicles, with a high center of gravity, to reduce speed (Figure 3-151).

It *Should* be placed at least 200 m ahead of the start of the curve, which permits braking as needed for goods vehicles prior to entering the curve.

A supplementary plate W3-2SP may be provided with the advisory speed limit (see Figure 3-152).

Figure 3-151 Truck Rollover Sign (W3-1)

Figure 3-152 Supplementary Plate for Advisory Speed (W3-2SP)

3.3.5. Loop Ramp Warning Sign (W4-1)

The Loop Ramp Warning sign (Sign W4-1) **shall** be placed ahead of tight cloverleaf loop ramps where approach speeds must be reduced significantly (e.g. over 50 km/h below approach speeds) to the posted speed of the loop (Figure 3-153).

Figure 3-153 Loop Ramp Warning Sign (W4-1)

3.3.6. Steep Descent or Ascent Sign (W5-Series)

The steep decent and ascent signs W5-1, W5-2 **shall** be used in advance of a downgrade or upgrade where the length, percent of grade, horizontal curvature, or other physical features require drivers to take special precautions (Figure 3-154 and Figure 3-155 accordingly).

Minimum criteria to provide these signs **shall** be one of the following:

1. 5 % grade for minimum 1,000 m.
2. 6 % grade for minimum 600 m.
3. 7 % grade for minimum 350 m.
4. 8 % grade for minimum 250 m.
5. 9 % grade for minimum 150 m.

These signs **shall** indicate percent grade in Arabic (Western) numerals above the slope symbol with an arrow indicating the direction of traffic flow (**shall** always be to the right).

If a pronounced variance in grades exists in a given section of highway, then additional sets of signs **shall** be used with the appropriate distance at which that grade will be encountered.

A supplemental plate may be placed underneath the sign(s) showing “Next” followed by the length, or distance of the descent or ascent.

Figure 3-154 Steep Descent (W5-1)

Figure 3-155 Steep Ascent (W5-2)

3.3.7. Highway Narrows Sign (W6-Series)

These signs **shall** not be used for lane drops. Lane drops **shall** be represented by Signs W38-1R and W38-1R as discussed in Section 3.3.38.

Signs W6-1 to W6-3 (Figure 3-156, Figure 3-157 and Figure 3-158) warn drivers of vehicles that the roadway ahead narrows from the right side (W6-2), the left side (W6-3) or from both sides (W6-1). The normal application of these *Should* be for temporary road narrowing situations at road works when the extent of the narrowing is less than a full lane width.

Highway narrows ahead signs *Should* be used when the width of a roadway is reduced on the left or right, or both sides, at a quicker rate than would be the case by a standard design taper.

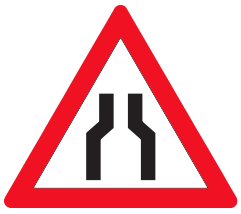


Figure 3-156 Highway Narrows from Both Sides Sign (W6-1)

Figure 3-157 Highway Narrows from the Right Sign (W6-2)

Figure 3-158 Highway Narrows from the Left Sign (W6-3)

3.3.8. One-Lane Narrow Bridge Sign (W7-1)

Sign W7-1 **shall** be used on two-way roadways to warn of a structure where the following conditions occur:

1. A curb-to-curb roadway width of less than 5 m.
2. When the alignment is poor on the approach to a structure having a clear roadway width of 5.5 m or less.

Additional protection *Should* be provided by the use of object markers, delineators and pavement markings. For traffic which does not have priority, *Should* the regulation of one-way traffic be required, the Priority Over Oncoming Traffic sign (R13-2) - Appendix A - may be used.

Sign W7-1 is shown in Figure 3-159.

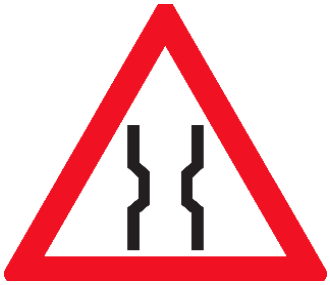


Figure 3-159 One-lane Narrow Bridge Sign (W7-1)

3.3.9. Two-Lanes Narrow Bridge Sign (W8-1)

Sign W8-1 **shall** be used to warn of a structure having a curb-to-curb two-way roadway width of 5 to 5.5 m or any bridge or culvert having a roadway clearance less than the width of the approach pavement (see Figure 3-160). Bridges or culverts having less than a 6 m span and

the above width also **shall** be treated as narrow bridges and **shall** be signed and delineated accordingly. Advance signing **shall** be used to warn approaching drivers of the specific hazard.

Additional protection *Should* be provided by the use of object markers, delineators, and pavement markings.

Advance signing *Should* be done by installing a Narrow Bridge symbol Warning sign or a One-Lane symbol Warning sign at about 800 m in advance of the narrow structure.

Depending on the degree of hazard, two advance Warning signs, one located 2 km and another located at 800 m in advance of the structure, may be warranted in special cases.

Figure 3-160 Two-Lane Narrow Bridge Sign (W8-1)

3.3.10. Divided Roadway Ends (W9-1, W10-1)

Signs W9-1 and W10-1 (Figure 3-161 and Figure 3-162 respectively) are used to warn of the end of a divided roadway and the beginning of an undivided roadway, with two-way operation. The location of these signs relative to the end of the divided roadway is shown in Figure 3-163.

Figure 3-161 Median Ends Sign (W9-1)

Figure 3-162 Two-Way Traffic (W10-1)

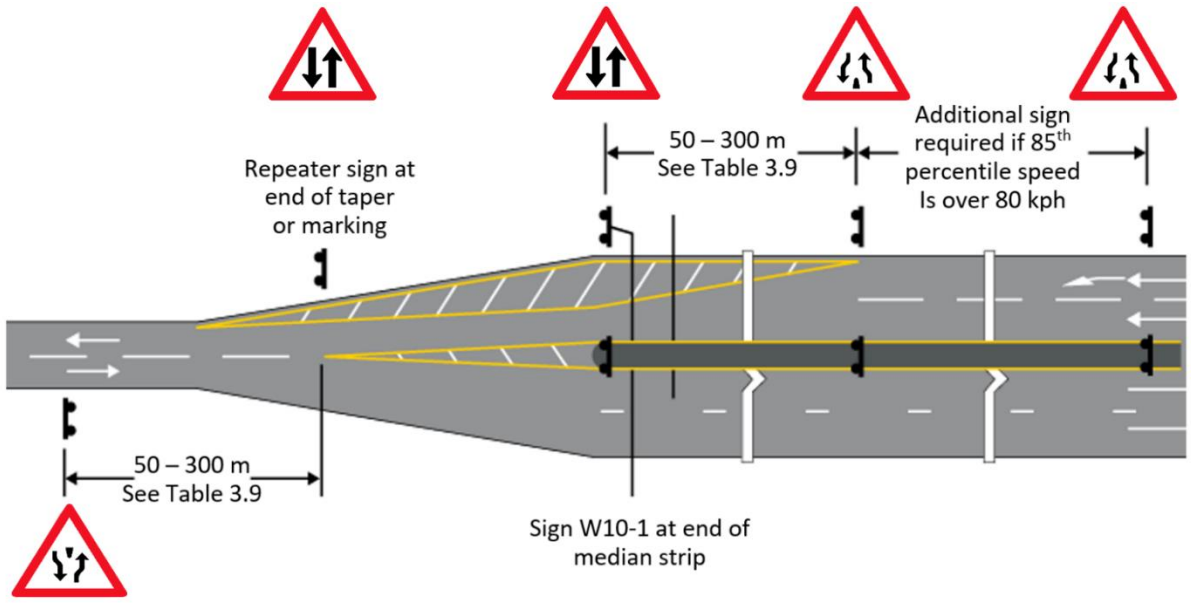


Figure 3-163 Location of Warning Signs along the Divided Roadway Ahead Sign

3.3.11. Divided Roadway Ahead (W11-1)

Where there is a transition from an undivided roadway to a divided roadway, an advance sign *Should* be positioned at an appropriate distance of up to 1.5 km before the start of the divided roadway. This sign *Should* be used on the approaches to a divided roadway. Divided Roadway Ahead Sign (see Figure 3-164) *Should* be located on the righthand side of the roadway at a sighting distance, measured back from the nose of the central hatch marking specified in Table 3-9. The location of these signs relative to divided roadway ahead is shown in Figure 3-163.

Figure 3-164 Divided Roadway Ahead (W11-1)

3.3.12. Two-Way Traffic on Route Crossing Ahead (W12-1)

Two-Way Traffic on Route Crossing Ahead Sign *Should* be used on a one-way roadway to warn of the approach to a T-intersection, with two-way traffic on the major roadway (Figure 3-165). This sign *Should* be located as close as possible to the beginning of the two-way roadway. This sign may be repeated after 100 m.

Figure 3-165 Two-Way Traffic on Route Crossing Ahead Sign (W12-1)

3.3.13. Divided Highway Begins / Ends Signs (W13-Series)

Divided Highway Begins/Ends Signs W13-1 and W13-2 **shall** be used to alert drivers that the roadway ahead has a median that is either starting or ending (see Figure 3-166). These signs **shall** be considered when the posted speed is above 60 km/h. For lower speeds, Warning Signs dual carriageway ends sign (Sign W13-1) or dual carriageway ahead sign (Sign W13-2) is to be used. The signs **shall** have a white background and a red border. The icon **shall** be black and red, with the arrows representing traffic movement in black and the obstructions in red.

Signs W13-1 and W13-2 **shall** be located in advance of the beginning or end of the median. Engineering Judgment **shall** be used to determine the exact location of the sign.

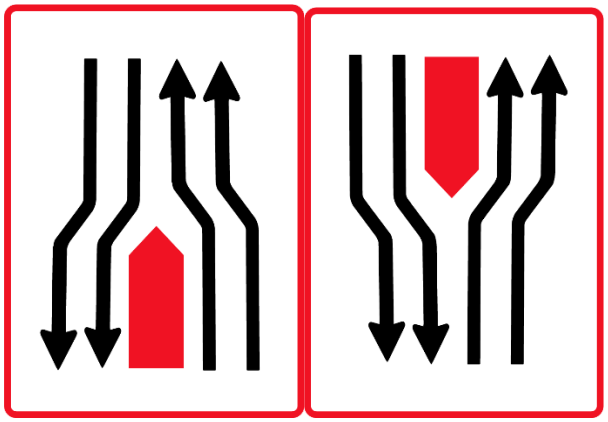


Figure 3-166 Divided Highway Ends and Begin Signs (W13-1 and W13-2)

3.3.14. Maximum Height Sign (Advance Vehicle Height Restriction) (W14-1)

Maximum Height Sign **shall** be used to indicate the maximum height of a vehicle that may pass underneath a structure spanning the roadway, where the clearance of that structure is less than 5.5 m (Figure 3-167).

The sign **shall** be located before the structure and may also be mounted on the structure itself to emphasize the warning. The figure quoted on the sign must be at least 300 mm less than the measured minimum clearance, to allow a margin for driver error, and *should* be expressed to the next lowest multiple of 300 mm.

Wherever possible, an alternative route for vehicles exceeding the stated height *Should* be indicated in advance of the intersection prior to the structure.

Figure 3-167 Advance Vehicle Height Restriction (W14-1)

3.3.15. No Through Highway Sign (W15-Series)

No Through Highway signs **Shall** be used to warn drivers of vehicles that the road indicated on the sign is not available to through traffic i.e. the road is a dead-end road or is closed to through traffic for some reason (Figure 3-168).

No through Highway signs W15 series *Should* be located with a clear sight distance to the sign in accordance with Table 3-9. Signs W15 series *Should* only be used when it is not otherwise obvious that the road concerned is not a through road.

The use of sign W15-1 is appropriate in advance of a crossroad when the straight-ahead leg of the intersection is not a through road.

Dead End Sign **shall** be used to indicate a dead-end road. The sign **shall** be placed in advance of the end of the road to warn drivers. Dead End Sign *should* be located on the right side of the roadway at a distance from an intersection, as specified in Table 3-9.

Figure 3-168 No Through Highway Signs (W15-1, W15-2R and W15-3L)

3.3.16. Stop Ahead Sign (W16-1)

Sign W16-1 **shall** be used on an approach to a Stop sign not visible for a sufficient distance to permit the driver to stop his vehicle at the Stop sign (Figure 3-169). Obstruction(s) causing the limited visibility may be permanent or intermittent.

Supplementary plate showing distance to the sign is recommended if stop sign is not visible at least 200 m away.

In some cases, the Stop Ahead sign may be used for emphasis where the Stop sign is poorly observed.

Figure 3-169 Stop Ahead Sign (W16-1)

3.3.17. Yield Ahead Sign (W17-1)

Yield Ahead sign (W17-1) **shall** be used on an approach to a Yield sign not visible for a sufficient distance to permit the driver to stop his vehicle at the Yield sign (Figure 3-170). Obstruction(s) causing the limited visibility may be permanent or intermittent. In some cases, the Yield Ahead sign may be used for emphasis where the Yield Ahead sign is poorly observed.

Supplementary plate showing distance to the sign is recommended if Yield Ahead sign is not visible at least 200 m away.

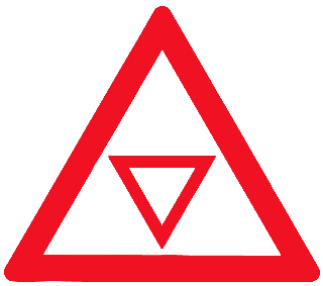


Figure 3-170 Yield Ahead Sign (W17-1)

3.3.18. Signal Ahead Sign (W18-Series)

Signal Ahead signs (W18-1 and W18-2, which are shown in Figure 3-171) **shall** be used in advance of any traffic control signal location where physical conditions prevent drivers from having a continuous view of at least two signal indications.

The symbol on the sign **shall** be in the three colors of signal lights the driver is approaching. Also, it *Should* be used at a location where road users would not expect such an installation.

- The arrangement of the colors may be vertical (W18-1) or horizontal (W18-2).
- For carriageway widths of 3 lanes or more, speeds over 80 km/h and limited visibility, a large rectangular diagrammatic signal ahead sign (white with red border) (W18-3) is preferred to be used (minimum 1,800 mm height).
- Distance to the signal is shown if the signal is not visible at least 200 m away (300 m at 100 km/h speeds and above).

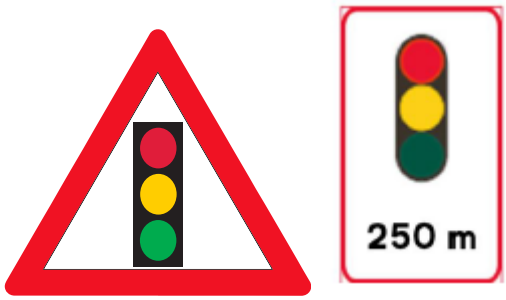


Figure 3-171 Signals Ahead Signs (Sign W18-1 and W-18-2)

3.3.19. Opening Bridge Ahead Sign (W19-1)

Opening Bridge Ahead Sign **shall** be used to warn drivers of an opening, lifting or swing bridge ahead (Figure 3-172). This sign *Should* be located on the right side of the roadway at a distance from an opening bridge or swing bridge, as specified in Table 3-9.

Figure 3-172 Opening Bridge Ahead Sign (W19-1)

3.3.20. Tunnel Sign (W20-1)

Sign W20-1 **shall** be placed in advance of a tunnel entrance (portal) to inform the driver extra care *Should* be used when traveling through the tunnel (Figure 3-173).

When the tunnel is more than 75 m in length, an Informative sign *Should* follow this sign carrying the message, ''Turn on Lights" (G10-1). Sign G10-1 is presented in Section 3.5.6.

Figure 3-173 Tunnel Ahead Sign (W20-1)

3.3.21. Dip Sign (W21-1)

Sign W21-1 **shall** be used to give warning that a dip occurs in the road and that it is necessary to reduce speed and use caution while traversing the dip (Figure 3-174).

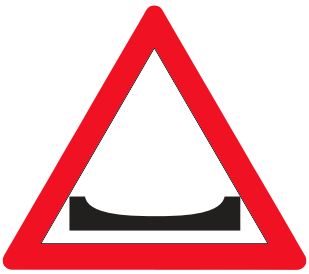


Figure 3-174 Dip in the Road Ahead Sign (W21-1)

3.3.22. Pavement Ends Sign (W22-1)

A Pavement Ends (W22-1) word message sign *Should* be used where a paved surface changes to either a gravel treated surface or an earth road surface (Figure 3-175). An Advisory Speed plaque may be used when the change in roadway condition requires a reduced speed.

Figure 3-175 Pavement Ends Sign (W22-1)

3.3.23. Dangerous Shoulder Sign (W23-1)

Sign W23-1 **shall** be used to warn of a *should*er condition that presents a hazard to vehicles which may stray from the pavement (Figure 3-176). One sign **shall** be placed near the beginning of the soft-shoulder or shoulder drop-off condition, and other signs **shall** be placed at intervals throughout the length of the road where the condition exists.

Figure 3-176 Dangerous Shoulder Sign (W23-1)

3.3.24. Slippery Highway Sign (W24-1)

Slippery Highway Sign **shall** be used to give warning of the section of road ahead that may be particularly slippery when wet (Figure 3-177). This sign **shall** be located in advance of the beginning of the slippery section and at appropriate intervals on long sections of such pavements.

Figure 3-177 Slippery Highway Ahead Sign (W24-1)

3.3.25. Loose Gravel Sign (W25-1)

Loose Gravel Sign **shall** be used to give warning that a driver's vehicle may cause loose gravel to be thrown up on other vehicles in the immediate vicinity (Figure 3-178).

Figure 3-178 Loose Gravel Ahead Sign (W25-1)

3.3.26. Road Leads to Quay or River Bank Sign (W26-1)

Sign W26-1 is intended for use to give warning that the road leads onto an unprotected jetty, quay or a wadi bank (Figure 3-179). It **shall** be used in conjunction with a supplementary plate showing distance to the hazard and **shall** be placed a minimum 300 m from the hazard.

Figure 3-179 Road Leads to Quay Sign (W26-1)

3.3.27. Rough Highway: Bad Condition Sign (W27-1)

Sign W27-1 warns of bumps or a rough road ahead and **shall** be used ahead of pavement which is deteriorated and requires drivers to reduce speed and use caution while traversing it (Figure 3-180).

Figure 3-180 Rough Road Sign (W27-1)

3.3.28. Falling Rocks Sign (W28-1)

Sign W28-1 **shall** be used to give warning of a section of road where danger from falling rocks exists and the consequent presence of rocks on the highway (Figure 3-181).

Figure 3-181 Falling Rocks Sign (W28-1)

3.3.29. Sand Dunes Sign (W29-1)

Sign W29-1 **shall** be used to warn of sand dunes that frequently may cover part of the road and may restrict road capacity (see Figure 3-182). This Sign **shall** be replaced near locations of frequent blowing and drifting sand dunes. Optimally, a sign with distance (m or km) *Should*

be provided prior to the nearest cross route or turnaround prior to the location where the condition frequently occurs.

Where frequent blockages are not always visible due to road geometrics, a supplementary plate may be provided with the extent of the condition, e.g., "Next 'X' km".

Figure 3-182 Sand Dunes Sign (W29-1)

3.3.30. Drifting Sand Sign (W30-1)

Drifting Sand Sign W30-1 together with supplementary Drifting Sand Plate W30-2SP, **shall** be used to warn drivers of the possibility of drifting sand on the roadway (see Figure 3-183). This sign and its associated supplementary plate *Should* be located on the right side of the roadway at the distance from drifting sand specified in Table 3-9.

Figure 3-183 Drifting Sand Signs (W30-1, W30-2SP)

3.3.31. Crosswind Sign (W31-1)

Sign W31-1 **shall** be used to give warning that a strong crosswind often affects a driver's control of a vehicle in this section of the road (Figure 3-184).

Figure 3-184 Crosswinds Ahead Sign (W31-1)

3.3.32. Wadi Crossing Sign (W32-1)

Sign W32-1 **shall** be used in advance of a low point on a rural route that is frequently flooded or scoured by water flows/sand (see Figure 3-185). Where such a crossing is not visible within 300 m, a supplementary sign *Should* be provided with the distance (in m).

Optimally, a wadi crossing sign with distance (m or km) *Should* be provided prior to the nearest cross route or turnaround prior to the crossing.

Figure 3-185 Wadi Crossing Sign (W32-1)

3.3.33. Rumble Strips Sign (W33-1)

Sign W33-1, which is shown in Figure 3-186, **shall** be used at:

1. approaches to towns to complement step-down speed zones,
2. approaches to Stop signs where the sign is not readily discernible, and
3. at other locations where deemed desirable to reduce speeds and improve safety.

Figure 3-186 Rumble Strips Ahead Sign (W33-1)

3.3.34. Speed Hump Ahead Sign (W34-1)

Sign W34-1 **shall** be used to give warning that a speed hump is ahead and that it is necessary to reduce speed and use caution while traversing the hump (Figure 3-187).

Figure 3-187 Speed Hump Ahead Sign (W34-1)

3.3.35. Hazard Sign (W35-1)

Sign W35-1 **shall** be used as necessary to warn motorists of general hazards described by a supplementary message (Figure 3-188). This sign **shall** only be displayed in conjunction with a supplementary plate which describes a particular condition not addressed with other standard warning signs, including but not limited to: high winds, blowing sand, hazardous objects close to road, etc.

Figure 3-188 Hazard Sign (W35-1)

3.3.36. Fire Station / Civil Defense Sign (W36-1)

Sign W36-1 **shall** be used to warn motorists a fire station / civil defense installation is located adjacent, or in proximity, to the highway, and they may encounter the fire equipment entering the highway on an emergency run (Figure 3-189). The sign *Should* be installed regardless of whether or not an emergency traffic signal is in place.

If an emergency traffic signal is used, then the sign *Should* be equipped with a hazard identification beacon which **shall** be actuated from a non-illuminated condition at the same time as the emergency traffic signal is changed to steady yellow.

Figure 3-189 Fire Station/Civil Defense Installation Ahead Sign (W36-1)

3.3.37. Overhead Electric Line Sign (W37-1)

Sign 37-1 **shall** be used when overhead primary electric lines with high voltage are passing over the road (Figure 3-190).

Figure 3-190 Overhead Electric Line Sign (W37-1)

3.3.38. Lane Drop Signs (W38-Series)

Lane Drop Signs W38-1R and W38-1L **shall** be used where necessary to warn of the reduction in the number of traffic lanes in the direction of travel (Figure 3-191). Signs **shall** not be used if the reduction in road width does not result in a reduction in the number of lanes. The signs are to be placed at the advance warning distances shown in Table 3-9, ahead of the start of the lane taper.

If the lane drop is not clearly visible ahead, a supplementary plate showing the distance to the start of the lane taper **shall** be provided.

For speeds over 100 km/h, a rectangular warning sign of 1,800 x 1,500 mm, denoted by thin red borders and with larger arrow displays (W38-2R and W38-2L, see Figure 3-192), *Should* be considered for use in conditions where current normal advance warning signage has not been deemed effective.

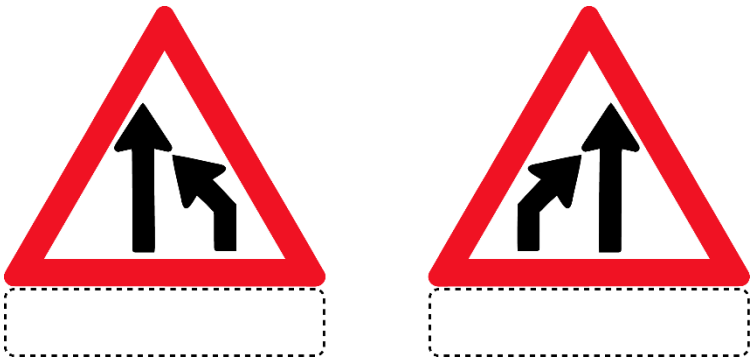


Figure 3-191 Lane Drop Signs for Speed Less Than or Equal to 100 km/h (W38-1R And W38-1L)

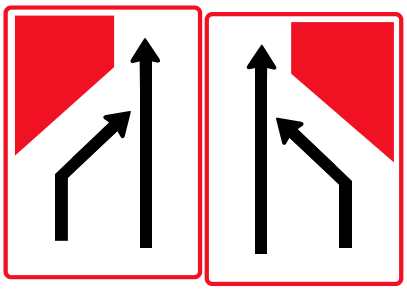


Figure 3-192 Lane Drop Signs for Speed Exceeding 100 km/h (W38-2R and W38-2L)

3.3.39. Merge Signs (W39-Series)

Merge signs (W39-1R, W39-1L, W39-2L, W39-2R) **shall** be used to warn motorists that merging movements may be encountered in advance of a point where two roadways converge (W39-1 and W39-1L are depicted in Figure 3-193 and W39-2L and W39-2R are shown in Figure 3-194).

For freeway or high-speed merges (speeds 100 km/h or above), diagrammatic merge signs W39-3R, W39-3L, W39-4R, W39-4L (Signs W39-3R and W39-3L are presented in Figure 3-195, while Signs W39-4R and W39-4L are shown in Figure 3-196) of minimum dimensions 1,800 mm x 1,500 mm width **shall** be used on the main road.

The sign *Should* be erected on the side of the major roadway where merging traffic will be encountered and in a position not to obstruct the driver's view of vehicles on the entering roadway.

Where two highways of approximately equal importance converge, a sign *Should* be placed on each roadway.
A thicker segment with an arrow *Should* indicate direction of travel for the main route, with the route currently being traversed always being shown vertically, whether or not it is the main route.

Signs W39-1R and W39-1L refers to the current route being the main route, while Signs W39-2L and W39-2R shows the current route as merging with the main route.

Signs W39-3R and W39-3L shows a merge from the side, while Signs W39-4R and W39-4L shows a merge ahead with the main road. The main road shows two lanes being merged with

regardless of whether there are two or more lanes on the main road. If it is deemed essential by the jurisdiction's traffic engineer to show the additional lanes, the sign design may be modified to show more than two lanes.

Figure 3-193 Traffic Merging Ahead Sign-Current Route as Main Route (W39-1R and W39-1L)

Figure 3-194 Merge with Main Route Traffic Ahead Sign (W39-2L and W39-2R)

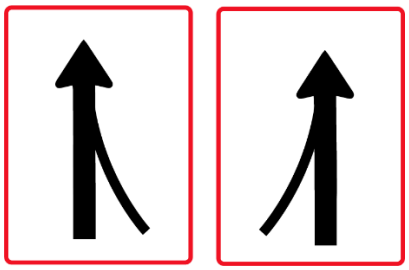


Figure 3-195 Traffic Merging Ahead Sign – Current Route is the Main and Speed Exceeds 100 km/h (W39-3R and W39-3L)

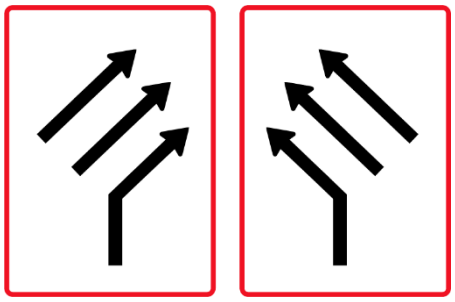


Figure 3-196 Merge with Main Route Traffic Ahead Sign – Speed Exceeds 100 km/h (W39-4R and W39-4L)

3.3.40. Intersection Ahead Signs (W40-Series)

W40 series signs warn drivers of vehicles of an intersection ahead.

Crossroad Ahead sign W40-1, Side Road Ahead signs W40-3R and W40-3L and Staggered Side Road Ahead signs W40-4R and W40-4L are specifically for use on a major road to indicate the presence and layout of the intersection ahead.

T-Intersection Ahead sign W40-2 may be used on a major or minor road although its use on major roads is not likely to be common. W40 series signs *Should* be located on the right side of the roadway at a distance from the intersection with a clear sight distance to the sign in accordance with Table 3-9.

W40 series signs *Should* be considered for use in an urban area only when all of the following conditions apply:

- The intersection is not controlled by traffic signals, and
- There are no advance direction signs, and
- With the exception of T- intersection Ahead sign W40-2, there are no Stop or Give Way signs or road markings on the major road approach, and
- No other means is available to improve the identification of the intersection from an adequate distance to allow drivers to safely negotiate a turn i.e. road markings, gore signing or street name signs.

Signs W40-4R and W40-4L *Should* only be used when the distance between the staggered side roads is less than that given in Table 3-11. If the distance exceeds the value shown, two type W40-3R or W40-3R signs *Should* be used, the signs being located in accordance with Section 3.3. W40 series may also be used in a rural situation according to the criteria given below. However, it is also appropriate to consider the use of Crossroad Ahead sign W40-1 and T-Intersection Ahead sign W40-2 on the minor road approach to a rural intersection, particularly if the road alignment is not straight on the approach to the intersection. For such an application the width of both legs of the symbol on Crossroad Ahead sign W40-1 *Should* be sized similarly to that for T-Intersection Ahead sign W40-2.

W40-Series Signs shown in Figure 3-197 to Figure 3-201.

Table 3-11 Intersection Spacing Requirements for Signs W40-4L and W40-4R

85th Percentile Speed (km/h)	**Distance Between Intersections (m)**
Up to 45	60
45 to 65	150
65 to 85	200
85 and above	300

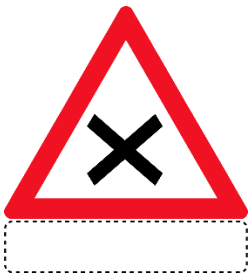


Figure 3-197 Crossroad Ahead Sign (W40-1)

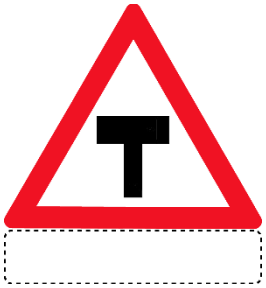


Figure 3-198 T-Intersection Ahead Sign (W40-2)

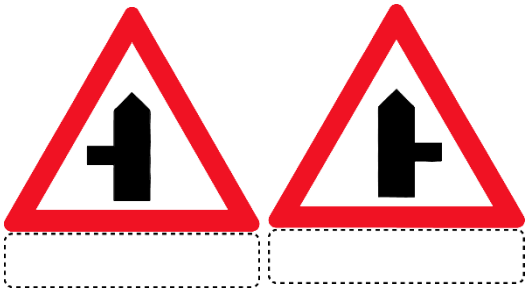


Figure 3-199 Side Roadway Ahead Sign (Left and Right, W40-3R and W40-3L Accordingly)

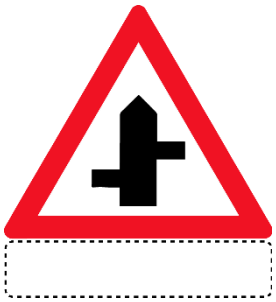


Figure 3-200 Side Roadway Ahead (Left and Right Staggered) Sign (W40-4L)

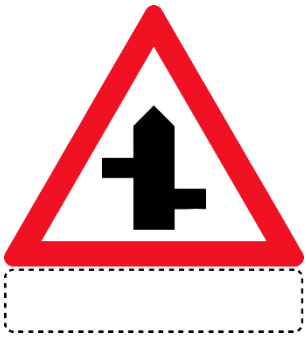


Figure 3-201 Side Roadway Ahead (Right and Left Staggered) Sign (W40-4R)

3.3.41. Roundabout Ahead Sign (W41-1)

Sign W41-1 **shall** be used to warn drivers of a roundabout ahead Diagrammatic Informative signs showing the configuration of the roundabout *Should* precede this Warning sign if it is not clear how the traffic pattern is configured in advance of the roundabout (Figure 3-202).

Figure 3-202 Roundabout Ahead Sign (W41-1)

3.3.42. U-Turn Ahead Sign (W42-1)

The W42-1 sign, as shown in Figure 3-203, **shall** be used to provide advance warning of a U-turn at an intersection or at a non-intersection location (i.e., an opening in the median designed for U turns).

If a U-turn location is ahead but specifically exempts trucks, Sign W42-1 **shall** be mounted with a supplementary symbol plate below which describes "No Trucks".

Figure 3-203 U-Turn Ahead Sign (W42-1)

3.3.43. Opposing U-Turn Ahead Sign (W43-1)

Sign W43-1 **shall** be used on high-speed rural dual carriageways to warn drivers that vehicles may be undertaking a U-turn maneuver across their path ahead (Figure 3-204).

Sign W43-1 **shall** utilize a rectangular shape, **shall** have a white background and a thin red border. The arrows *Should* be black.
Good engineering judgment **shall** be exercised in locating the signs in advance of the U-turns.

A likely usage of this sign will be on the approach to an isolated U-turn on a high-speed rural dual carriageway where approaching drivers may make a U-turn and drivers are likely to encounter vehicles crossing their path. Engineering Judgment *Should* be used to determine if a larger sign is needed in certain circumstances.

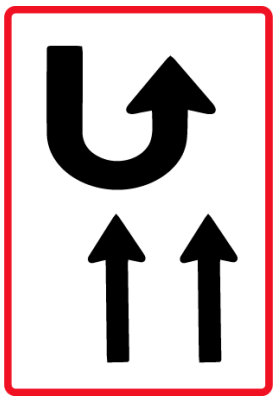


Figure 3-204 Opposing U-Turn Ahead Sign (W43-1)

3.3.44. Cyclists Sign (W44-1)

Sign W44-1 **shall** be used to give warning of a point where cyclists frequently enter or cross the road (Figure 3-205).

Figure 3-205 Cyclists Crossing Ahead Sign (W 44-1)

3.3.45. Slow Moving Vehicles (W45-Series)

Sign W45-1 **shall** be used on roadways where the gradient will have an effect on the speed of trucks. This sign *Should* be located on the right side of the roadway at the distance from where there is the likely presence of slow-moving vehicles specified in Table 3-9.

Sign W45-2 *Should* be used in advance of locations where military vehicles may cross the roadway or are moving slowly along the roadway. Sign W 45-2 *Should* be located on the right side of the roadway at the distance from where there is the likely presence of slow-moving military vehicles specified in Table 3-9.

Sign W45-3 is used where drivers may unexpectedly come across a queue of traffic, for example, around a bend. Sign W45-3 *Should* only be used where there is a persistent problem that could cause a significant risk to drivers. Sign W45-3 *Should* be located on the right side of the roadway at the distance from where there queuing vehicles are likely to occur specified in Table 3-9.

W45-series Signs are shown in Figure 3-206.

Figure 3-206 Slow Moving Vehicles (W45-1, W45-2 and W45-3)

3.3.46. Pedestrian Crossing Sign (W46-1)

Sign W46-1 **shall** be used to give warning of an established pedestrian crossing zone (Figure 3-207).

If there are visibility restrictions, a distance plate *Should* be provided below the sign. The sign *Should* be placed a minimum 100 m ahead of the crossing.

Figure 3-207 Pedestrian Crossing Sign (W46-1)

3.3.47. Children Sign (W47-1)

Sign W47-1 intended for use to give warning of a section of road frequented by children, such as at the exit from a school or a playground (Figure 3-208). The W47-1 sign **shall** be used as an advance warning sign.

If there are visibility restrictions, a distance plate *Should* be provided below the sign. The sign *Should* be placed a minimum 100 m ahead of the crossing.

Figure 3-208 Children Sign (W47-1)

3.3.48. Animal / Camel Crossing Sign (W48-1)

Sign W48-1 **shall** be used to give warning of the unexpected entry of animals/camels crossing the road or sharing the road (Figure 3-209).

Figure 3-209 Camels Crossing Ahead Sign (W48-1)

3.3.49. Hazard Warning Markers (OM-Series)

Hazard Warning Markers OM1-1, OM1-2, OM1-3 **shall** be used where a bridge parapet, culvert or other obstruction is adjacent to a traffic lane (Figure 3-210). This sign *Should* be located on both sides of the roadway.

If the obstruction is accompanied by a narrowing of the roadway, Roadway Narrows Signs *Should* also be used.

Figure 3-210 Hazard Warning Markers (OM1-1, OM1-2 and OM1-3)

3.3.50. End of Roadway Object Markers (OM2-Series)

End of Roadway Object Markers OM2-Series alerts drivers of a roadway ending (Figure 3-211).

- The sign **shall** be used only when there are no alternative vehicle paths for the driver to use.
- This sign *Should* be located at the center of the end of roadway.

Where required, additional marker signs may be provided adjacent to the center marker, or the center marker may be supplemented with a barricade.

Figure 3-211 End of Roadway Object Markers (OM2-1, OM2-2 and OM2-3)

3.3.51. Countdown Marker Signs (W49-Series)

Countdown markers Signs W49-1SP, W49-2SP, W49-3SP **shall** be used to measure intervals of 100 m before intersection exits on expressways/freeways.

Countdown markers **shall** be used approaching roundabouts/intersections if travel speeds or visibility of the roundabout/intersection result in the need to reduce travel speeds well in advance.

Countdown markers consist of three consecutive signs (minimum 1,200 mm high by 700 mm wide), in blue with white border and legend, they show three bars (300 m from exit/intersection), two bars (200 m from exit/intersection) and one bar (100 m from exit/intersection). Bars **shall** slope downward and to the right for left hand installations, and downward and to the left for right hand installations (the latter arrangement is shown in Figure 3-212).

Figure 3-212 Countdown Markers (W49-1SP, W49-2SP and W49-3SP)

3.3.52. Intersection on a Curve Ahead Sign Curve Ahead Sign (W50-1)

Intersection on a Curve Ahead Sign *Should* be used in advance of intersections that occur on sharp curves. avoids the use of separate signs (Figure 3-213). Where the curve is to the left, the symbol is reversed.

Figure 3-213 Intersection on a Curve Ahead Sign (W50-1)

3.3.53. Truck Escape Ramp Signs (W51-Series)

Where Truck/Goods Vehicle escape ramps have been provided, Truck/Goods Vehicle escape ramp sign W51-1 (see Figure 3-214) **shall** be placed in advance of the ramp and sign W51-2 (see Figure 3-215) at the ramp location (gore area). The advance signs **shall** be placed at 2.0 km, 1.0 km and 500 m from the ramp location.

- Regulatory signs **shall** be placed in the general area of the exit ramp to keep drivers from using the escape area for parking.
- The Informative sign W51-3 (see Figure 3-216) that **shall** be used is a diagrammatic sign, which is designed for truck/goods vehicle drivers. This large sign would be erected at a turnoff or pullout area at the summit so that the truck/goods vehicle drivers could study the alignment and would also be advised, in Arabic and English, of the percentage of descending grade, the length of the descent, and the emphasis of the need to gear down.

Figure 3-214 Advance Truck/Goods Vehicle Escape Ramp Sign (W51-1) with Supplementary Plate

Figure 3-215 Truck/Goods Vehicle Escape Ramp Sign (W51-2) with Supplementary Plate

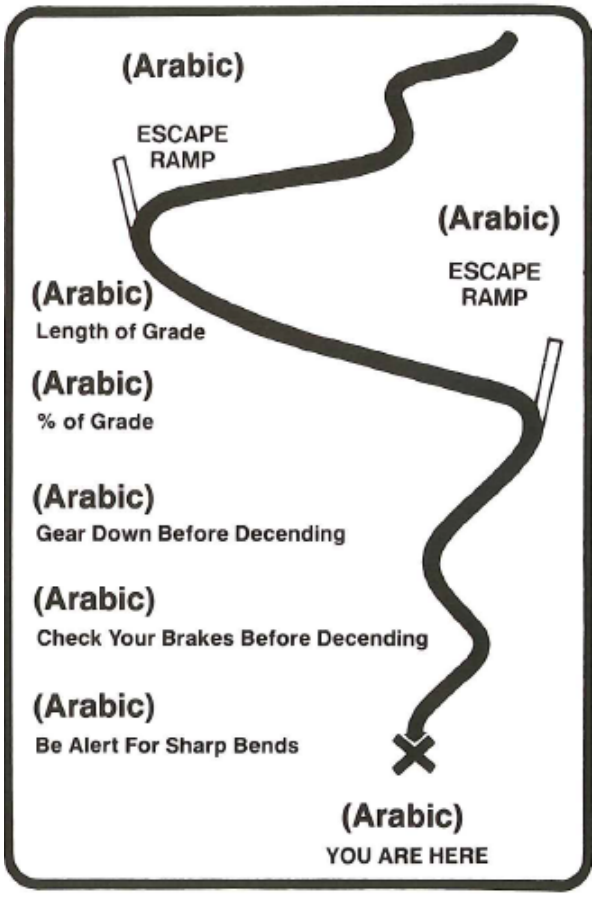


Figure 3-216 Truck/Goods Vehicle Escape Ramp Sign (W51-3)

3.3.54. Other Warning Signs

Warning signs other than those specified may be required under special conditions. Such signs **shall** conform to the general requirements for shape, color, and placement of Warning signs and be integrated in accordance with the process outlined in Section 3.1.

3.4. Standard Informative Signs

3.4.1. Application

Informative signs *Should* be designed to be easily readable, permitting drivers to make timely and proper responses. This means high visibility, large lettering, and short legends for quick comprehension. Standard shapes and colors are required so the signs can be promptly recognized. This group of signs includes several categories, all of which convey useful information to road users. The categories are as follows: Advance Direction signs, Direction signs, Route Marker signs, Place Identification signs, Confirmatory signs, Useful Information signs, Facility signs, and Parking signs. Most signs will bear text in Arabic and English.

Standards for Arterial, Collector and Local Highways are prescribed in Section 3.5 of this Manual Standards for Freeways/and for Expressways are combined in Section 3.6 of this Manual. Arterial Collector highways call for an intermediate level of signing more advanced

than prescribed for Local Highways, but less demanding in the requirements and specifications than Expressway and Freeway signing standards.

Informative signs may be used to show the KSA, province, city, and village jurisdictional boundaries. Where these signs interfere with signing for interchanges or intersections or other equally critical points, Informative signs indicating boundaries will be omitted or relocated to a more suitable position.

On all such signs the design *Should* be simple and dignified, devoid of any tendency toward advertising. The signs *Should* be designed to look similar to all other highway signs. The signing must furnish drivers with clear instructions for orderly progress to their destinations.

Sign installations are an integral part of the highway facility and must be planned concurrently with the development of highway location and geometric design. Plans for signing must be analyzed during the earliest stages of preliminary design and details correlated as final design is developed.

Informative signs **shall** serve distinct functions as follows:

1. Give directions to destinations or to streets, at intersections or interchanges.
2. Furnish advance notice of the approach to intersections or interchanges.
3. Direct drivers into appropriate lanes in advance of diverging or merging movements.
4. Indicate access to general motorist services, rest, scenic, recreational areas, and holy sites.
5. Provide other information of value to the driver.

Informative signs **shall** be used to guide vehicle operators along streets and highways; inform them of intersecting routes; direct them to cities, towns, villages, or other important destinations; and identify nearby geographical, geological, historical and religious points of interest. Generally, these signs are designed to give information which will help the driver along his way in the most simple, direct manner possible.

3.4.2. Standard Design of Informative Signs

3.4.2.1 Size of signs

The sign size **shall** be determined primarily by the length of the message, size of the lettering and spacing necessary for proper legibility, in relation to the posted speed. A sign mounted over a roadway lane may have to be limited in horizontal dimension to the width of the lane, so another sign may be placed over an adjacent lane. The necessity to maintain proper vertical clearance may place a further limitation on the size of the overhead sign and the message which can be accommodated.

For most Informative signs the legend is so variable, no rigidly standardized sign size can be established.

3.4.2.2 Arabic and English legend

On signs with dual language messages, the letter size of the English legend **shall** be related to Arabic letter size as follows based on the "x," or lowercase, English letter height. The x-size is

discussed in the following paragraphs, but the proportion of Arabic and English letter heights relative to the variable "x" is described below:

1. Lowercase English letter height = 1.0x
2. Stroke width = 0.2x
3. Uppercase English letter height = 1.4x
4. English text background tile height = 2.0x
5. Aleph height of equivalent Arabic text = 2.0x
6. Arabic text background tile height = 3.24x

3.4.2.3 Size of lettering

For Informative signs with varying legends, sign legibility is a direct function of letter size. The legibility distance must give the driver sufficient time to read the sign before passing it. Although under the best conditions an Informative sign message can be read in a brief glance, a reasonable safety factor must be allowed for inattention, blocking of view by other vehicles, unfavorable atmospheric conditions, inferior eyesight, or other causes for delayed or slow reading.

Informative signs **shall** have Size of Lettering as follows:

1. Minimum Letter Sizes as Function of Approach Speeds. Based on use of the standard 0.6 m legibility distance/mm of lowercase English "x" letter height, minimum letter sizes **shall** be as presented in Table 3-12 for different approach speeds.
2. Longitudinal Sign Spacing and Impact on Sign Visibility. Table 3-13 **shall** be used for determination of minimum sign spacing and thus longitudinal visibility for guide signs on arterials, freeways and expressways in rural and urban environments.

The minimum sizes specified in Table 3-12 below *Should* be exceeded where unusual conditions indicate a need for greater legibility.

Table 3-12 Minimum "x" Height for Guide Signs (millimeters)

Posted Speed	120 km/h	100 km/h	80 km/h	60 km/h	40 km/h
Primary Guide Sign					
Overhead	300	300	250	200	200
Ground Mounted*	300	250	200	150	100
Supplemental Sign					
Stack*	300	250	150	100	100
Symbol Only	300	250	150	125	100
Gore Exit Sign	300	250	200	200	N/A
Chevron Sign					
At Roundabout	N/A	125	100	100	75

Posted Speed	120 km/h	100 km/h	80 km/h	60 km/h	40 km/h
At Intersection	N/A	125	125	100	100
At Freeway Ramp	250	150	150	125	125
Route Emblem	300	250	200	150	150
General Information Sign*	250	150	150	100	100

* For ground-mounted signs, "x" height may be reduced based on location and visibility as per approval by the Transport Jurisdiction.

** For 140 and 160 km/h speeds the 120 km/h *Should* be the base however engineering Judgment *Should* be used if there is a specific justification for increasing these.

Table 3-13: Minimum Longitudinal Sign Spacing Requirements – General

Type of Facility	Type of Sign	Minimum Longitudinal Spacing Between Signs
Rural Arterial (non-freeway/express way), speeds under 80 km/h	Regulatory, Warning and Smaller Guide Signs (1 m height or less)	100 m
Urban Arterial (non-freeway/express way), speeds under 80 km/h	Regulatory, Warning and Smaller Guide Signs (1 m height or less)	75 m
Rural Arterial (non-freeway/express way), speeds under 80 km/h	Larger Guide and Regulatory Signs (Height > 1 m)	175 m
Urban Arterial (non-freeway/express way), speeds under 80 km/h	Larger Guide and Regulatory Signs (Height > 1 m)	150 m
Freeways / Expressways (speeds 100 km/h and under)	All Signs	200 m
Freeways / Expressways (speeds over 100 km/h)	All Signs	300 m (250 m for ground-mounted signs located before or after overhead guide signs)

Table 3-14: Minimum Longitudinal Sign Spacing Requirements Based on the Type of Facility

Minimum Longitudinal Spacing Between Signs		
Type of Facility	**Type of Sign**	
	Smaller Regulatory, Warning, and Guide Signs (Height ≤ 1 m)	**Larger Regulatory, Warning, and Guide Signs (Height > 1 m)**
Rural Arterial, Speeds < 80 km/h	100 m	175 m
Urban Arterial, Speeds < 80 km/h	75 m	150 m
Freeways/ Expressways, Speeds ≤ 100 km/h	200 m	200 m
Freeways/ Expressways, Speeds > 100 km/h	300 m	300 m
Note: 250 m **shall** *be used for ground-mounted signs located before or after overhead guide signs.*		

3.4.2.4 Style of lettering and legend spacing

Using standardized letter style and arrow designs helps to assure uniform and effective application. The message dimensions of all expressway and arterial highway signs **shall** be determined first and the outside sign dimensions secondarily.

All names of places, streets, and highways on Informative signs **shall** be in both Arabic and English (refer to Section 3.1.3.6). English names generally **shall** be composed of lower-case letters with initial upper-case letters. The Arabic style **shall** be Naskh or Al Madinah (refer to Section 3.1.3.6).

3.4.2.5 Amount of legend

Total units of information in the body of an informative sign *Should* be limited to the following:

1. Route emblem / direction (if used).
2. No more three units of principal legend as follows:
    a. One street name plus up to two destinations.
    b. Up to two street names.
    c. Up to three destinations.
    d. A symbol may substitute for one line of text.
3. Lane assignment or directional arrow and distance to exit.

Regardless of letter size, the legend on an Informative sign must be kept to a minimum to be legible at a glance during the few moments a driver can turn his eyes from the road. Informative signs *Should* be limited to six lines of principal legend (three lines in Arabic and three lines in English).

Symbols, action information, cardinal directions and exit numbers which make up other lines

of the message *Should* be kept to a minimum.

A destination symbol may be used as a substitute for a single line of principal legend (i.e., one line in Arabic, one line in English).

3.4.2.6 Abbreviations

Abbreviations **shall** be kept to a minimum but can be useful when destination messages are excessively long.

3.4.2.7 Arrows and symbols

Arrows **shall** be used on many Informative signs to indicate the directions toward designated routes or destinations. On a roadside sign a directional arrow for a straight-through movement **shall** point upward. Design and application of arrows for freeway and expressway highway informative signs **shall** be as shown in, Figure 3-218 and Figure 3-217 (overhead signs).

- For a curve the arrow *Should* be pointed upward so as to best describe the direction in which the route leaves the intersection and at an angle related to the sharpness of the curve.
- Where a long, single panel is mounted on an overhead structure for the purpose of giving straight-through information common to all lanes, downward arrows can be used. The downward arrow *should* point to the lane which they pertain (Figure 3-218 and Figure 3-217).
- Ground-mounted signs *should* have arrows on the side of the direction of the turning movement (or on the left side for through movements). Gore exit signs will show arrows at the bottom right (or bottom left for left-hand exits)
- Upward pointing arrows may be pointed at any appropriate angle to convey a clear comprehension of the direction to be taken. At right-angle intersections a horizontal arrow is appropriate.
- Arterial signage may use arrows as shown in Figure 3-220. Sections 3.5 and 3.6 include specific information on selection of arrow configurations for the various sign applications. For added legibility, it is recommended the widths across the barbs of the arrow be at least equal to the height of the largest letters on the sign, and for short downward pointing arrows on overhead signs, about 1.75 times the letter height.
- Arrows may be placed below the other sign legend or to one side of it. Figure 3-221 (freeways/expressways) and Figure 3-222 (arterials) provides examples of acceptable arrow layouts for overhead and ground- mounted guide signage.
- Roundabouts may require specific diagrammatic arrow and road configurations as per the example in Figure 3-223.

Figure 3-217 Directional Arrows for Freeway/Expressway Signage

Figure 3-218 Pull-Through Information Examples (3 Lanes of Traffic)

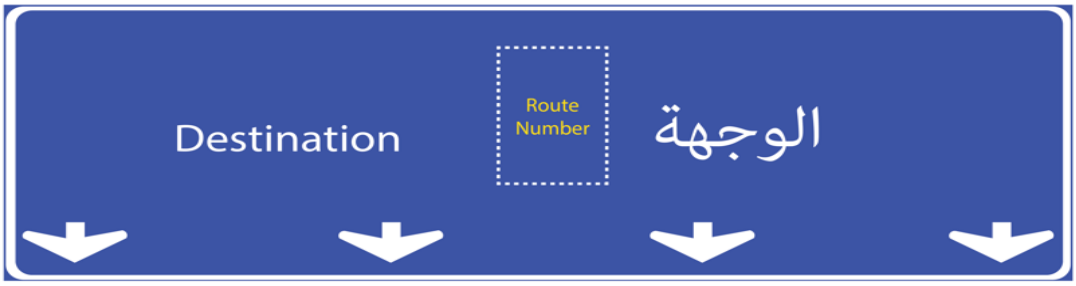


Figure 3-219 Pull-Through Information Examples (General Layout for 4 or More Lanes of Traffic)

Figure 3-220 Directional Arrows for Arterial Signage

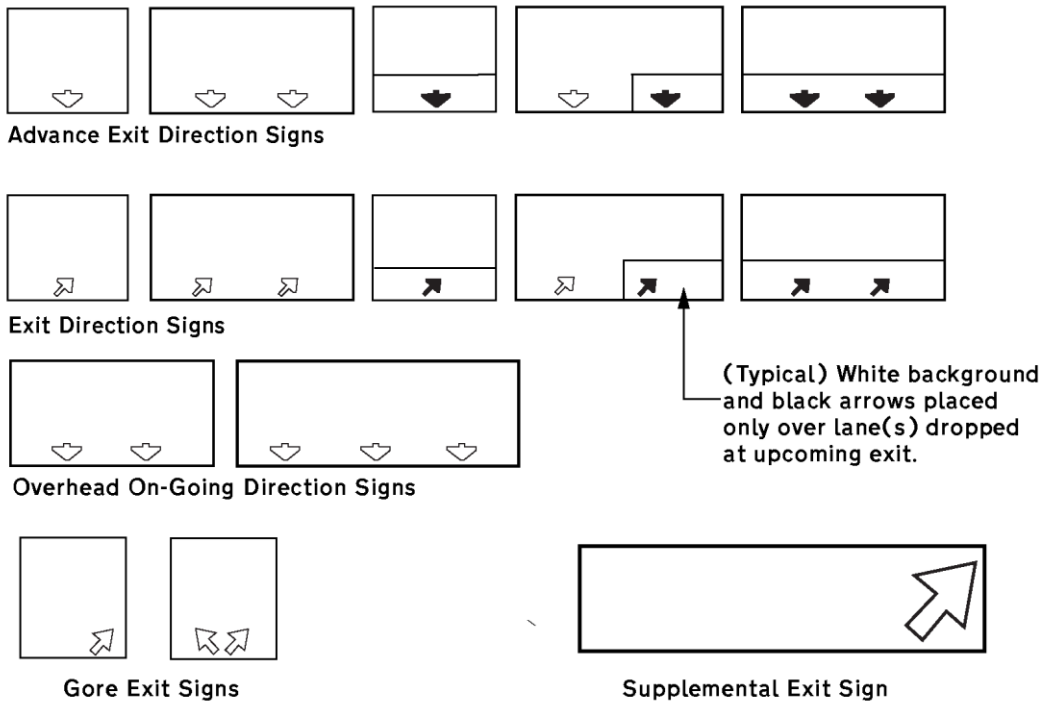
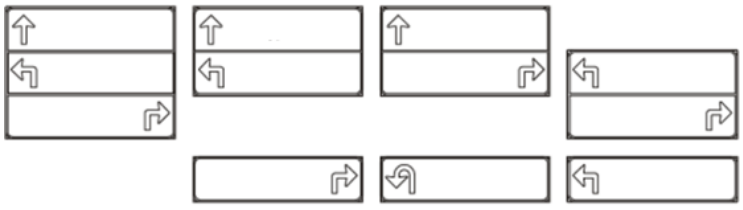


Figure 3-221 Typical Arrow Layouts for Freeway/Expressway Signs



Vertical stack sign examples

Horizontal stack sign examples

Figure 3-222 Typical Arrow Layouts for Arterial Signs (Ground-Mount Vertical Stack and Overhead-Mount Horizontal Stack)

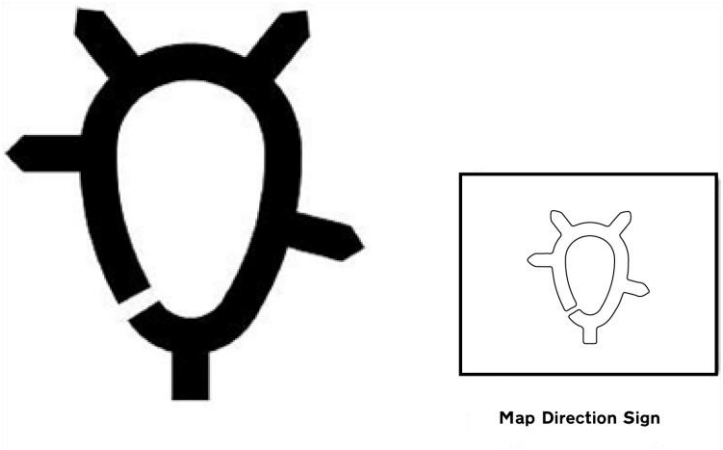


Figure 3-223 Representative Diagrammatic Layout for Roundabout Intersection (Map Directional Signage)

3.4.2.8 Interline and edge spacing

Interline spacing and border edge spacing **shall** be as per the following:

1. Side space between border and right or left line of justification = 0.5x.
2. Minimum lateral space between a route number emblem and an arrow = 1.0x.
3. Minimum lateral space between text and a Type 5 or Type 8 arrow = 1.0x.
4. Minimum lateral space between text and a symbol or emblem = 0.5x.
5. Vertical space between the top border and nearest legend = 0.5x.
6. Vertical space between the bottom border and nearest legend = 0.5x.
7. Vertical space between an upper row of legend and a lower row of legend on a horizontal stack type sign = 0.5x.

The typical requirements for interline and border edge spacing is depicted in Figure 3-224.

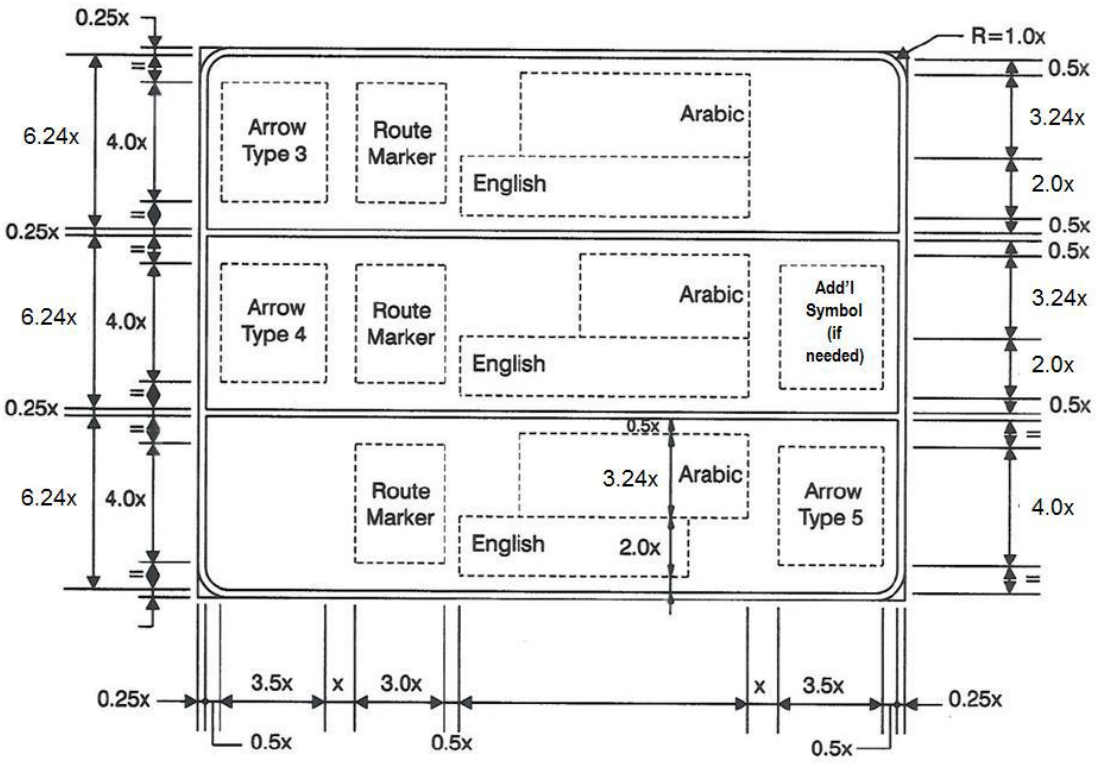


Figure 3-224 Guide Sign Spacing – Typical Requirements

3.4.2.9 Sign borders

Signs containing destinations **shall** have a border of the same color as the legend, to outline their distinctive shape to make them easily recognizable and to give them a finished appearance.

- Informative signs larger than 2 m by 3 m **shall** have a border width of 0.5x.
- The border width *Should* be a minimum of 0.25x and no wider than the stroke width of the Arabic legend.
- On sign larger than 4 m by 12 m, a border of 0.75x may be appropriate.

In general, border widths *Should* be proportional to sign size, and the corners of the sign border **shall** be rounded.

3.4.2.10 Color and background

Informative signs on all highways **shall** have white letters, arrows, and borders on backgrounds as follows:

1. Blue or Green – guide signs for primary destinations, street name signage.
2. Brown – guide signs for secondary special destinations (i.e., tourist, cultural).
3. Yellow – temporary traffic management (i.e., road works and traffic diversions) guide signs.

If there is a need for the use of additional colors for any reason, from the one's notified in Section 3.1.3.2, their application *Should* be consistent throughout the country, and *Should* meet the technical requirements of that chapter. They **shall** not be used as a substitute for the

colors indicated above for informative signs described above. White background may be used for signs pointing to local or government destinations, meaning arrows, legend and borders will be black.

3.4.2.11 Viewing factors

Proper placement of signs, either overhead or at the roadside, can greatly enhance the effectiveness of an installation.

- Sign faces *Should* always be oriented to minimize specular glare.
- Decisions on the placement of signs, both roadside and overhead *Should* be related to site conditions.
- Where highway design features and other appurtenances are affected, sign placement *Should* be jointly planned for best service and safety.
- Signs *Should* be located to be seen far enough in advance to allow drivers to read and comprehend the message.

3.4.3. Vertical and Horizontal Clearance

In ground installations, directional Informative signs **shall** be erected at a minimum height of 2 m above the edge of the pavement to the bottom of the sign.

If a sign is mounted below another sign, the major sign **shall** be at least 2.5 m and the secondary sign at least 1.5 m above the level of the pavement edge. (Refer to Section 3.1.4.1, Figure 3-8). When signs are positioned a minimum of 9 m away from the pavement edge to increase roadside safety, the vertical clearance of such signs may be reduced to 1.5 m above the pavement edge. (Refer to Section 3.1.4.1, Figure 3-8).

To provide a clear roadside recovery area for out-of-control vehicles, lateral horizontal clearances *Should* be provided for roadside signs and overhead sign supports. In no case **shall** any part of the sign or the sign structure, which is within the applicable vertical clearance dimension and exposed to traffic, be less than 1 m beyond any shoulder or travel lane prepared for normal or emergency travel of vehicles.

Advantage *Should* be taken of the longitudinal location of existing guardrail, overcrossing structures, and similar conditions to lessen the exposure of signs and sign supports to traffic. Breakaway or yielding supports *Should* be located as far from the traveled portion of the roadway as feasible.

3.4.4. Route Marking and Emblems

Route markers **shall** be used to identify and mark all numbered highways in the Kingdom. The markers for each classification of streets and highways **shall** be distinctive as far as the symbol is concerned. All markers **shall** be square in shape with the symbol superimposed on the square. Route markers as well as any auxiliary markers which accompany the route markers **shall** be reflectorized. The marker symbols **shall** be green and white with black Naskh or Al Madinah style numerals. Auxiliary markers **shall** be the same color combination of the route marker which they supplement.

Distinctive markers are used on the various categories of highways classified according to SHC 301 (Highway Geometric Design). Route numbers are assigned in accordance with the functional classification criteria. Highway and Expressway route markers will carry a route number with Arabic numbers (Western) with or less, imposed on the outline of the Arabian Peninsula (Figure 3-227) and **shall** be green and white. On Arterials, the marker will be in green and white with Arabic numbers (Western), with 3 digits (Figure 3-228). On Collectors and Locals, the symbol will be circular shaped in green and white, with Arabic numbers (Western), with 4 digits (Figure 3-229).

Route numbering selection **shall** use north to south and east to west directional routing and **shall** include even numbered designations for east and west routes and odd numbered designations for north and south routes. Cardinal direction markers **shall** be used as auxiliary markers with route numbering markers.

A very important part of guide signing is the route numbering system. Route numbers allow the motorist to develop a simple series of directions to follow within the Kingdom, as well as across the surrounding Countries. Where numbered routes are used to identify a specific main road, the route numbers will be prominently and predictably displayed on the guide signs, making driver orientation and direction clear and uncomplicated.

Figure 3-225 describes a standard hierarchy of route numbering systems for KSA, including international (Mashreq) routes, national routes, and regional or secondary routes which travel within KSA. At the base level is the local community addressing system (building number, road name), which is generally not directly related to the route numbering system but nevertheless is an essential part of wayfinding.

- Sign I1-1, shown in Figure 3-226 is defined to represent International or Mashreq routes, and *Should* be installed along way these routes. However, national routes also have unique numbers and identifiers as shown in Figure 3-227.

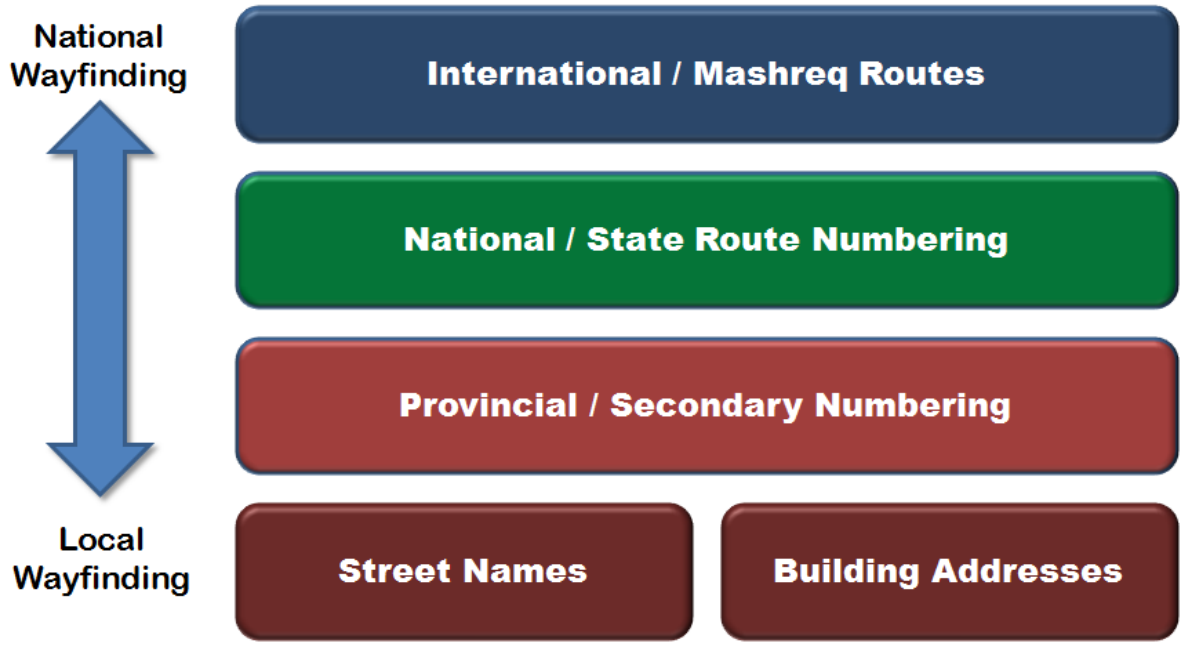


Figure 3-225 Standard Hierarchy of Route Numbering Systems for KSA

3.4.4.1 International / Mashreq routes (I1-1)

As designated by the United Nations Economic Commission for Western Asia (UNESCWA), the M-route designation is provided for major routes crossing international boundaries for movement of goods and people (Sign I1-1). The routes are designated alongside national or state numberings for these routes within a given country and *Should* provide continuity across international borders. M-routes in each country *Should* follow the emblem layout shown in Figure 3-226.

Further information regarding Mashreq routes network details can be found in SHC 301 (Highway Geometric Design).

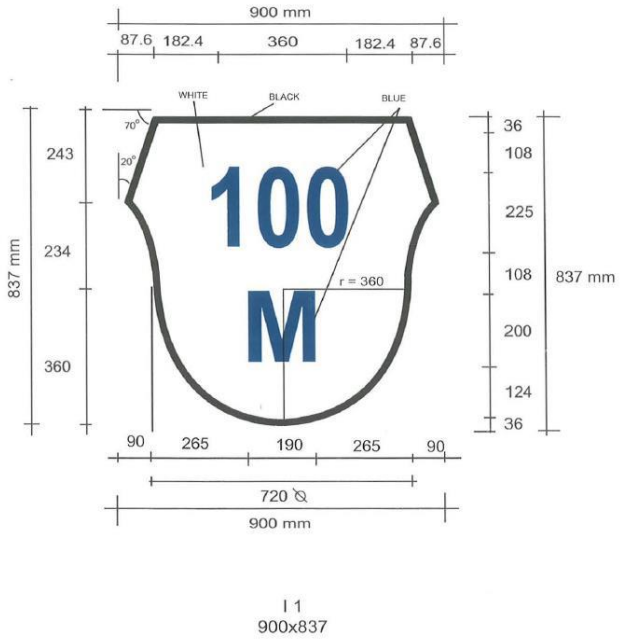


Figure 3-226 Route Marker for International/Mashreq Routes (I1-1)

Note on Figure 3-226: Route Marker shall be used to identify and mark all numbered highways throughout the GCC.

3.4.4.2 National / primary network routes numbering (freeways-expressways) (I1-2)

For major urban routes with three or more directional lanes along with high-speed routes (80 km/h and above), route emblems (I1-2) *Should* be a minimum of 900 x 900 mm (square markers) and either 1,000 x 750 mm or 750 x 1,000 mm for rectangular markers, depending on sign orientation. Route numbers contained within the signs *Should* be sized for visibility at specific approach speeds as per Section 3.5.

Figure 3-227 Route Marker for National / Primary Network Routes Numbering (Freeways-Expressways) (I1-2)

3.4.4.3 Secondary network routes numbering (arterials) (I1-3)

The relevant transport authorities may designate routes of regional significance that do not meet the criteria of national or state routes as indicated above.

They may connect national routes with major regional destinations such as major transportation, government, or industrial facilities that serve significant traffic.
Smaller markers may be used in conjunction with kilometer referencing signage as described in Section 3.6.10.

- On a typical rural or urban route (speeds of 80 km/h or less), sign dimensions *Should* be a minimum of 750 x 750 mm for square markers, and either 600 x 800 mm or 800 x 600 mm for rectangular markers, depending on sign orientation.
- For major urban routes with three or more directional lanes along with high-speed routes (80 km/h and above), route emblems *Should* be a minimum of 900 x 900 mm (square markers) and either 1,000 x 750 mm or 750 x 1,000 mm for rectangular markers, depending on sign orientation.

Route numbers contained within the signs *Should* be sized for visibility at specific approach speeds as per Section 3.5.

The dimension of route emblems is dependent on approach speed and visibility requirements, as with other signs.

Figure 3-228 Route Marker for Secondary Network (Arterials) (I1-3)

3.4.4.4 Secondary network routes numbering (collectors and locals)

On a typical rural or urban route (speeds of 80 km/h or less), sign dimensions *Should* be a minimum of 750 x 750 mm for square markers, and either 600 x 800 mm or 800 x 600 mm for rectangular markers, depending on sign orientation.

For major urban routes with three or more directional lanes along with high-speed routes (80 km/h and above), route emblems *Should* be a minimum of 900 x 900 mm (square markers) and either 1,000 x 750 mm or 750 x 1,000 mm for rectangular markers, depending on sign orientation.

Route numbers contained within the signs *Should* be sized for visibility at specific approach speeds as per Figure 3-229.

Figure 3-229 Route Marker for Secondary Arterials (I1-4)

3.4.5. Makkah & Al Madinah Trail Marker (I2-Series)

Makkah trail marker (I2-1) is designed to provide pilgrims with route guidance on following a particular route to Makkah. It may be erected at strategic locations along major routes to indicate the direction to Makkah (Figure 3-230) (MoC).

Al Madinah trail marker (I2-2) is designed to provide route guidance on following a particular route to Al Madinah. It may be erected at strategic locations along major routes to indicate the direction to Al Madinah (Figure 3-231) (Riyadh AMANAH, 1441).

Trail markers *Should* be minimum of 600 x 600 mm.

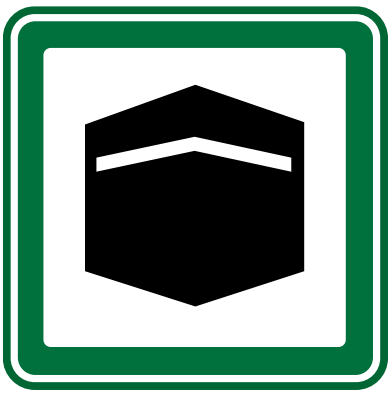


Figure 3-230 Makkah Route Trail Marker (I2-1)

Figure 3-231 Al Madinah Route Trail Marker (I2-2)

3.4.6. Cardinal Direction Markers (I3-Series)

Cardinal Direction markers **shall** consist of a single plate with the Arabic word for direction on the right two-thirds of the sign and the letter N (North), S (South), E (East), or W (West) on the left (see Figure 3-232). The two sections are divided by a vertical line. The colors **shall** correspond to that for the route markers, e.g., markers for blue route emblems **shall** be blue with white legend, and markers for green route emblems **shall** be green with white legend.

The Relevant Transport Authority may use Cardinal Direction markers to indicate specific travel directions for a named numbered route. The markers may be provided as follows:

1. Above the route number emblem on a stand-alone installation on the roadside, either on an advance trailblazer ahead of an intersection (in conjunction with directional arrow), or on a route reassurance assembly mounted downstream from an intersection or farther along the road.
2. To the right of the route number emblem on a horizontal stack guide sign.

Figure 3-232 Cardinal Direction Markers (I3-1, I3-2, I3-3 and I3-4 Respectively)

3.4.7. Advance Curve Arrow (I4-Series)

The Advance Curve Arrow markers (from Figure 3-233 to Figure 3-237) display a right or left arrow, with the shaft bent at a right angle or at an either 90 or 45-degree angle. These Advance Curve arrows are mounted below route number markers in advance of intersections, typically when no other guide signage with this information is provided. The arrow shows the direction that the route takes at its intersecting point. The colors of the Directional Arrow marker **shall** correspond to that for the route markers, e.g., markers for blue route emblems **shall** be blue with white legend, and markers for green route emblems **shall** be green with white legend.

In some instances, a vertical arrow could be used if one route continues straight through and the other route leaves at some angle.

Figure 3-233 Advance Curve Arrow Marker (I4-1R) –90-Degree Angle

Figure 3-234 Advance Curve Arrow Marker (I4-1L) –90-Degree Angle

Figure 3-235 Advance Curve Arrow Marker (I4-2R) – 45-Degree Angle

Figure 3-236 Advance Curve Arrow Marker (I4-2L) – 45-Degree Angle

Figure 3-237 Advance Curve Arrow Marker (I4-3R/L) – 45-Degree Angle

3.4.8. Directional Arrow (I5-Series)

The Directional Arrow markers (Figure 3-238 and Figure 3-239) display a single-or double-headed arrow, pointing in the general direction that a route may follow. As with Signs I3-series, these are mounted either below route number markers in advance of intersections, typically when no other guide signage with this information is provided.

The colors of the Directional Arrow marker **shall** correspond to that for the route markers, e.g., markers for blue route emblems **shall** be blue with white legend, and markers for green route emblems **shall** be green with white legend.

Figure 3-238 Directional Arrow Markers – Single-headed Arrow (I5-1R, I5-2R and I5-3 Respectively)

Figure 3-239 Directional Arrow Marker – Double-headed Arrow (I5-4, I5-5, I5-6 and I5-7 Respectively)

3.4.9. Directional Guidance Using Trailblazer Assemblies

Directional guidance using trailblazer assemblies may be used at rural intersections, or at urban intersections where sufficient space is not available for installation of overhead or roadside guide sign stack assemblies or chevron signs Generic route marker signs are shown in lieu of route markers/custom emblems that may be specified by RGA.

The departure route number signage may be placed in a complementary fashion with destination signage (either ahead of the destination sign or atop the destination sign).

In general, if the Transport Jurisdiction utilizes cardinal directions, they *Should* be provided on main routes where the route is headed predominantly in the direction shown and for a significant distance as defined by the Transport Jurisdiction.

Examples of trailblazers and mounting locations are shown in Figure 3-240, Figure 3-241, Figure 3-242 and Figure 3-243 as shown below.

Departure signage from intersections is illustrated in Figure 3-244 and shows use of route markers with and without cardinal directions provided.

The examples shown do not include regulatory or warning signage applicable to specific intersections and locations.

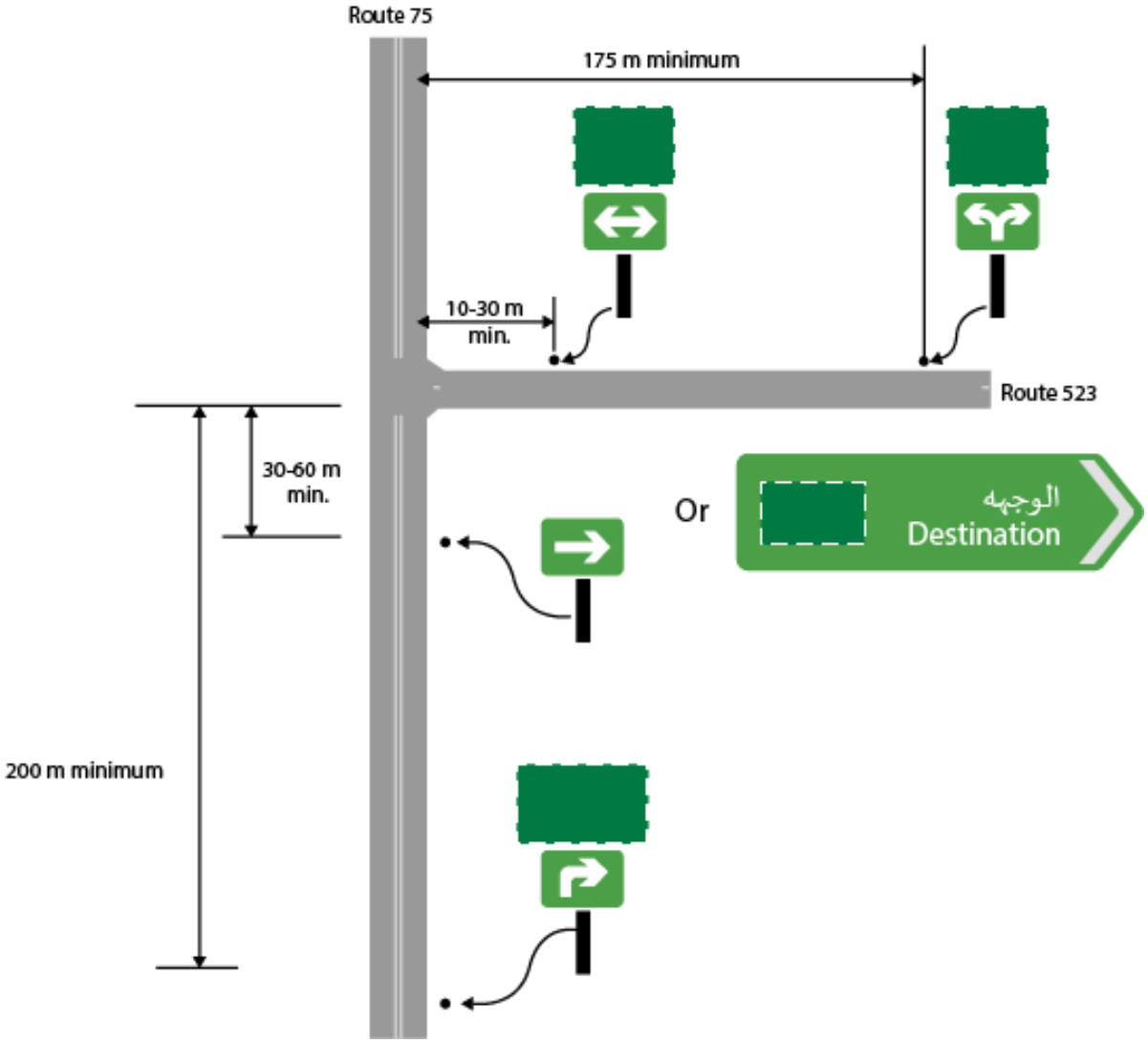


Figure 3-240 Route Approach Signage for Rural Main Road and Secondary Route Intersection (T-intersection for Side Road)

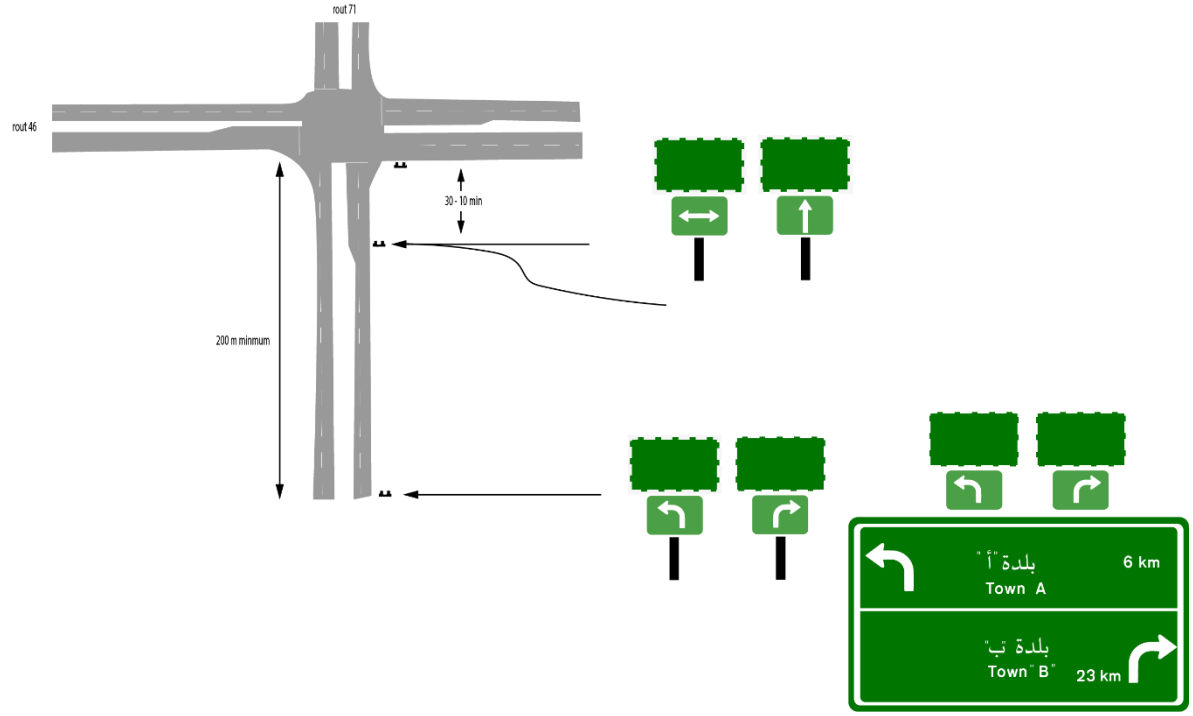


Figure 3-241 Route Approach Signage (4-way Intersection Between Numbered Rural Routes and Other Routes with Limited Spacing for Signage)

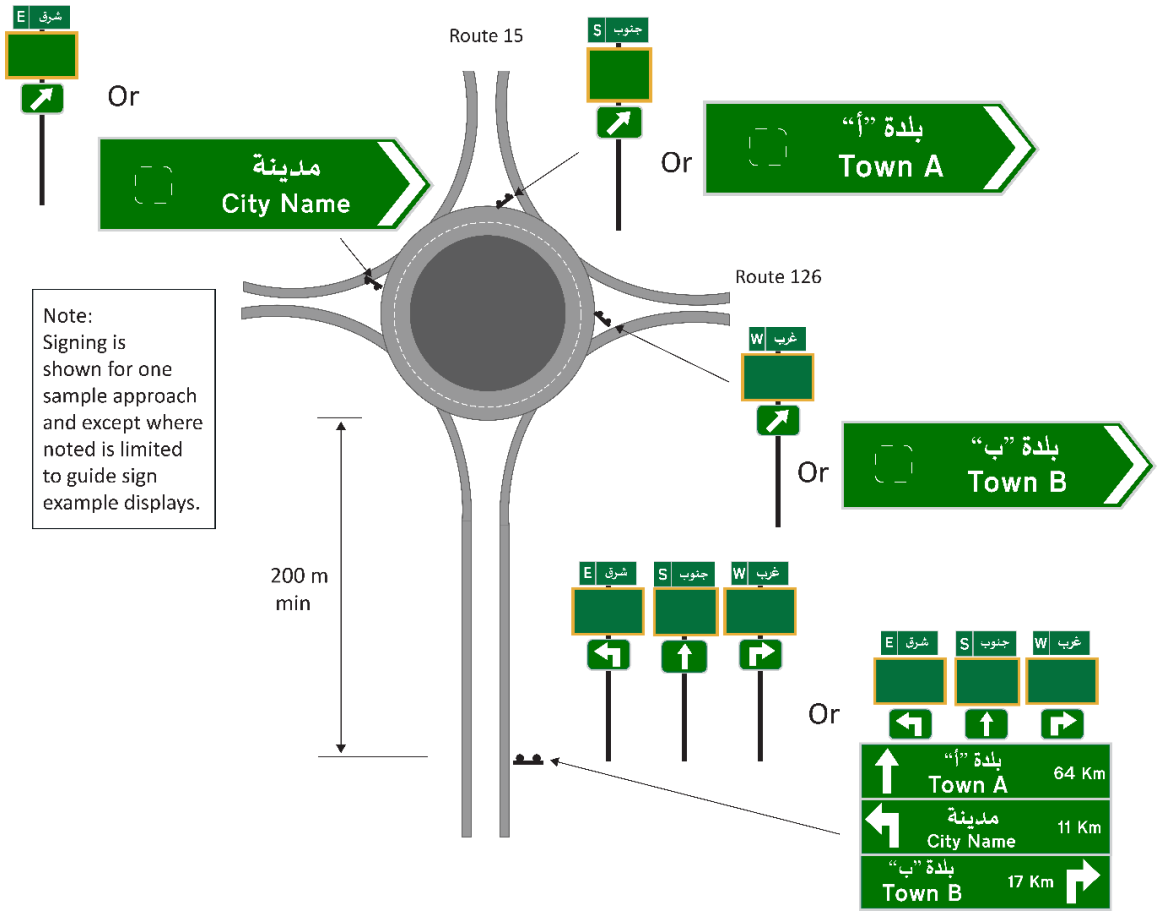


Figure 3-242 Route Approach Signage (Roundabout Between Numbered Rural Routes and Other Routes with Limited Spacing for Signage)

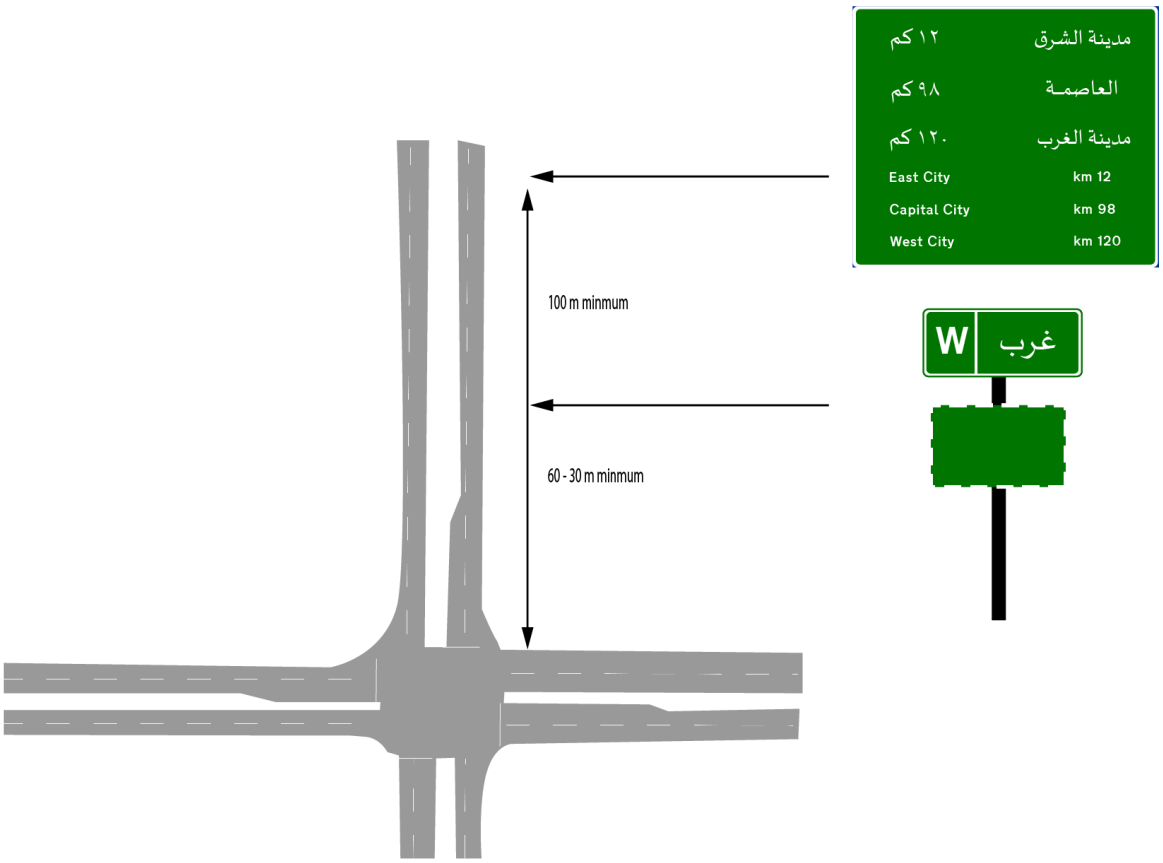
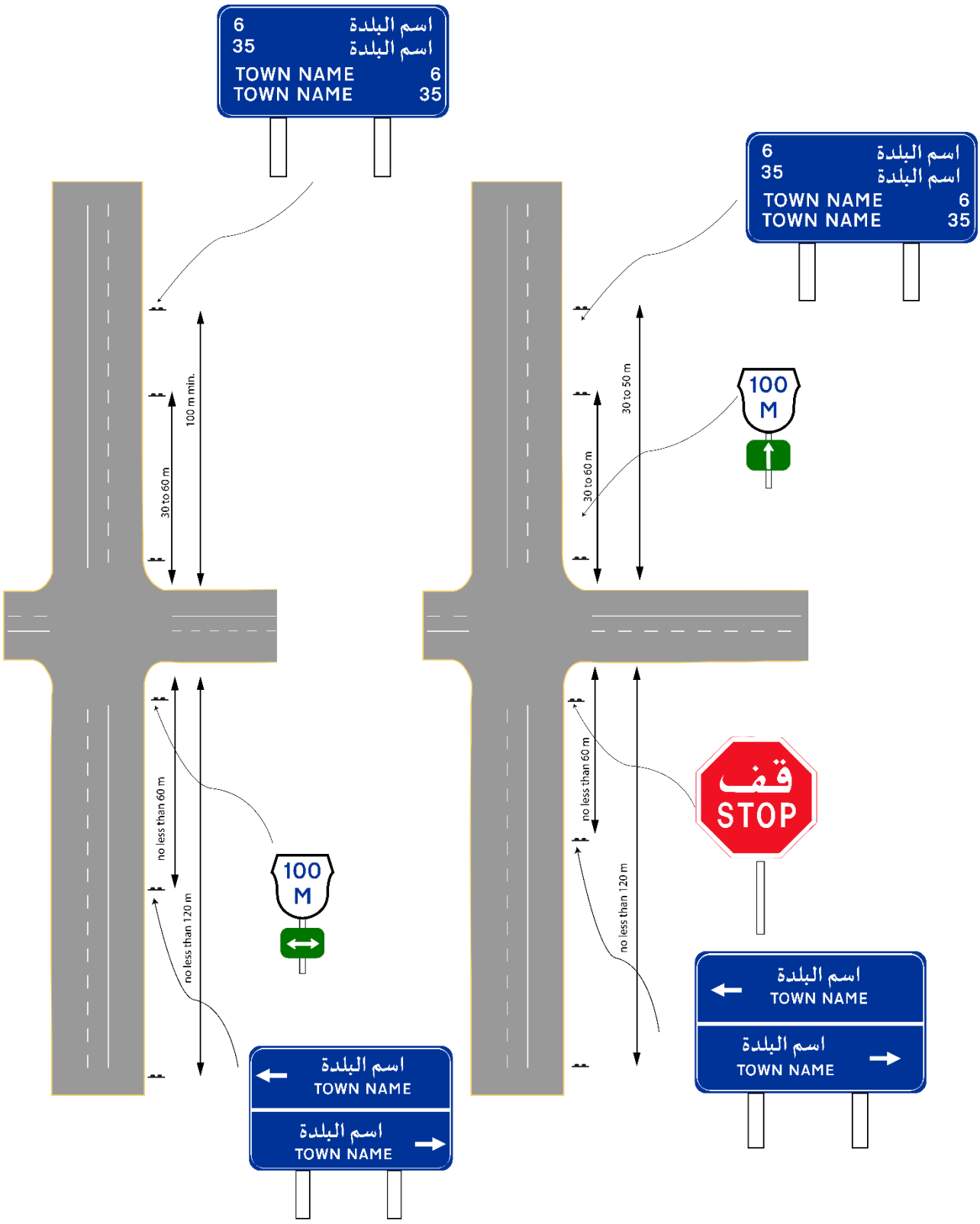
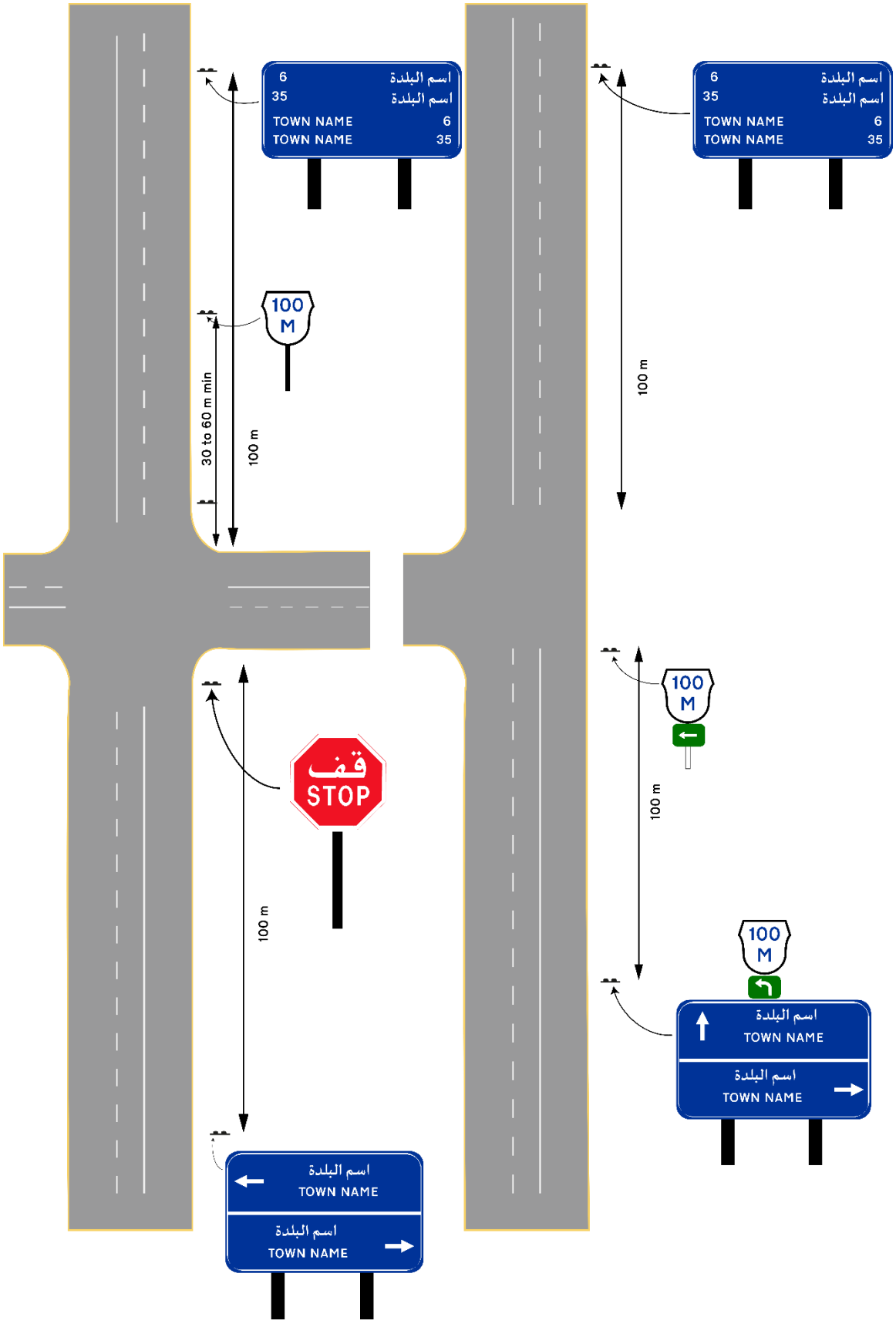


Figure 3-243 Route Reassurance / Destination Signing Departing a Typical Intersection


6 اسم البلدة
35 اسم البلدة
TOWN NAME 6
TOWN NAME 35
100 m min.
30 to 60 m
100 M
no less than 60 m
no less than 120 m
اسم البلدة
TOWN NAME
اسم البلدة
TOWN NAME
30 to 50 m
30 to 60 m
قف
STOP
no less than 60 m
no less than 120 m
اسم البلدة
TOWN NAME
اسم البلدة
TOWN NAME


6 اسم البلدة
35 اسم البلدة
TOWN NAME 6
TOWN NAME 35
100 M
30 to 60 m min
100 m
قف
STOP
اسم البلدة
TOWN NAME
اسم البلدة
TOWN NAME

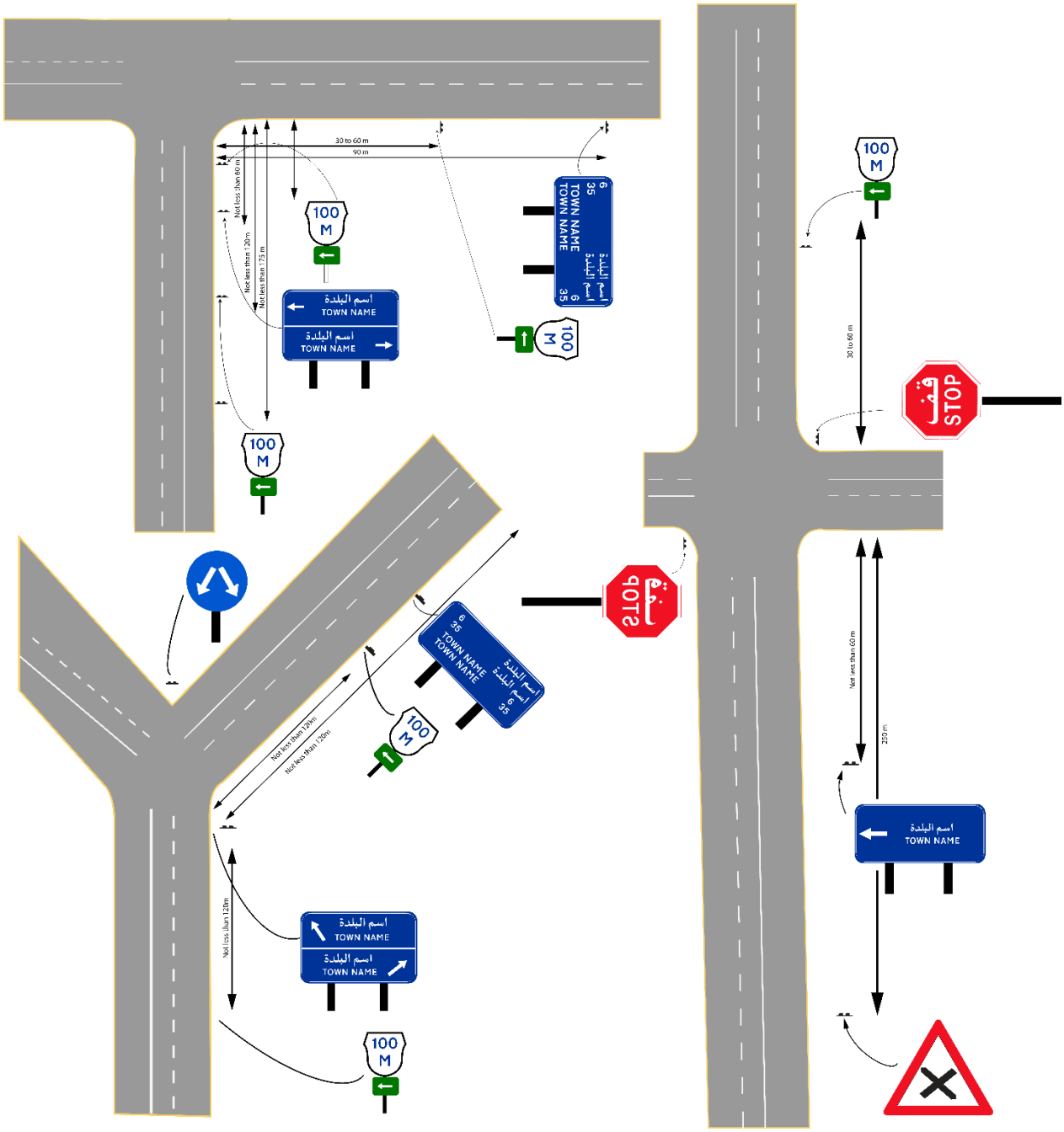


Figure 3-244 Typical Route Signs and Markings at Rural Intersections (For One Direction of Travel Only)

3.5. Standard Guide Signs – Arterial, Collector and Local Highways

3.5.1. Application

Standards for Arterial, Collector and Local Highway Guide Signs prescribed **shall** apply to any highway or road other than a freeway or expressway.

Arrows pointing vertically and arrows pointing left **shall** be at the extreme left and arrows pointing to the right **shall** be at the extreme right of a sign or sign stack (Figure 3-245).

As a general rule, directional arrows *Should* be horizontal or vertical, but at an irregular intersection a sloping arrow will sometimes convey a clearer indication of the direction to be followed. For added legibility, it is recommended the width across the barbs of the arrow be at least equal to the height of the largest letters on the sign, and for short downward pointing arrows on overhead signs, about 1 time the letter height.

3.5.2. Size of Lettering and Legend Spacing

Arabic letters and numbers **shall** be the largest and have the predominate place on the sign. Section 3.4.2.2 outlines the sizes of both Arabic and English letters relative to the height of the English lowercase letter "x". Table 3-12 the recommended height for the letter "x" under different approach speeds. Where distances are shown to destinations, the number height **shall** be the same as the English capital letter height. Sign panels **shall** be large enough to accommodate the required legend without crowding. Section 3.4.2.5 refers to the amount of allowable legend in the body of an informative sign.

3.5.3. Advance Direction Signs

Various types of Advance Direction signs for Arterial, Collector and Local roads are discussed in the following sections. The Advance Direction signs must be carefully designed to afford the maximum degree of clarity and must be located and sized based on approach speeds. Section 3.4.2.8 refers to the typical requirements for the guide sign spacing and sizing.

Advance direction signs **shall** be placed a sufficient distance from the intersection to be effective for day and night conditions (see from Figure 3-245 to Figure 3-249).

All approaches to intersections between two arterial routes *Should* be provided with a minimum of two advance direction signs as well as a chevron direction sign at the intersection (see below example of sign types). The advance supplemental sign is optional.

The location of signs *Should* take into consideration the road and traffic conditions, including the normal speed of vehicles and the distance at which the sign is visible. The distance will be no less than 150 m on arterial highways and other roads carrying high speed traffic.

The following types of Advance Direction sign may be specified for use in advance of, at, or within at-grade intersections:

- Advanced Horizontal Stack Sign (overhead mounted), or
- Advance Vertical Stack Sign (ground mounted), or
- Advance Map Sign.
- Advance Supplemental Sign.
- Chevron Direction sign.
- Street Name Sign.

3.5.3.1. Advance horizontal stack sign (G1-1)

Advance horizontal stack sign (G1-1) (example is shown in Figure 3-245) **shall** be overhead-mounted guide signs located in advance of a major at- grade intersection, in which panels for specific road directions are mounted approximately above the lanes which are to be used for making the appropriate through or turning movements. The primary functions of these signs are:

- To indicate the routes and control destinations at the end of each route and intermediate destinations, where applicable, that can be reached by turning left or right, or continuing ahead.
- To assist drivers and ensure adequate time to select the most appropriate lanes for the maneuvers they wish to make at the intersection ahead.

One panel is provided for each choice of direction, and **shall** contain:

- either the street name plus one destination, or
- up to two destinations.

Route numbers **shall** be shown on the top left of the right-hand panel, and next to the directional arrow on the left-hand and through panels. The panels **shall** be sized to fit the information required within the road width.

If cardinal directions are used, they *Should* be shown to the right of the route number emblem City center, airport or other major destination symbols may also be provided as appropriate to represent those destinations.

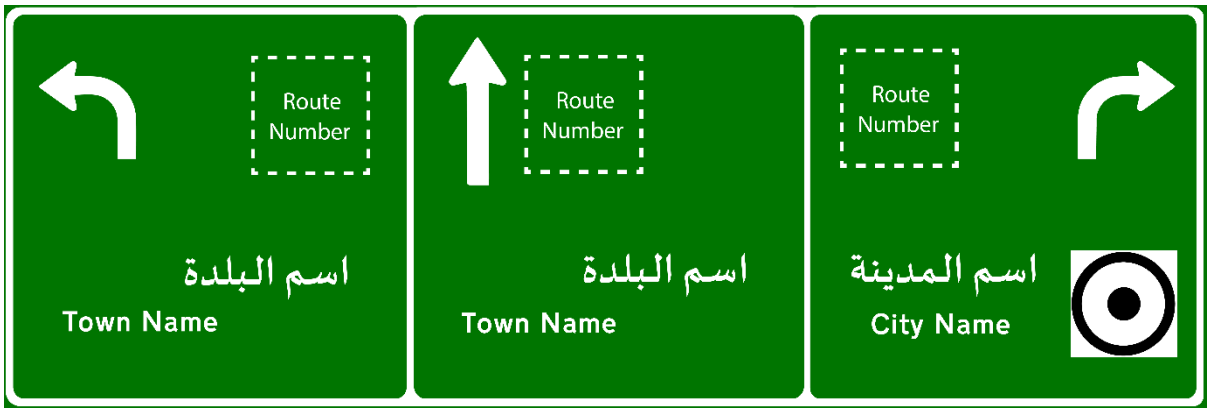


Figure 3-245 Advance Horizontal Stack Sign - Example (G1-1)

3.5.3.2. Advance vertical stack sign (G2-1, G3-1)

Advance Vertical Stack Signs (G2-1 and G3-1) **shall** be ground-mounted guide signs located in advance of an at-grade intersection, which show, on up to three panels stacked vertically, the available route numbers, street names and/or control destinations and corresponding through or turning movements.

The primary functions of this sign are:

1. To indicate the routes and control destinations at the end of each route that can be reached by turning left or right or continuing ahead.

2. To assist drivers and ensure adequate time to select the most appropriate lanes for the maneuvers they wish to make at the intersection ahead.

Examples of Vertical Stack Signs are depicted in Figure 3-246 and Figure 3-247.

No more than two lines (Arabic and English each) *Should* be shown per stack, either street name plus control destination; or one control and one secondary destination.

At rural intersections, destinations may also be shown with distances, and may not always show a through movement panel if the approach to a T-intersection.

Through movements (if any) are shown as the top panel, while left movements appear on the panel below and right turn movements at the bottom. Arrows appear on the left side (except for right turns where the arrow is on the right side). The route number emblem is to the right of the arrow except for right turn panels where it is at the far left of the panel.

If there is only a single side road movement (left or right) at the intersection, and it is not signalized, a single panel may be used to represent that movement.

Figure 3-246 Advance Vertical Stack Sign (Rural, with Distances to Destinations) - Example (G2-1)

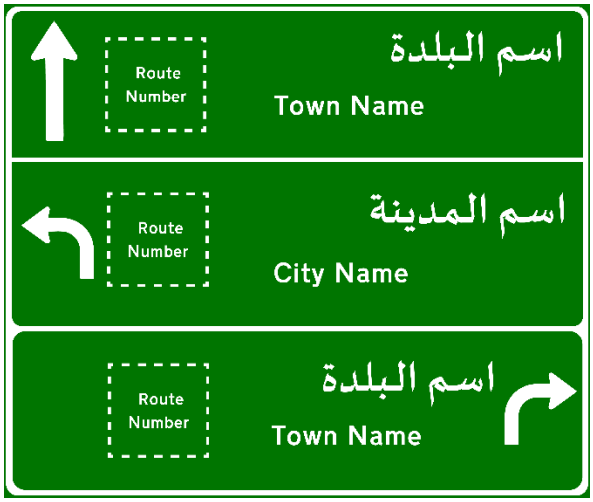


Figure 3-247 Advance Vertical Stack Sign (Urban) - Example (G3-1)

3.5.3.3. Advance map sign (G4-1)

Sign G4-1 **shall** typically be applied for complex intersections containing nonstandard or irregular road geometry such as an enlarged roundabout, dog-legged intersection, and/or more than four exit roadways.

Due to the size required for this type of sign, it *Should* only be used in exceptional circumstances. It *Should* not be used at T-intersections for example.

Advance Map Signs may be ground or overhead-mounted or located in advance of an at-grade intersection. The sign, using a diagrammatic display, shows the route numbers, street names and/or control destinations associated with the directional indications on the map. The map does not show specific lane assignments for turning movements.

Advance map sign may be used in lieu of stack signage at intersections with 3 or more directional options.

Example is illustrated in Figure 3-248.

Figure 3-248 Advance Sign - Example (G4-1)

3.5.3.4. Chevron direction signs (G5-Series)

Chevron signs (G5-1, G5-2 and G5-12 series) **shall** provide directional indications at the point of turning, including provision of route numbers, street names and control destination, supplemental and local destinations. The color of the sign background depends on the route and the function of the sign, including use of green or blue for main routes and destinations, brown for tourist and services installations and white (with black legend) for government installations and services. Chevron direction signs *Should* show no more than two lines of information and two route numbers.

Examples are shown in Figure 3-249.

Figure 3-249 Chevron Direction Sign Examples (G5-1, G5-3 and G12-1)

3.5.3.5. Street name sign (G6-Series)

Street name signs (G6-1 - G6-5) *Should* be mounted on poles at street corners, as large signs in the median facing oncoming traffic at the intersection or mounted overhead on traffic signal mast arms or support structures.

There are three typical styles that *Should* be utilized:

1. Single or dual-chevron style, mounted on the cross-street median, showing directions of travel along the intersecting street from the main road (see Figure 3-250).
2. Single panel style, mounted on street median or utilized as reassurance signing along a main route, usually in conjunction with a route number emblem (left side of sign) (see Figure 3-251).
3. Overhead cantilever-arm signalized intersection, usually dimensioned to be smaller than the above options to reduce wind loading (see Figure 3-252).

Generally, street name signing on medians or reassurance signing will be white with black borders and legend. Overhead cantilever arm signing *Should* be green or blue with white background (border optional) and *Should* either be retroreflective or internally illuminated signs.

Local street-name signs on intersection corners are well-suited to neighborhood and sector local roads due to the lower travel speeds and limited space for sign installation. They *Should* be set up as "flag-style" mountings (each street name on the post, with the signs mounted at right angles from one another), or as "stack" mountings, with one street name sign mounted directly on top of the second sign, on the axis of the pole.

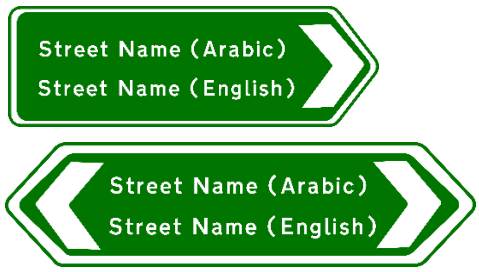
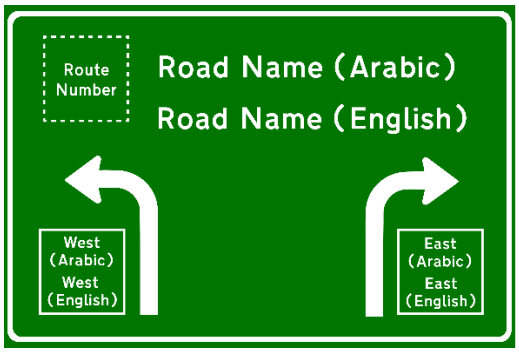


Figure 3-250 Single and Dual-Chevron Street Name Sign (G6-2 and G6-1 Respectively)

Figure 3-251 Single Panel Street Name Sign (G6-3)



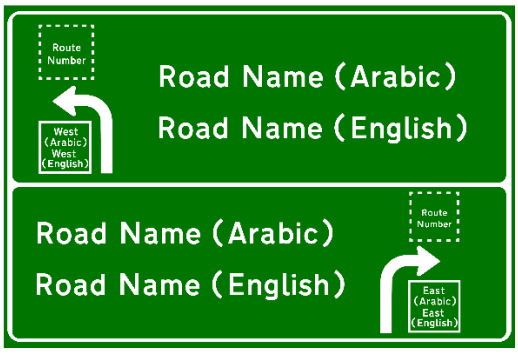


Figure 3-252 Overhead Cantilever-Arm Street Name Sign - Examples (G6-4 and G6-5 Respectively)

3.5.4. Place Identification Signs (G7-Series)

Place identification signs (G7-series) are used to show boundary between two administration divisions of KSA, as well as to designate built-up areas, wadis, mountain passes, and historical landmarks.

- Blue or green backgrounds may be used for signs when crossing national boundaries or entering larger communities.
- Brown background *Should* be used for tourist or natural landmarks such as mountain areas, wadis, or national park areas.
- For entering localities such as neighborhoods or communities, a sign with a white background may be used. Modifiers including "Entering" or "Welcome to" may be provided prior to the neighborhood or community name.

Figure 3-253 shows three examples of place identification signage.

Figure 3-253 Place Identification Signs Examples (G7-1, G7-2 and G7-3)

3.5.5. Confirmatory Signs

Several types of confirmatory signs (e.g., directional and speed limit signs) may be used to provide reassurance to drivers that they are on the correct route.

- For example, following an entry or exit to / from an expressway additional repeated direction signs *Should* be provided to reassure drivers that they are on the correct path.

- For example, following an entry or exit to / from an expressway the appropriate speed limit sign *Should* be provided immediately after entering the new carriageway and then repeated thereafter to remind and assure drivers of the appropriate speed limit.

3.5.5.1. Confirmatory (Distance) signs (G8-1)

These signs **shall** confirm the destinations and related distances along a road mainly departing from a built-up area or beyond the intersection with another numbered highway.

Background color **shall** be either retroreflective blue or green, with retroreflective white legend and borders, consistent with other guide signs located along the road facility as per this Volume.

No more than three places **shall** be identified along with distances and units.

An example of confirmatory (distance) sign is shown in Figure 3-254.

Figure 3-254 Confirmatory (Distance) Sign - Example (G8-1)

3.5.5.2. Route and highway confirmation sings

Use of white rectangular street name signs (see Section 3.5.3.5 above) along routes leaving a signalized or rural interchange reinforce the name of the street. Route number trailblazer displays *Should* be provided at the departure of major intersections with distance signage to follow.

3.5.6. Useful Information Signs (G9-1, G10-1)

Useful Information signs provide general information which is not included in facilities signing, the parking series, traffic signal operation, and rest, recreational, and cultural areas signing. Figure 3-255 and Figure 3-256 are examples of useful information signs.

Figure 3-255 No Through Road Sign (G9-1)

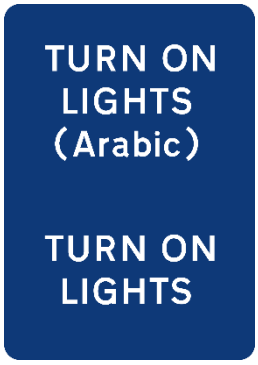


Figure 3-256 Turn on Lights Sign (G10-1)

3.5.7. Facilities / Services Signs (G11-Series)

Facilities signs provide information to the traveler on how to find services, both personal and for the vehicle. Service signing covers petrol, mosque, food, lodging, repairs, first aid and sickness needs.

Services Signs informs motorists of services available either adjacent to the roadway or at a nearby, upcoming exit from the roadway.

Services eligible for this sign include:

1. Petrol station.
2. Mechanic.
3. Restaurant.
4. Hotel.
5. Refreshments.
6. Public telephone.
7. Hospital (with a physician on duty 24 hours a day).
8. First aid station (open 24 hours a day).
9. Wi-Fi Facilities
10. Mosque.
11. Toilet.

Iconic symbols are illustrated below:

- Petrol Station (G11-1)
  This sign indicates a gas station. If this sign is used before the station, it must indicate the distance to the gas station (Figure 3-257).

Figure 3-257 Petrol Station Sign (Sign G11-1)

- Mechanic (G11-2)
  This sign indicates auto mechanics (Figure 3-258).

Figure 3-258 Mechanic Sign (Sign G11-2)

- Restaurant (G11-3)
  This sign is used for the purpose of guiding to restaurants (Figure 3-259).

Figure 3-259 Restaurant Sign (Sign G 11-3)

- Hotel (G11-4)
  This sign is used for the purpose of directing to hotels, and if the symbol is used on other directive signs, it is okay to write the name of the hotel (Figure 3-260).

Figure 3-260 Hotel Sign (Sign G 11-4)

- Refreshments (G11-5)
  This sign instructs a small restaurant with light services only (Figure 3-261).

Figure 3-261 Refreshments Sign (Sign G 11-5)

- Public Telephone (G11-6)
  This sign indicates a public telephone. It can be used at the telephone site. This sign can be used on the roads to denote emergency phones, and in this case the word emergency (in Arabic only) is written at the bottom of the sign (Figure 3-262).

Figure 3-262 Telephone Sign (Sign G11-6)

- Hospital (G11-7)
  This sign can be used to guide drivers to hospitals. The sign symbol can also be used alone or by adding the name of the hospital to another guide sign.
  The sign can also be installed on a street passing a hospital to alert road users that they are passing a hospital and that they *Should* take the necessary precautions in accordance with the traffic regulations (Figure 3-263).

Figure 3-263 Hospital Sign (Sign G11-7)

- First Aid Center (G11-8)
  This sign is used for the purpose of directing to first aid centers and smaller hospitals where first aid services can be obtained or transfers to other hospitals when necessary (Figure 3-264).

Figure 3-264 First Aid Sign (Sign G11-8)

- Wi-Fi (G 11-9)
  This sign indicates Wi-Fi facilities (Figure 3-265).

Figure 3-265 Wi-Fi Sign (Sign G11-9)

- Mosque (G11-10)
  This sign indicates a mosque (Figure 3-266).

Figure 3-266 Mosque Sign (Sign G11-10)

- Toilet (G 11-11)
  This sign indicates a Toilet (Figure 3-267).

Figure 3-267 Toilet Sign (Sign G11-11)

Only services that fulfill the needs of the road user *Should* be shown as white icons with black legend, shown on a rectangular guide sign with blue background and white border, along with arrow information or exit number (G11-12 and G11-13, see Figure 3-268 and Figure 3-269 accordingly).

Figure 3-268 Rest Area and Other Roadside Services – Advance Informative Sign (G11-12)

Figure 3-269 Rest Area and Other Roadside Services – Informative Sign at the Destination (G11-13)

3.5.8. Designated Parking Area Signs (G12-Series)

The designated parking signs indicate where parking is available: on the street, off the street and any parking with special instructions. The parking icon is represented by a white "P" in a blue icon, which is shown on a white directional sign or flag type (representing a local guide sign) as illustrated in Figure 3-270 (Chevron Sign) and Figure 3-271 (Trailblazer Sign).

Because parking signs are used on a local level, the signs **shall** be in white with the blue parking symbol situated as part of the legend. The arrow **shall** be black and **shall** be either a hook arrow, through arrow or U-turn arrow.

Figure 3-270 Designated Parking Area (Chevron Sign) (G12-1)

Figure 3-271 Designated Parking Area (Trailblazer Sign) (G 12-2)

3.5.9. Traffic Signal Signs (G13-Series)

Traffic Signal signs in this series are often desirable or necessary for instruction of pedestrians and drivers. Traffic Signal signs are used in several situations:

1. Indicate a stopping point. (Stop here on red Sign (G13-1), see Figure 3-272).
2. Guard against blocking an intersection when waiting driver is waiting for a green signal. See Section 3.2.74 for signage details.
3. Identify certain signals and indicate what the driver must do.
4. Instruct pedestrians to push button for signals to cross the street. (Pedestrian Push Button Sign (G13-3), see Figure 3-273).

Figure 3-272 Stop Here on Red Sign (G13-1)

Figure 3-273 Pedestrian Push Button Sign (G13-3)

3.5.10. Major Destination Symbols (G14-Series)

Specific major destinations on guide signs may be represented by symbols (black legend on white emblem). These include airport, city center and industrial area signage.

Use of Airport (G14-1), City Centre (G14-2), Industrial Area (G14-3) or Stadium (G14-4) symbols **shall** only be used along routes that have either of these as a destination (see Figure 3-274, Figure 3-275 and Figure 3-276).

- The symbol plates **shall** be located to the right of the route shield in the middle of the top portion of the stack, or, for left and through movement signs, right justified within the stack above all Arabic and English text.
- The airport symbol **shall** be turned in the direction of the required movement leading to the airport. However, the nose of the symbol **shall** not point below horizontal at any time.
- The symbol **shall** be turned with the nose of the plane pointing at the direction to follow in order to reach the airport.

Normally the symbol is used without the name of the airport, but if there is more than one airport in the area, the names may be used in combination with the symbols.

City Centre symbols may be used in conjunction with the name of the city center area (if there are multiple city center areas within a region). Industrial Area symbols may be used in conjunction with the name of the industrial area (if there are multiple industrial areas within a region). More symbols can be found in Appendix C.

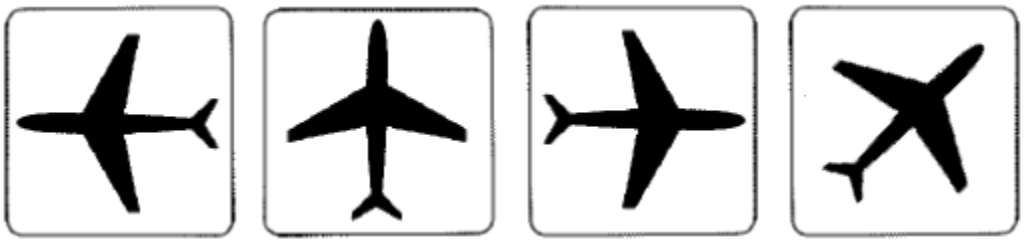


Figure 3-274 Airport Symbols (G14-1A, G14-1B, G14-1C and G14-1D Respectively)

Figure 3-275 City Center Symbol (G14-2)

Figure 3-276 Industrial Area Symbol (G14-3)

3.5.11. Pedestrian Underpass / Overpass Sign (G15-1)

The sign guides pedestrians to the locations of entrances to pedestrian underpasses and overpasses.

The sign **shall** be reduced-size chevron sign visible to pedestrians on the sidewalk (see Figure 3-277). The background **shall** be green, matching other guide signs utilized by the relevant road authority along arterial routes.

It *Should* be located within 5 meters of the entrance to a pedestrian underpass / overpass and in a position to maximize its visibility for pedestrians from all angles.

If one end of a pedestrian underpass / overpass has more than a single point of entrance, and those points are located more than 15 meters apart, a separate sign may be installed for each point of entrance. In this case, the signs *Should* be located as close as possible to the point of entrance.

Figure 3-277 Pedestrian Underpass / Overpass Sign (G15-1)

3.6. Standard Informative Signs – Freeways and Expressways

3.6.1. Application

Standards for Informative signs prescribed **shall** apply to any freeway or expressway as applicable, unless specifically accepted elsewhere. These standards provide a uniform and effective system of highway signing which is adequate for high-volume, high-speed motor vehicle traffic on all modern freeways and expressways.

Since many geometric design variables are found in existing freeways and expressways, a signing concept commensurate with prevailing conditions *Should* be the prime consideration. Freeway and expressway signing *Should* be planned at the design stage.

The use of two languages on each panel on the sign board requires that destinations **shall** appear in Arabic on the top line and in English on the bottom line. This will require larger sign boards to achieve this desirable easy-to-read letter size. Freeway and expressway signing *Should* always be considered and developed as a planned system of installations.

An engineering study will be necessary for the proper solution of the problems of many individual locations. In addition, consideration of an entire route is necessary. Drivers *Should* be presented with consistent signing on the approaches to interchanges.

The standards prescribed for sign letter size are the same for both urban and rural areas. Space is often at a premium on urban sections, but the typical traffic pattern is also more complex for the driver to negotiate, and large easy-to-read lettering is just as necessary as on rural highways.

3.6.2. Size of Lettering and Legend Spacing

All names of places, streets, and highways on freeway and expressway informative signs **shall** be composed of Arabic style letters and number, as designated by the responsible authority. On signs with dual language messages, the letter size of the English legend **shall** be approximately two-thirds of the Arabic letter size. The Arabic letter sizes will be determined first and the English sizes will be adapted to the Arabic sizes. The prescribed numeral and letters.

3.6.3. Designation of Destinations

"Control" destination points along the route **shall** always be selected and then shown on the signs as the next major destination point.

Post-interchange signs **shall** consist of two-or three-line messages carrying the names of significant destinations and distances to those points.

Destination legends *Should* provide the drivers with the best orientation possible. Continuity in successive sign messages and consistency with available map information is essential.

Selecting major destinations along the freeway or expressway is important to the quality of service provided by these routes. Control destinations *Should* be used in advance of the following:

1. Interchanges between expressway and arterial routes.
2. Separation points of overlapping freeway or expressway routes.
3. On intersecting routes to guide traffic entering the freeway or expressway route.
4. On "Pull Thru" signs (for a destination beyond an intersection or interchange).
5. On the bottom line of post interchange distance signs.

Post-interchange distance signs may be installed when additional information is needed beyond the interchange.

3.6.4. Routing to a Given Destination

At any decision point, a given destination **shall** be indicated via only one route. A route diverging from a freeway or expressway route *Should* not have any of the same destination names which are shown at that point for the freeway or expressway route.

3.6.5. Auto Tour Route Sign

Auto Tour Route signs **shall** not be installed on freeways or expressways, except as necessary to provide continuity between discontinuous segments of conventional roadways that are designated as auto tour routes, for which the freeway or expressway provides the only connection between the segments. If installed on freeways or expressways, Auto Tour Route signs **shall** be installed as independent trailblazer assemblies (see Section 3.4.4) and **shall** not be installed with other Route signs or confirmation assemblies or on guide signs. If installed on freeways or expressways, Auto Tour Route trailblazer assemblies **shall** be installed at less frequent intervals than route confirmation assemblies.

Auto Tour Route signs may be installed on a highway if they have been approved by the concern authority.

Auto Tour Route signs are informational signs, plaques, or shields designed to provide road users with route guidance in following an auto tour route of particular cultural, historical, or educational significance.

Signed auto tour routes are used in some cases to generally follow the historical route of a trail, such as Desert Camps, Dune Bashing, Desert Safari etc.

If shields or other similar signs are used to provide route guidance in following an auto tour route, they *Should* be designed in accordance with the sizes and other design principles for route signs.

3.6.6. Overhead Sign Installations

Overhead signs **shall** be used in lieu of or as an adjunct to ground signs (see Section 3.1.4.2).

Overcrossing structures can serve as sign mounting locations provide the bridge design takes into consideration the dead and live loading of signs mounted on the face of the bridge.

- Overhead signs **shall** have a vertical clearance of not less than 5.5 m to the sign, light fixture, or sign bridge over the entire width of the pavement and shoulders.
- Overhead sign installations **shall** be externally illuminated where possible, especially on highways with roadway lighting or high traffic volume.
- Where internal illumination is used, the sign colors **shall** appear essentially the same by night and day. When a sign is internally illuminated, the requirements for reflectivity do not apply.
- All overhead signs **shall** use retroreflective sheeting. Overhead reflectorized panels **shall** contain white reflective cutout letters and numerals placed on a blue or green retroreflective background.

The illumination chosen *Should* provide effective and reasonably uniform illumination of the sign face and message.

3.6.7. Number of Signs at an Overhead Installation

When overhead signs are warranted, it is desirable to limit the number of signs at these locations to only those essential in communicating pertinent destination information to the motorist. Exit Direction signs for a single exit and the Advance Direction Informative signs will only need one panel with one or two destinations. The distance between successive signs *Should* be considerably greater than the minimum where feasible, allowing enough time for motorists to easily read them.

In no case *Should* more than three signs or panels be displayed at any one location.

At other overhead locations it may be necessary to erect more than one sign to inform motorists of a multiple exit condition at an interchange. Where complex geometries occur, it may be necessary to provide additional panels with confirmatory messages to guide the motorist properly. In no case *Should* more than three signs or panels be displayed at any one location.

3.6.8. Signs for Intersections at Grade

Whenever there are intersections at grade within the limits of a minor highway, signs *Should* be of a size compatible with the design of other signing on the freeway or expressway.

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

3.6.9. Interchange Numbering

Road users need signs to help identify the location of the exit, as well as to obtain route, direction, and destination information for specific exit ramps. Referencing the kilometer posts and using it for the exits and interchanges numbering system will assist road users in determining their destination distances and travel kilometers and assist highway agencies. This method will provide sustainable interchange numbering because the exit numbering sequence does not have to be changed if new interchanges are added to a route. Figure 3-278 through Figure 3-280 show examples of guide signs for common types of interchanges. The interchange layouts shown in most of the figures illustrate only the major guide signs for one direction of traffic on the freeway/expressway and on the exit ramps.

All Freeway and Expressway routes are kilometer posted beginning at the most westerly or southerly point. The Kilometer post numbering system is to have the interchanges on the routes numbered according to the previous kilometer post going from south to north and from west to east. As an example, if the first interchange on the route is located between kilometer post 4 and 5, it is numbered as Interchange number 4. The next interchange, if located at kilometer post 8.7, it would be numbered as Interchange number 8, etc. With this system the motorist can easily determine the location and distance to a desired interchange. An example of exit number panel sign which is placed at top of guide sign (G16-1) is shown in Figure 3-281.

The signing layout for all interchanges having only one exit ramp in the direction of travel *Should* be similar, regardless of the interchange type. For the sake of uniform application, the significant features of the signing plan for each of the more frequent kinds of interchanges *Should* be followed as closely as possible. Even when unusual geometric features exist, variations in the signing layout *Should* be held to a minimum.

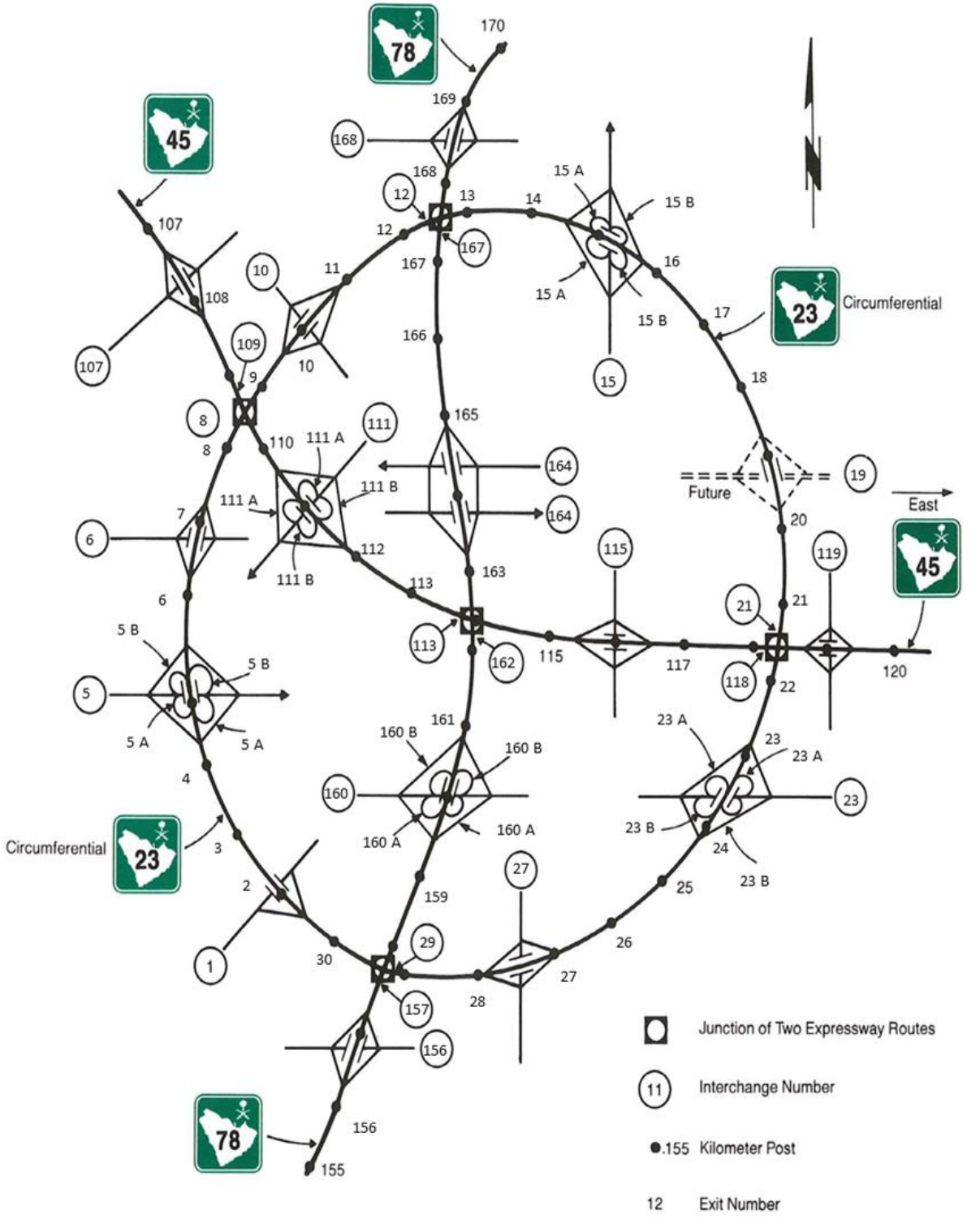


Figure 3-278 Typical Interchange Numbering for Mainline and Ring Routes

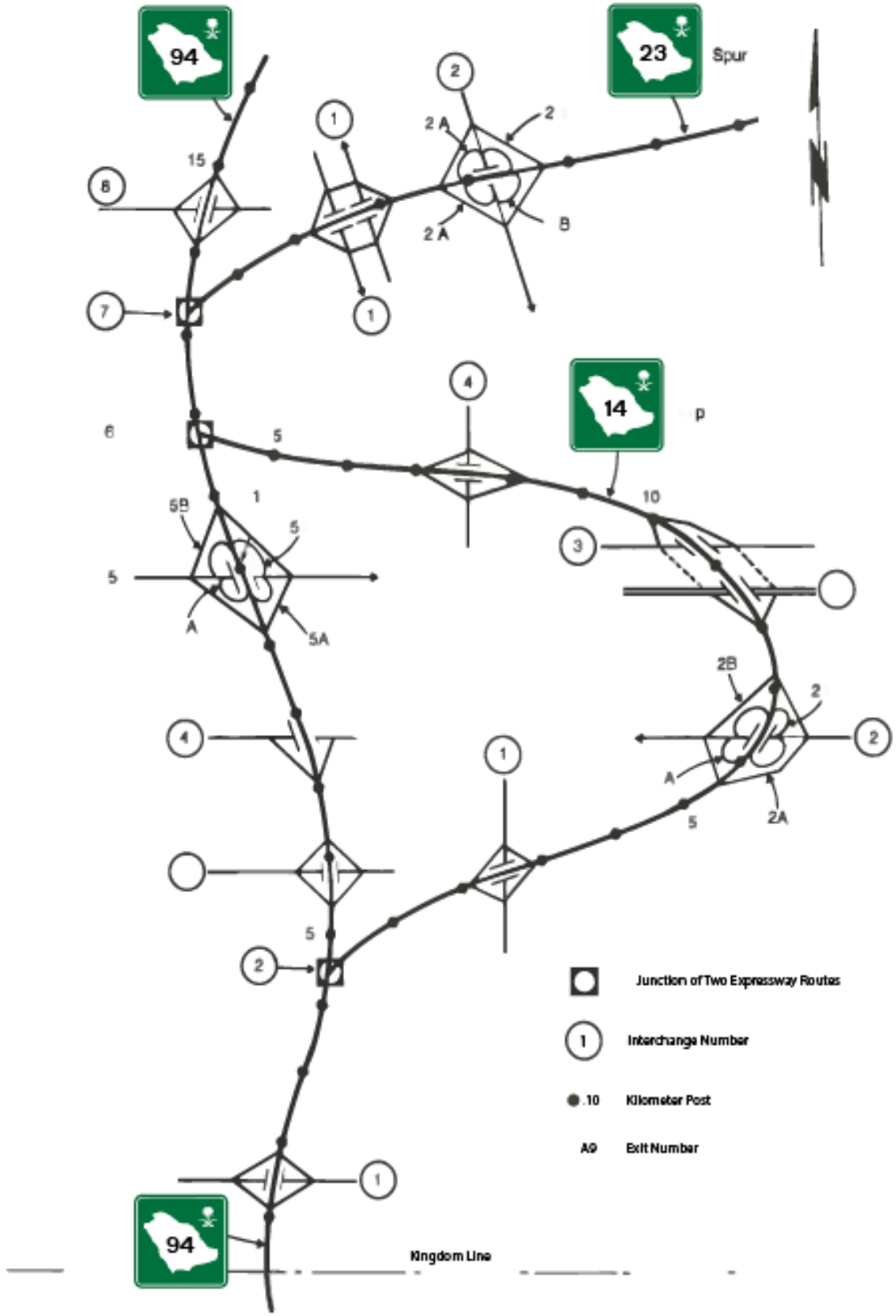


Figure 3-279 Typical Interchange Numbering for Mainline Loop and Spur Routes

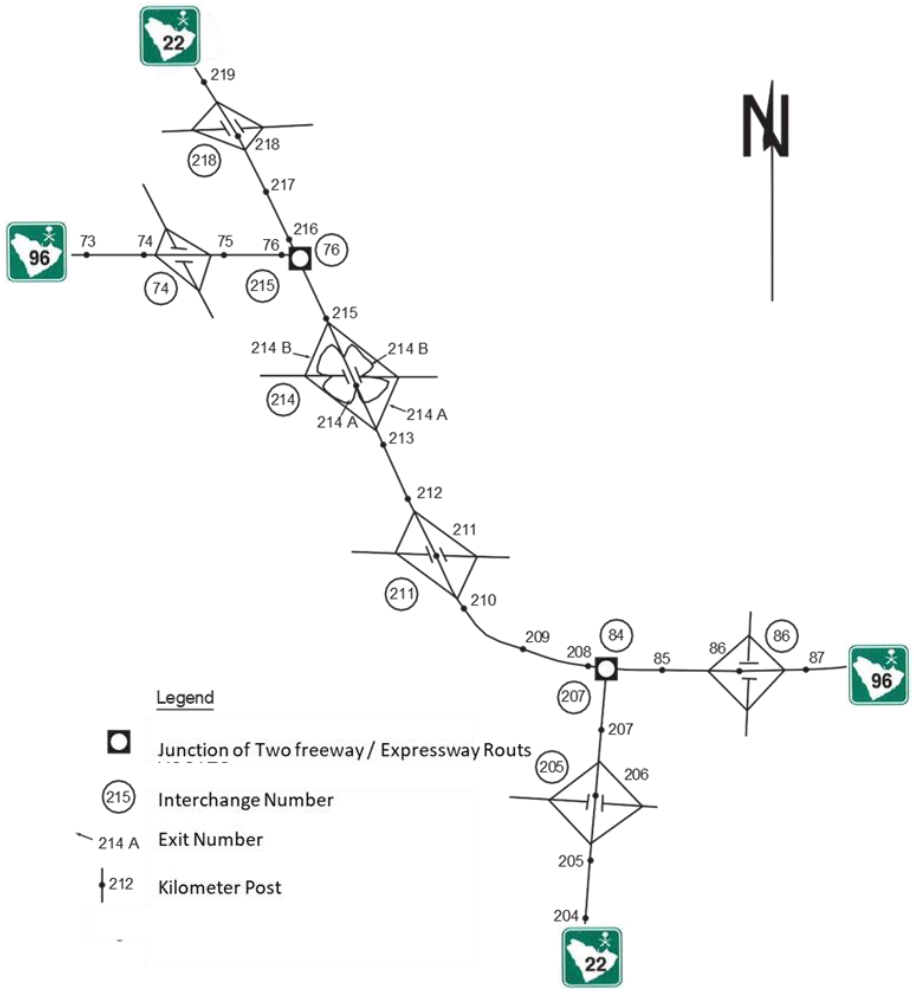


Figure 3-280 Typical Interchange Numbering for Mainline Loop and Spur Routes

Figure 3-281 Exit Number Panels Sign (Placed at Top of Guide Sign) (G16-1)

3.6.10. Kilometer Posting (G17-1)

- Kilometer signs **shall** be installed on all classes of highways. Numbering will run from west to east and from south to north.
- Kilometer posting **shall** be used on ring roads.
- Kilometer posts **shall** be placed at exact kilometer stations measured along the center line.
- On two-lane roads, a kilometer post **shall** be placed along the right shoulder only but with ascending-descending kilometers on either side, whichever is appropriate.
- On multi-lane highways, a kilometer post **shall** be placed along both outside shoulders but with ascending or descending kilometers, whichever is appropriate.

- The panels **shall** be located in line with the delineator posts.
- Route number **shall** be placed above the kilometer post, dimensioned to be the same width as the kilometer post sign in Figure 3-282.
- Table 3-15 contains information regarding the numbers of digits, dimensions and area occupied in the kilometer posting sign.

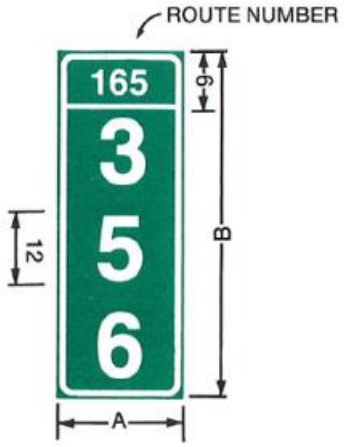


Figure 3-282 Kilometer Posting Sign with Road Number (G17-1)

Table 3-15 Numbers of Digits, Dimensions and Area Occupied in the Kilometer Posting Sign

Number of Digits	Dimensions (cm)		Area (m^2)
	A	B	
1	20	60	0.12
2	20	60	0.12
3	20	60	0.12
4	20	80	0.16

3.6.11. Freeway / Expressway Begins and Ends Signs (G18-Series)

Sign G18-1 indicates to drivers of vehicles that a dual carriageway freeway begins and that the various controls and prohibitions become effective beyond the sign. It is installed at beginning of freeway controlled-access facilities, denoting specific freeway restrictions as covered under specific national or transport agency regulations. (Figure 3-283 - left sign)

Sign G18-2 indicates to the drivers of vehicles that a freeway is about to end and that the relevant freeway rules are no longer applicable. It is be installed at end of freeway controlled-access facilities, denoting the end of specific freeway restrictions specific national or transport agency regulations. (Figure 3-283 – right sign)

Both of the below signs are of a dimension 600 x 900 mm and consist of white legend on blue background, similar to regulatory signs (given the sign provides reference to regulatory requirements associated with freeways or motorways).

A freeway/expressway ends Ahead ends in 1 km (G18-3), may be used in advance of the end of a freeway/expressway. The rectangular signs may be post-mounted or may be mounted overhead for increased emphasis (Figure 3-284).

If the reason that the freeway/expressway is ending is that the next portion of the freeway is not yet constructed and as a result all traffic must use an exit ramp to leave the freeway, an All Traffic Must Exit (G18-4) sign *Should* be used in addition to the Freeway Ends signs in advance of the downstream end of the freeway (Figure 3-285).

Figure 3-283 Freeway/Expressway Begins and Ends Signs (G18-1 and G18-2 Respectively)

Figure 3-284 Freeway/Expressway Ends (Distance Included) Sign (G18-3)

Figure 3-285 All Traffic Must Exit Sign (G18-4)

3.6.12. Interchange Informative Signs

Interchange Informative signs, in proper sequence, give all necessary route and destination information through interchanges. New destination information *Should* not be introduced into the major sign sequence for an interchange, or *Should* information be dropped.

- Advance Direction signage **shall** be provided a minimum of 2,000 m prior to the interchange, then placed at 1,000 m and 500 m prior to the interchange.
- Exit Direction sign **shall** be placed approximately 200 m before the gore.
- Gore Exit sign **shall** be placed in the gore area.
- Informative signs placed in advance of an interchange deceleration lane *Should* be spaced at least 250 m apart. This minimum spacing can be reduced, where necessary, to 200 m if operating speeds are 65 km/h or less.

On exit direction signs (overhead or ground mounted), arrows to indicate a movement ahead or slightly right or left **shall** be upward slanting and located on the appropriate side of the sign.

Downward-pointing arrows are lane assignment arrows and **shall** be used only on overhead guide signs to prescribe the use of specific lanes for traffic bound for a destination or route that can be reached only by being in the lane(s) designated. A separate arrow *Should* be centered over each lane for the signed destination or route.

3.6.12.1. Advance direction sign (G19-1)

The Advance Direction sign (Figure 3-286) gives notice well in advance of the exit point of the principal destinations served by the next interchange and the distance to that interchange. Where there is less than 2 km between interchanges, interchange sequence series signs *Should* be used in lieu of the Advance Direction sign for the affected interchanges.

- For major interchanges, three Advance Direction signs **shall** be used.
- For minor interchanges, one Advance Direction sign **shall** be used.
- The recommended location for their placement is approximately 2,000 m, 1,000 m and 500 m from the theoretical gore. Use of these signs is shown in Figure 3-286.
- The recommended location for placement in minor interchanges, is approximately 1,000 m from the theoretical gore.

With both the major and minor types, a shifting of advance distances may be necessary to fit a specific condition.

Figure 3-286 Advance Direction Sign (G19-1)

3.6.12.2. Exit direction sign (G19-2)

The Exit Direction sign (Figure 3-287) repeats the route and destination information which was shown on the Advance Informative sign(s) for the next exit. Exit Direction signs **shall** be used at all interchanges. The placement of the exit direction sign is shown in Figure 3-288.

The sign **shall** carry the exit number, route number, cardinal direction and destination with an appropriate upward slanting arrow.

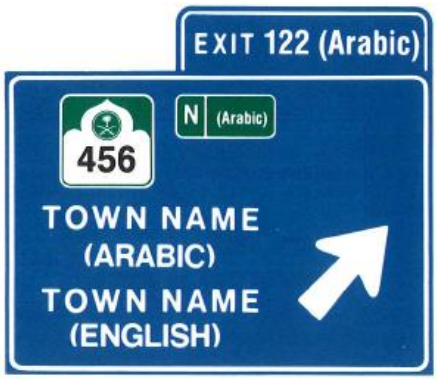


Figure 3-287 Exit Direction Sign (G19-2)

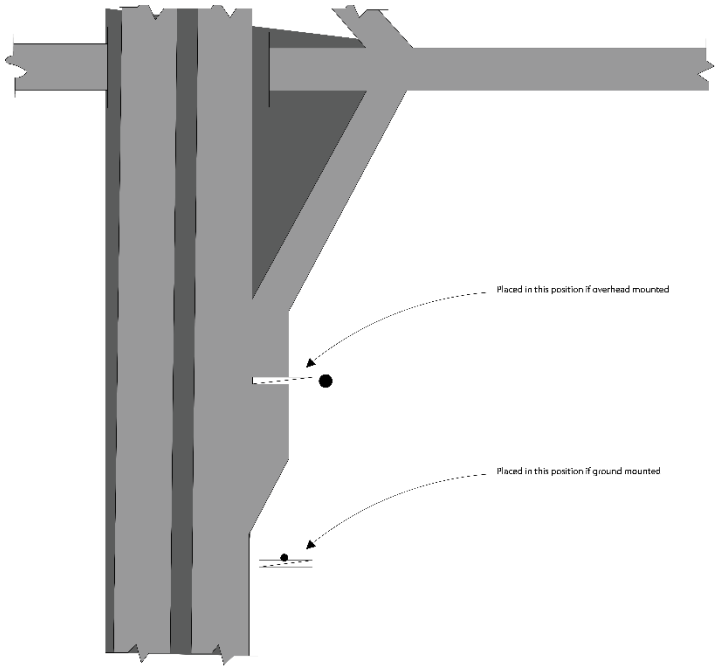


Figure 3-288 Placement of Exit Direction Sign

3.6.12.3. Gore exit sign (G19-3)

The Gore Sign (see Figure 3-289) indicates the place of departure from the main-line roadway. There **shall** be consistent application of this type of sign. The Gore sign **shall** be located in the area between the main roadway and the ramp at all exits. The sign **shall** carry the word Exit

with an interchange number and an appropriate upward slanting arrow, which is aligned to approximate the angle of departure.

Figure 3-289 Gore Exit Sign (G19-3)

3.6.13. Exit Only Panel (G20-Series, G21-Series)

Major Informative signs for all lane drops (where the lane exits rather than continuing beyond the exit) at interchanges **shall** be mounted overhead. The Exit Only panel(s) (G20-1 and G20-2) (see Figure 3-290) **shall** be used on overhead Advance Direction signs and Exit Direction signs (G21-1 and G21-2, see Figure 3-291) for all interchange lane drops at which the through route continues ahead on the mainline. Advance Informative signs 500 m and further from the interchange **shall** contain the distance message along with the word "Only".

Exit Direction signs for lane drops within 500 m of the interchange **shall** contain the word "Exit" but not the distance message, and **shall** show the direction of the exit. Exit Only panels **shall** have black legend on a white reflectorized background. Wherever the through route exits on a lane which does not continue on the mainline, diagrammatic signs *Should* be used without the Exit Only panel.

Figure 3-290 Exit Only Panels (G20-1 and G20-2 Respectively)

Figure 3-291 Advance and Exit Direction Signage (G21-1 and G21-2 Respectively)

3.6.14. Sign Spreading (G22-Series) and Pull Thru Signs (G23-Series)

Sign spreading (see Figure 3-292) is a concept in which overhead Informative signs are so spaced that the ability of motorists to comprehend the information is not overloaded by having too many signs at one location.

Where overhead signing is used, sign spreading *Should* be used at all single exit interchanges and to the extent possible at multi-exit interchanges.

Sign spreading is accomplished as follows:

1. The Exit Direction sign is the only overhead sign used in the vicinity of the gore. It is located over the roadway near the theoretical gore and may be on a sign bridge or cantilever structure over the exiting lane.
2. The Advance Informative sign for the next interchange exit *Should* be placed on the interchange overcrossing structure when the crossroad goes over the mainline. If the main-line goes over the crossroad, the sign *Should* be placed on a cantilever over the lane or it may be ground mounted behind the guardrail leading to the bridge rail.

Pull-through signs provide reassurance on the current route and destination and are useful for interchanges with multiple-lane exits as well as freeway-to-freeway interchanges. Pull-through signs for 3 or fewer lanes (in each direction) show the Arabic destination name above the English destination name to the right of the route number, while directional routes with 4 lanes or more *Should* show the destination information in Arabic to the right of the route number and the corresponding English to the left. For two destinations being shown on the pull-through sign, the Arabic is shown above the corresponding English destination (see Figure 3-293).

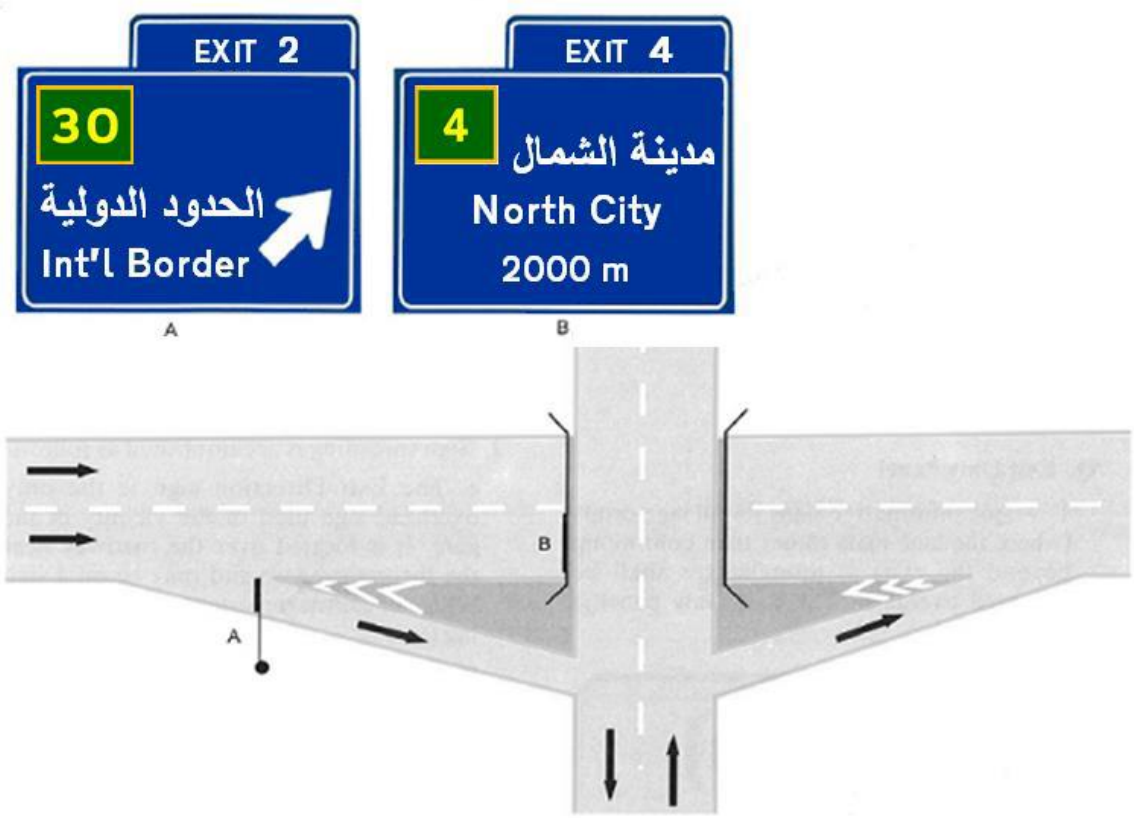


Figure 3-292 Simple Sign Spreading Example and Placement (G22-1, G22-2)

Figure 3-293 Pull-Through Signage Examples (G23-1, G23-2)

3.6.15. Diagrammatic Signs (G24-Series)

The use of diagrammatic signs (see Figure 3-294) in advance of intersections and interchanges may be useful for some locations where the geometric layout needs to be better described than possible with standard overhead signs. These signs show a graphic view of the exit arrangement in relationship to the main highway.

Diagrammatic signs *Should* be used for several situations:

1. Advance guide sign location for left exits or route splits and for some interchanges between expressways.
2. Optional lane splits.
3. Exits with route discontinuity.
4. Two-lane exits with an optional lane.
5. Diagrammatic signs **shall** not be used at cloverleaf interchanges. Conventional signing is superior in this instance.

Diagrammatic signs **shall** be designed in accordance with the following criteria:

1. The graphic legend **shall** be of a plan view showing a simplified off-ramp arrangement.
2. Only one destination may be shown for each arrowhead, with a maximum of two destinations per sign.
3. The shaft for the exit ramp movement *Should* be shorter than but not separated from the through movement graphic.
4. Arrow shafts *Should* contain lane lines where appropriate.
5. Destinations, in Arabic and English, *Should* be clearly related to the arrowhead.
6. A cardinal direction plaque may be used if desirable. It *Should* generally be placed adjacent to the destination.

7. To facilitate visibility of the exit information, the through route number and destination may be smaller size font and symbols than the exit route number and destination.

Figure 3-294 Diagrammatic Sign Example (G24-1, G24-2)

3.6.16. Typical Interchange Signing Applications

Typical sign installations are illustrated from Figure 3-295 to Figure 3-302. The caption under each illustration describes the signing function as follows:

1. Freeway approach to single-exit interchanges with no lane drop (Figure 3-295). Note two destinations served by one ramp are consecutively listed in Arabic, then in English.
2. Freeway approach to single-exit interchanges with one lane drop and optional exit from second right lane (Figure 3-296). As with the above, note two destinations served by one ramp are consecutively listed in Arabic, then in English. There is also a separate major destination logo, that for the airport.
3. Freeway approach to multi-ramp interchange served by collector road (Figure 3-297, Figure 3-298). Where there are separate ramps for each destination, the first destination on the advance direction signs is shown in Arabic and English, followed by the second destination which is shown below, first in Arabic then in English.
4. Freeway approach to multi-ramp interchange with consecutive ramps served directly from mainline (Figure 3-299, Figure 3-300). As above, the first destination on the advance direction signs is shown in Arabic and English, followed by the second destination which is shown below, first in Arabic then in English. Each ramp is consecutively tagged with “A” and “B” following the exit number.
5. Freeway approach to major interchange with two lanes drop leading to route split (Figure 3-301, Figure 3-302). Each exit ramp is assigned to a specific route and destination which splits from the exit ramp.
6. For each of the above scenarios, if the exit drop needs to be further emphasized on a particular roadway, countdown signage may be used as described in Section 3.3.51 and shown in Figure 3-212. They *Should* be placed on the right-hand side behind the *should*er or auxiliary lane and the distances set from the start of the gore.

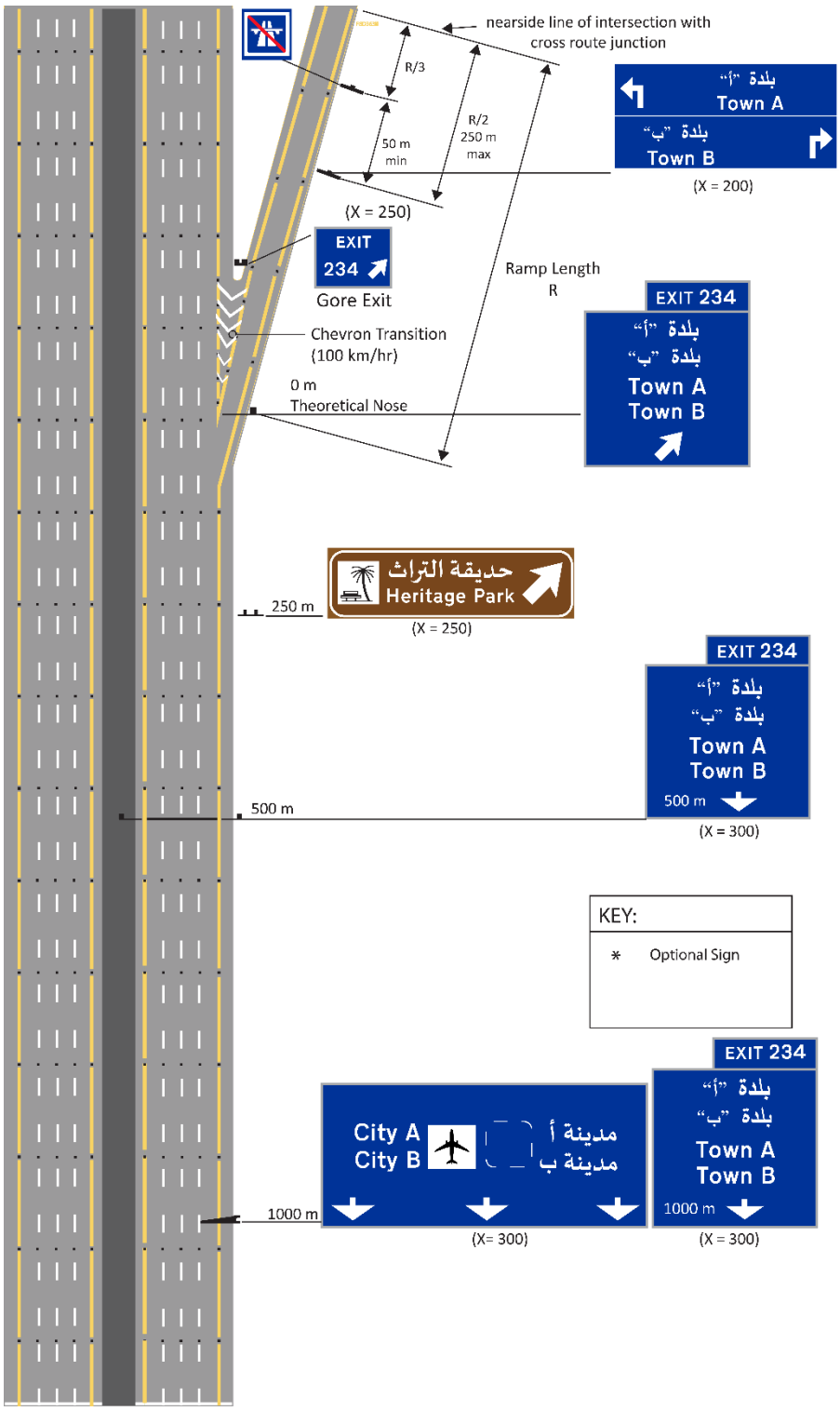


Figure 3-295 Freeway Approach to Single-Exit Interchange with No Lane Drop

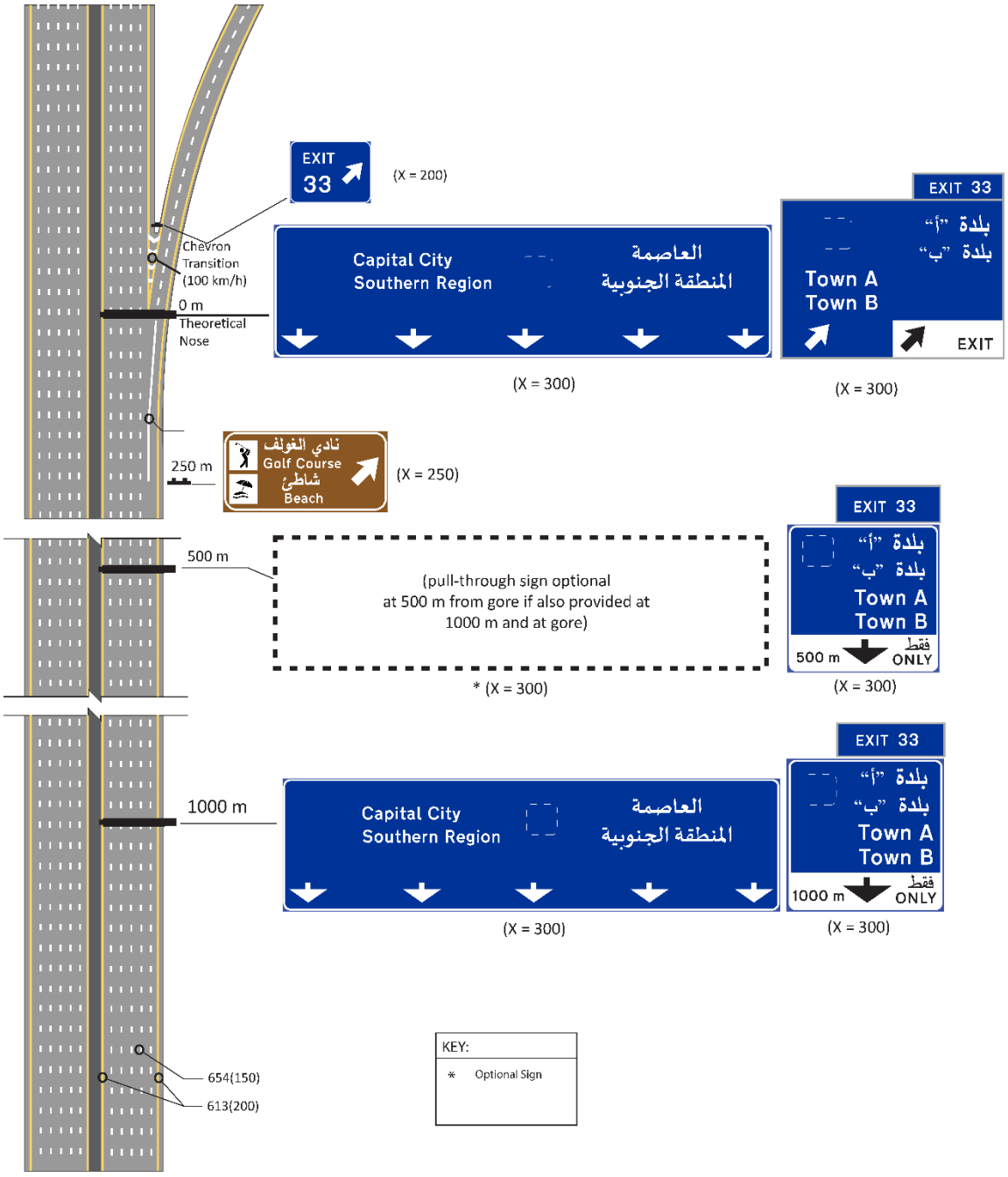


Figure 3-296 Freeway Approach to Single-Exit Interchanges with One Lane Drop and Optional Exit from Second Right Lane

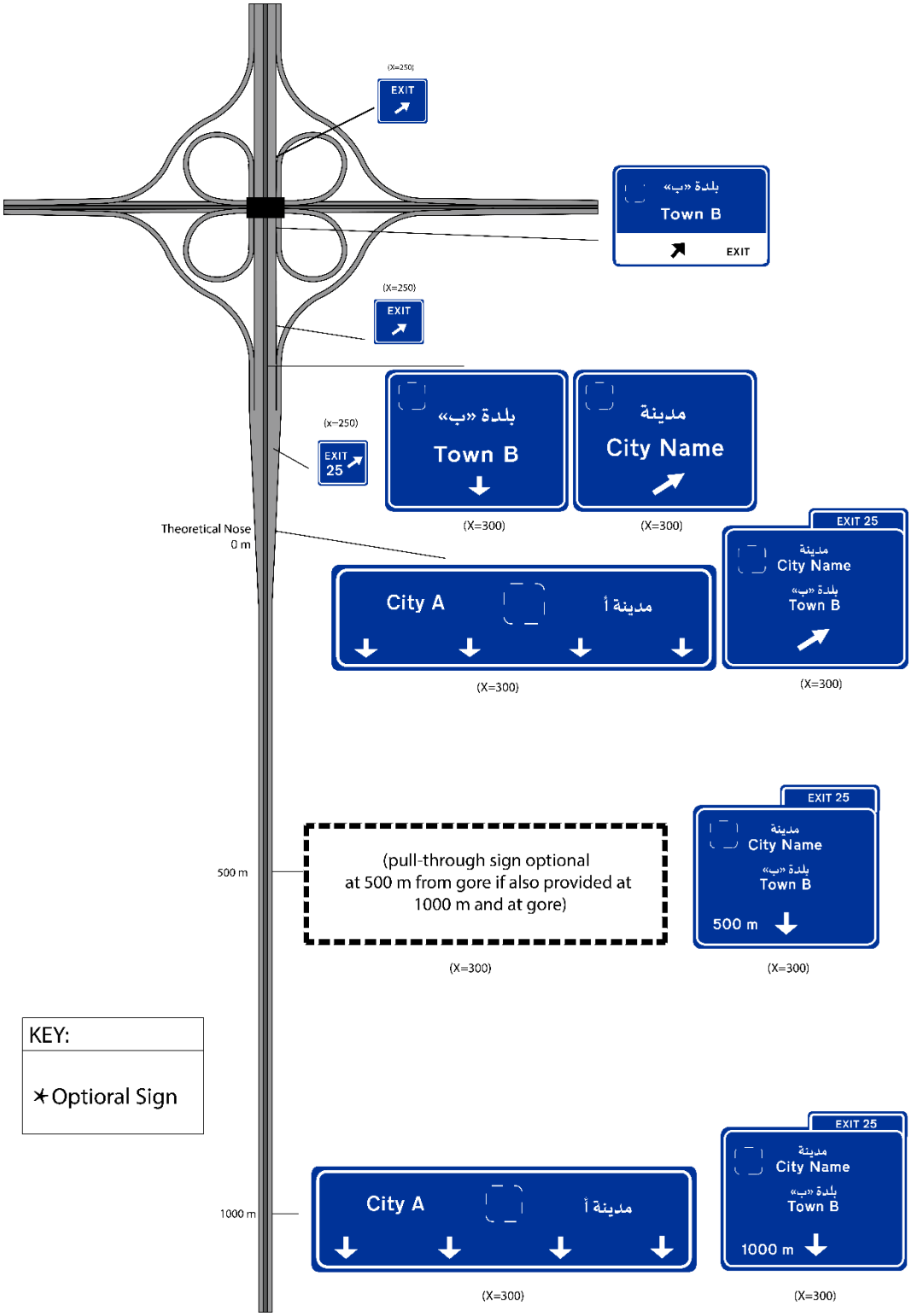


Figure 3-297 Freeway Approach to Multi-Ramp Interchange Served by Collector Road

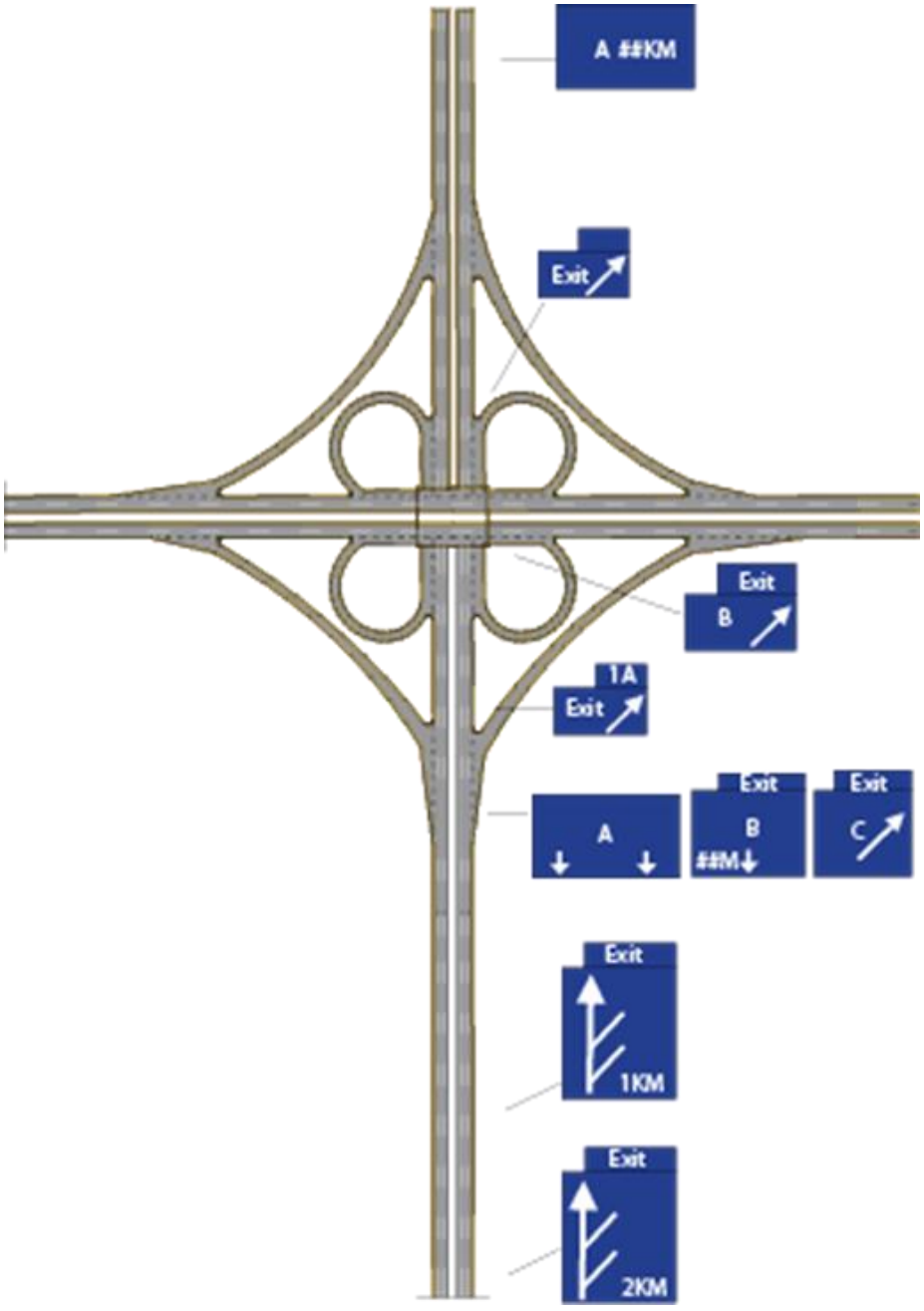


Figure 3-298 Freeway Approach to Multi-Ramp Interchange Served by Collector Road

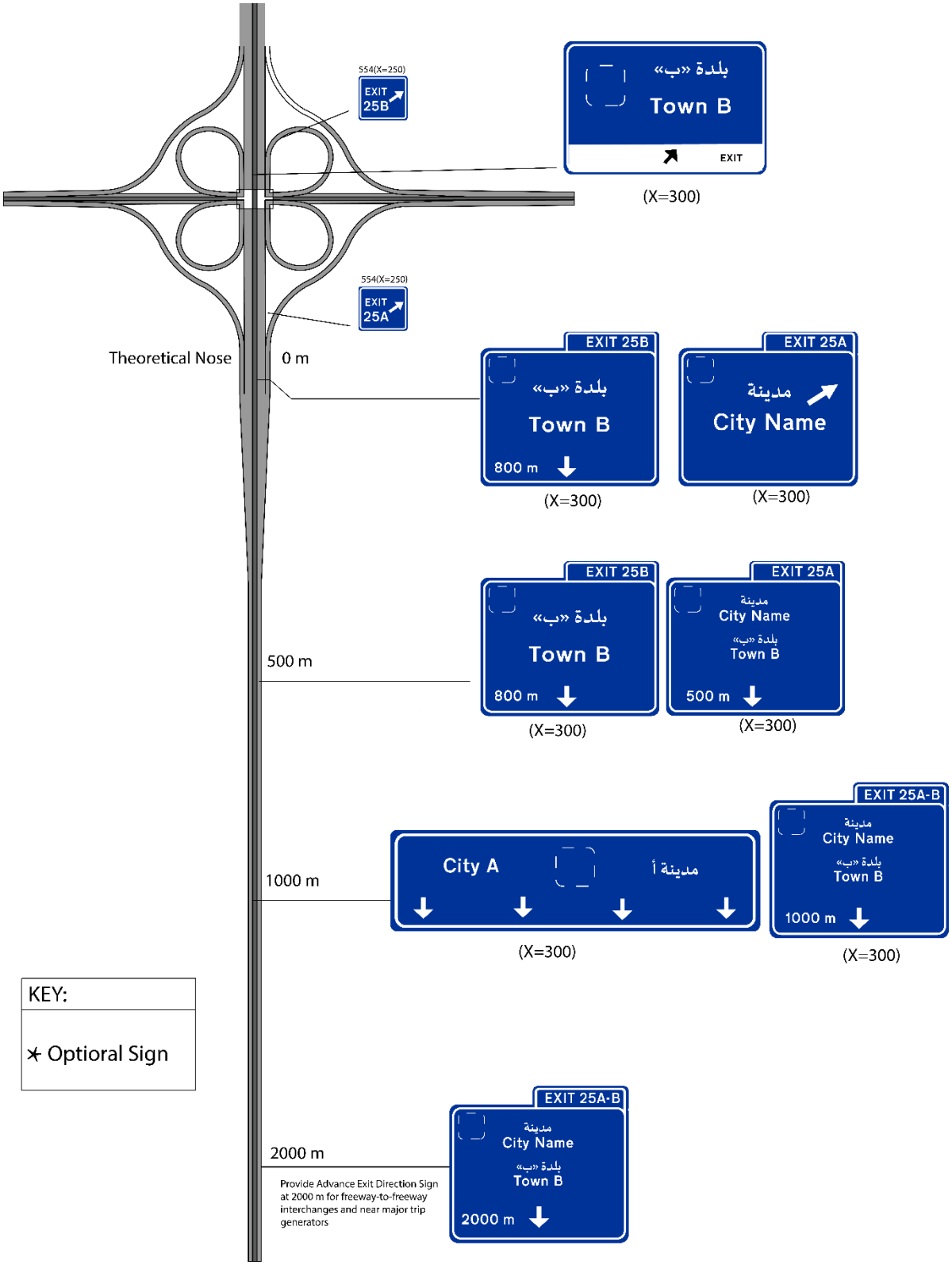


Figure 3-299 Freeway Approach to Multi-Ramp Interchange (Consecutive Ramps Directly from Mainline)

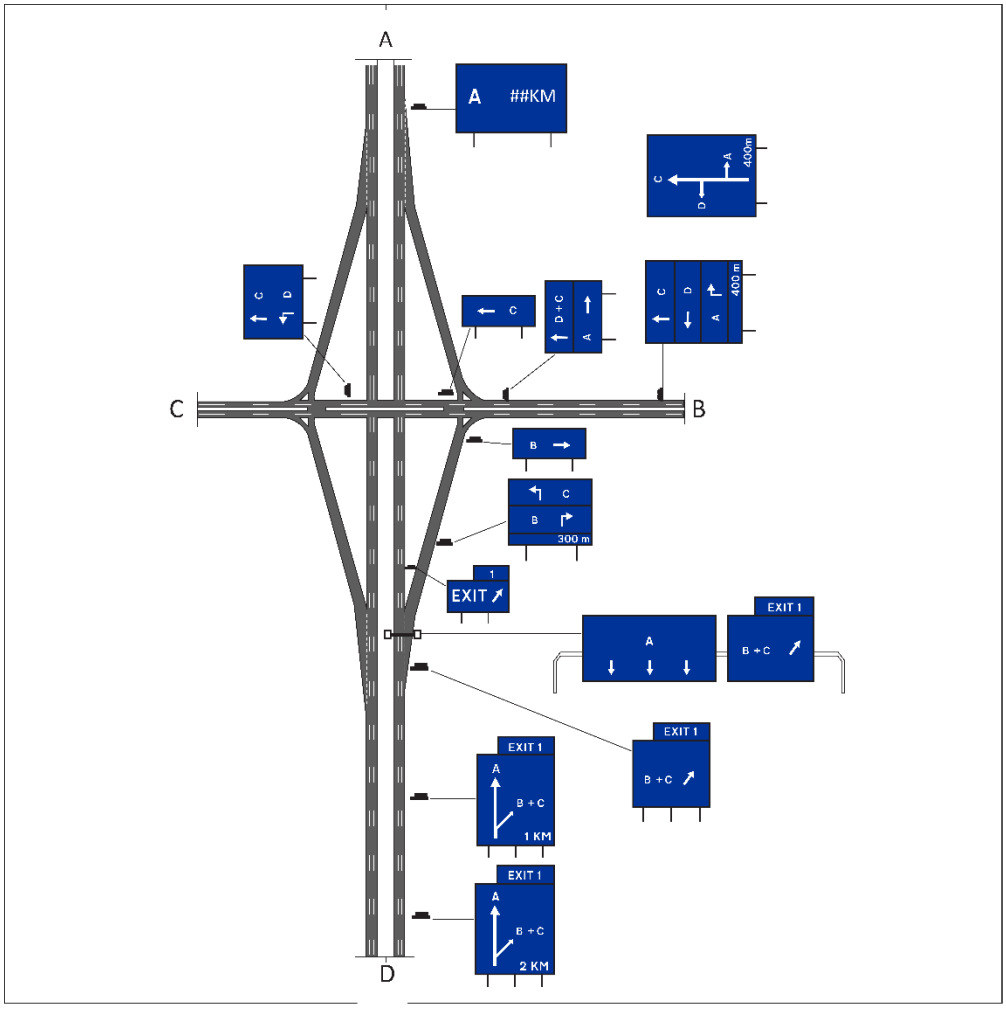


Figure 3-300 Freeway Approach to Multi-Ramp Interchange (Consecutive Ramps Directly from Mainline)

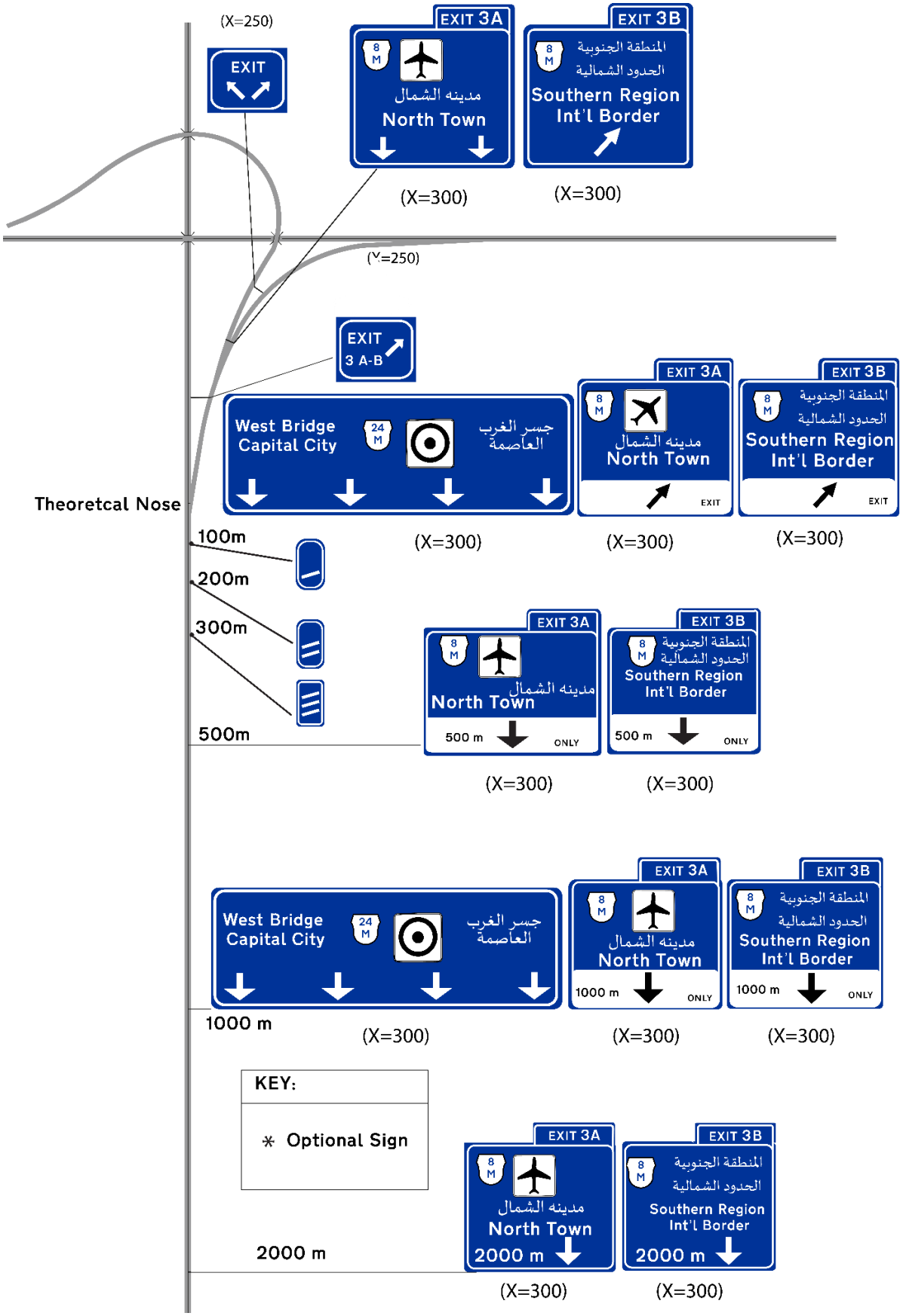


Figure 3-301 Freeway Approach to Major Interchange with Two-Lane Drop Leading to Route Split

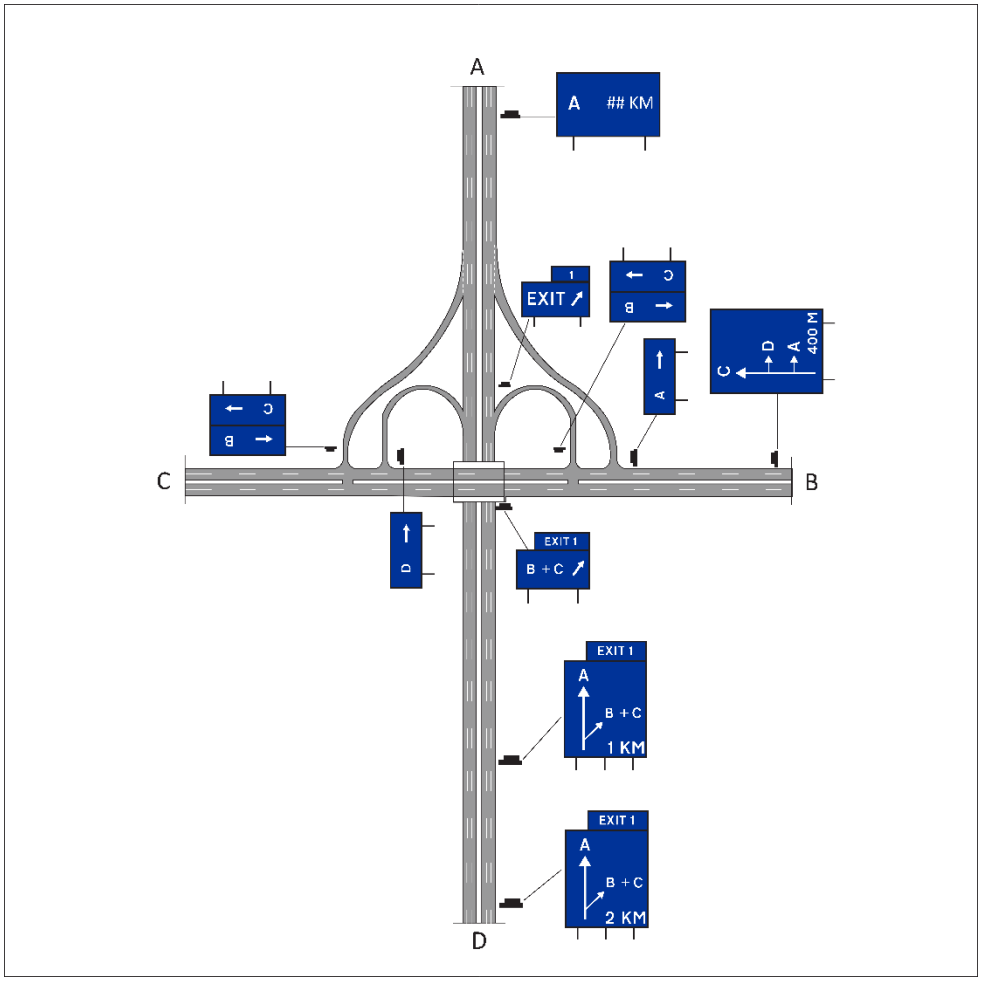


Figure 3-302 Freeway Approach to Major Interchange with Two-Lane Drop Leading to Route Split

3.7. Toll Highway Signs

Toll highways are typically limited-access freeways or expressway facilities but might also be conventional highways. A portion of or an entire route might be a toll highway. Alternatively, a bridge, tunnel, or other crossing point might be the only toll portion of a highway. The general signing requirements for toll highways depend on the type of facility and access (i.e., freeway, expressway, or conventional highways).

The aspect of tolling and the presence of toll plazas or collection points necessitate additional considerations in the typical signing needs. The notification of the collection of tolls in advance of and at entry points to the toll highway also necessitates additional modifications to the typical signing. This section provides the signing needs for the toll highways which include the regulatory signs, advanced warning signs, and the directional signs.

3.7.1. Regulatory Signs

- Regulatory signs applicable only to a particular lane or lanes **shall** be located in a position that makes their applicability clear to highway users approaching the toll plaza.

- Regulatory signs, or regulatory panels within directional guide signs, indicating restrictions on vehicle type and on the forms of toll payment accepted at a specific toll plaza lane *Should* be installed over the applicable lane either directly on the toll plaza canopy or on a separate structure immediately in advance of the canopy and located such that each sign is clearly related to an individual toll lane.

3.7.1.1. Posted speed signs

- One or more posted speed signs (R3-1) *Should* be installed in Electronic Toll Collection (ETC) only lanes at toll plazas. This enables an enforceable posted speed to be established only for those traffic lanes where it is intended that vehicles moving through the plaza do not stop.
- The posted speed displayed on those signs **shall** be based on a study taking into account the geometry of the toll plaza and the lanes and other appropriate safety and operational factors refer to SHC 301 (Highway Geometric Design).
- Posted speed sign **shall** not be installed for a toll plaza lane that is controlled by a Stop sign (R1-1), where a stop is required.
- Posted speed signs (R3-1) may optionally be installed over the applicable lane on the toll plaza canopy, on the approach end of the tollbooth island, on the tollbooth itself, or on a vertical element of the canopy structure.

3.7.1.2. Stop signs

- Stop sign (R1-1) **shall** not be installed for a toll plaza lane that is operated as an ETC only lane designed for tolls to be collected while vehicles continue moving.
- Stop sign (R1-1) for a toll plaza cash payment lane *Should* be located in a longitudinal position, if required, as near as practically possible to the point where a vehicle is expected to stop to pay the toll or take a ticket.

3.7.1.3. Toll rate signs (T25-1)

- Toll Rate sign in may be installed in advance of the toll plaza to indicate the toll applicable to the various vehicle types.
- Toll Rate sign Figure 3-303 *Should* not contain more than three lines of legend (excluding the word "Toll").
- Toll Rate sign (see Figure 3-303*) Should* be located on the right side of the roadway between the first advance sign informing road users of the toll plaza and the toll plaza. The payment amounts **shall** be shown in Arabic numerals.

Figure 3-303 Toll Rate Sign (T25-1)

3.7.2. Pay Toll Advance Warning Signs (T25-2)

- Pay Toll Sign (Figure 3-304) *Should* be installed overhead at approximately 1.6 km and 800 m in advance of mainline toll plazas at which some or all lanes are required to come to a stop to pay a toll.
    - This sign **shall** be shown in Arabic and English text.
    - An additional Pay Toll advance warning may be installed approximately 3.2 km in advance of a mainline toll plaza and may be installed overhead or post mounted.

Figure 3-304 Typical Pay Toll Sign (T25-2)

3.7.2.1. Stop ahead pay toll sign (T25-3)

- Stop Ahead Pay Toll Sign (Figure 3-305) *Should* be installed overhead downstream from the Pay Toll sign that is 800 m in advance of a mainline toll plaza where some or all of the lanes are required to come to a stop to pay a toll.
- The location of the overhead sign *Should* coincide with the approximate location where the mainline lanes begin to widen on the approach to the toll plaza lanes.
- This sign **shall** be shown in Arabic and English text.

Figure 3-305 Stop Ahead Pay Toll Sign (T25-3)

3.7.2.2. Last exit before toll (T25-4)

- Last Exit Before Toll (Figure 3-306) *Should* be used to notify road users of the last exit from a roadway before it becomes a facility on which toll payments are required.
- This sign *Should* be installed either above or below the appropriate signs for the exit This sign **shall** be shown in Arabic and English text.

Figure 3-306 Last Exit Before Toll (T25-4)

- The character heights for the toll rate and toll advance warning signs **shall** be as provided in Table 3-12.

3.8. Preferential and Managed Lane Signs (P26-1, P27-1, P28-1)

Preferential lanes are lanes designated for special traffic uses, such as High-Occupancy Vehicles (HOVs), Light Rail Transit (LRT), buses, taxis, or bicycles. Preferential lane treatments might be as simple as restricting a turning lane to a certain class of vehicles during peak periods, or as sophisticated as providing a separate roadway system within a highway corridor for certain vehicles.

Preferential lanes might be barrier-separated (on a separate alignment or physically separated from the other travel lanes by a barrier or median), buffer-separated (separated from the adjacent general-purpose lanes only by a narrow buffer area created with longitudinal pavement markings), or contiguous (separated from the adjacent general-purpose lanes only by a lane line). Preferential lanes might allow continuous access with the adjacent general-purpose lanes or restrict access only to designated locations. Preferential lanes might be operated in a constant direction or operated as reversible lanes. Some reversible preferential lanes on a divided highway might be operated counter-flow to the direction of traffic on the immediately adjacent general-purpose lanes. Preferential lanes might be operated on a 24-hour basis, for extended periods of the day, during peak travel periods only, during special events, or during other activities. Signing Standards for managed lane facilities, described in terms of “Express Lanes” and “Bus Lanes” for the purposes of relating these signs to the examples in the prior two sections.

- Transit (Public) - Passenger transportation service, usually local in scope, that is available to any person who pays a prescribed fare. It operates on established schedules along designated routes or lines with specific stops and is designed to move relatively large numbers of people at one time. Examples include **bus, light rail, rapid transit**.

- **On-Road Public Transport (ORPT)** - Includes on-road public transport means like buses, trams etc.
- Category B – Longitudinally separated from other traffic by curbs, barriers, etc., but with at-grade crossings for other vehicles and pedestrians.
- Category C – On streets with mixed traffic, where public transport vehicles may travel with other vehicles. This may include some allocation of priority to public transport (e.g., bus lanes, transit signal priority etc.) but without physical segregation.
- Transit Lanes – They are a portion of the street designated for the preferential or exclusive use of transit vehicles, sometimes permitting limited use by other vehicles. They are often repurposed from a general traffic lane, designated by striping, signage, and pavement markings. Transit lanes allow transit vehicles to easily enter and exit the lane to suit their route.
- **Rapid Transit (System)** - Transit service that is operated completely separate from all other modes of transportation. The term "rail rapid transit" frequently refers both to operation of **light rail transit** vehicles over exclusive right-of-way and **heavy rail transit** vehicles; the term "**bus rapid transit**" refers to operation of motor buses over exclusive bus roads or busways.
- **Light Rail Transit (LRT)** - A form of urban rail public transportation characterized by a combination of **tram and rapid transit features that usually use electric rail cars** operating mostly in private rights-of-way **separated** from other traffic but sometimes, if necessary, **mixed** with other traffic in city streets.
- **Rapid Rail System (RRT)** - Transit system using **trains of high performance**, **electrically powered rail cars** operating in exclusive rights-of-way, usually without grade crossings, with high platform stations. The tracks may be in underground tunnels, on elevated structures, in open cuts, at surface level, or any combination thereof.
- **Bus Rapid Transit (BRT)** - Bus rapid transit is a public transportation strategy where buses travel on exclusive right of way or receive preferential treatment at signalized intersections, with the objective of reducing transit vehicle travel time and increasing reliability.
- **HOV Lane** - Any preferential lane designated for exclusive use by high occupancy vehicles for all or part of a day, including a designated lane on a freeway, other highway, street, or independent roadway on a separate right of way.

3.8.1. Managed Lane Advance Direction Sign (P26-1,27-1,28-1)

Managed Lane Advance Direction Sign provides advance information on a managed lane which diverges either from the left or right lane, indicating the basic nature of the facility (e.g., Express Lane (see Figure 3-307) or Bus Lane (see Figure 3-308) and the distance to the beginning of the facility:

- The sign **shall** be mounted as an overhead sign and **shall** show the direction (upward left or upward right arrow) that the lane travels from the general-purpose lane.
- The sign **shall** be mounted on overhead gantries or cantilever supports in advance of the managed lane transition.
- The signs **shall** indicate the managed lane transition is 1,000 m away.

– The sign **shall** provide carpool restriction information (when carpool restriction facility applicable in an Express Lane) as part of message, for instance, HOV-3 for restrictions to vehicles with 3 persons or more along with authorized buses, see Figure 3-309.

Figure 3-307 Typical Express Lane Sign (P26-1)

Figure 3-308 Typical Bus Lane Sign (P27-1)

Figure 3-309 Typical Express Lane and HOV-3 Sign (P28-1)

3.9. Specific Destinations Placement Criteria

Specific Service signs **shall** be used as guide signs that provide road users with directional information for eligible destinations including government entities, commercial centers, universities, colleges, schools, private hospitals, hotels, and many different commercial activities. Such destinations have heavy and variable traffic volumes.

- The destination **shall** be located on one of the roads affiliated with the relevant authority or at a distance of no more than 5 km from the nearest road owned by that authority (from all directions).
- The signs for such destinations **shall** be installed within a radius of no more 5 km from the destination, and a number of no more than four signs **shall** be provided from any one direction.
- The signs **shall** not conflict with other destinations or obscure basic road signs.
- It is possible to take advantage of the existing informative and guide signs to add the names of such destinations, as much as possible.
- The signs **shall** not include a logo, telephone number, or destination address.
- The non-governmental signs **shall** be commercially invested through set fees. The signs are manufactured, installed, and maintained by RGA, at the expense of the party requesting such signs. The signs are according to the specifications of the SHC and under the supervision of the concerned branches of RGA.
- Table 3-16 **shall** be used to determine which destination to add to an existing destination guide sign.

Table 3-16 Criteria for Signing Destinations on Urban and Rural Highways

Class	Type of Destination	Criteria	
		Urban Areas[1]	**Rural Areas[2]**
Transportation Facilites	- Airports - Seaports - Railway Stations - Public Transport Centers and Stations	All destinations	All destinations
Educational Institutions	• Govermental Universities • Private Universities and Colleges	Number of Registered students **shall** be 15,000 or more	Number of Registered students **shall** be 5,000 or more
Stadiums	• Official Matches Stadiums	Stadium capacity **shall** be at least 40,000	Stadiums that hosted official matches
Hospitals	• Governmental Hospitals • Private Hospitals	Specialized hospitals	Private Hospitals which have all the displineres and emergency sections
Commercial Centers	• Major Commercial Centers	Major Commercial Centers with large number of parking and adequate exits and entries	Major Commercial Centers with large number of parking and adequate exits and entries
Business Centers	• Industrial Cities • Economic Cities • Commerce and Industrial Chambers	All destinations	All destinations
Recrational & Tourist Facilities	• 5-Stars and 4-Stars Hotels, with event venue and restaurants. • Major Recreational facilities. • Histrorical and Cultural Spots.	All destinations	All destinations

Class	Type of Destination	Criteria	
		Urban Areas[1]	Rural Areas[2]
Mousqes	• Mosques with praying and washing deceased Muslim persons services.	All destinations	All destinations
Charities	• Charities with direct access to MoTLS highways which have been certified by the responsible authorities.	All destinations	All destinations
Villages	• Villages must be certified by official minutes stating their eligibility for destination signs by the relevant Emara and MoTLS branches, and all villages' roads must be paved.	Not applicable	All destinations

[1] Over 50,000 population.

[2] 50,000 and under population.

3.10. Tourist – Oriented Directional Signs

Tourist-oriented directional signs (see Figure 3-310) are guide signs with one or more sign panels that display the business identification and directional information for eligible business, service, and activity facilities.

- When used, tourist-oriented directional signs **shall** be used only on rural conventional roads and **shall** not be used on conventional roads in urban areas or at interchanges on freeways or expressways**.**
- Where both tourist-oriented directional signs and Specific Service signs (see section 3.9) would be needed at the same intersection, the tourist-oriented directional signs **shall** incorporate the needed information from, and be used in place of, the Specific Service signs.
- Tourist-oriented directional signs **shall** have one or more sign panels for the purpose of displaying the identification of and directional information for eligible facilities. Each sign panel **shall** be rectangular in shape and **shall** have a white legend and border on a brown background. The content of the legend on each sign panel **shall** be limited to the identification and directional information for no more than one eligible service or activity facility. The legends **shall** not include promotional advertising.
- Design standards for letters, numerals, and spacing **shall** be as provided as per Section 3.1.3.6.
- For tourist-oriented destinations signs installed in advance of an approach intersection (see Figure 3-311):

  - The number of signs **shall** not exceed three: One sign for tourist-oriented destinations to the left, one for destinations to the right, and one for destinations straight ahead.
  - The number of sign panels installed on each sign **shall** not exceed four.
  - The sign panels for right-turn, left-turn, and straight-through destinations **shall** be on separate signs.
  - The left-turn destination sign *Should* be located farthest from the intersection, then the right-turn destination sign, with the straight-through destination sign located closest to the intersection.
- Signs for facilities in the straight-through direction *Should* be considered only when there are signs for destinations in either the left or right direction.
- If it has been determined to be appropriate to combine the left-turn and right-turn destination sign panels on a single sign, the left-turn destination sign panels *Should* be above the right-turn destination sign panels (see Figure 3-310).
- When there are multiple destinations in the same direction, they *Should* be in order based on their distance from the intersection. Straight-through sign panel *Should* not be combined with a sign displaying left- and/or right-turn destinations.
- The sign panels *Should* not exceed the size necessary to accommodate two lines of legend without crowding. Symbols and logo sign panels on a directional sign panel *Should* not exceed the height of two lines of a word legend.
- At intersection approaches where three or fewer facilities are displayed, the left-turn, right-turn, and straight-through destination sign panels may be combined on the same sign.
- The location of other traffic control devices **shall** take precedence over the location of tourist-oriented directional signs.
  - If used, the intersection approach signs *Should* be located at least 100 m in advance of the intersection Signs *Should* be spaced at least 100 m apart and at least 100 m from other traffic control devices.
  - If used, advance signs *Should* be located approximately 1.0 km from the intersection with 500 m between these signs. In the direction of travel, the order of advance sign placement *Should* be to show the destinations to the left first, then destinations to the right, and last, the destinations straight ahead.
  - Lateral offset and position of signs *Should* be governed by Sections 3.1.4.4 and 3.1.4.5 except as permitted in this section.

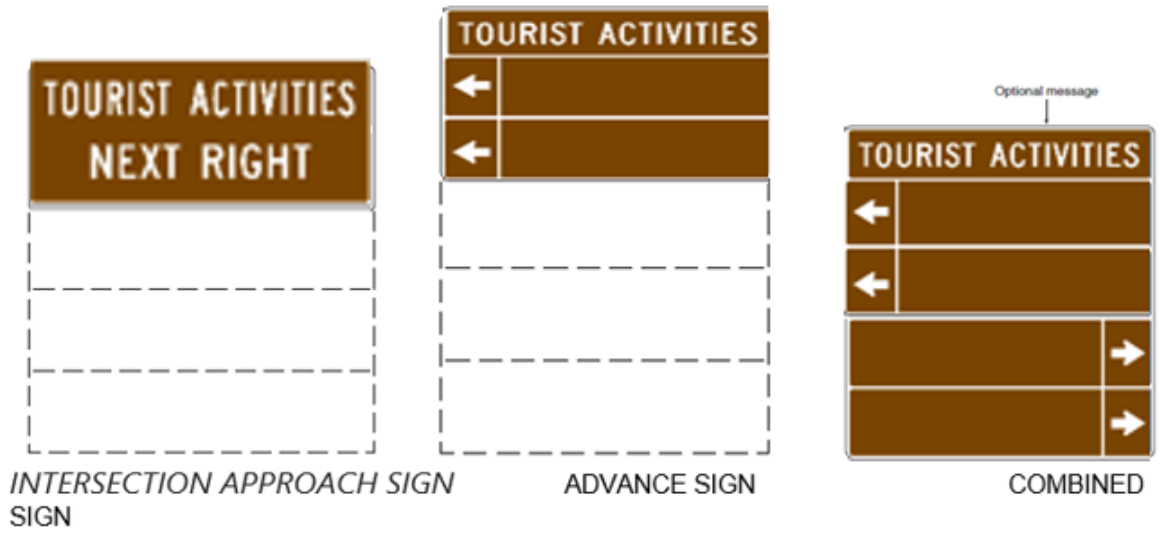


Figure 3-310 Examples of Tourist-Oriented Directional Signs

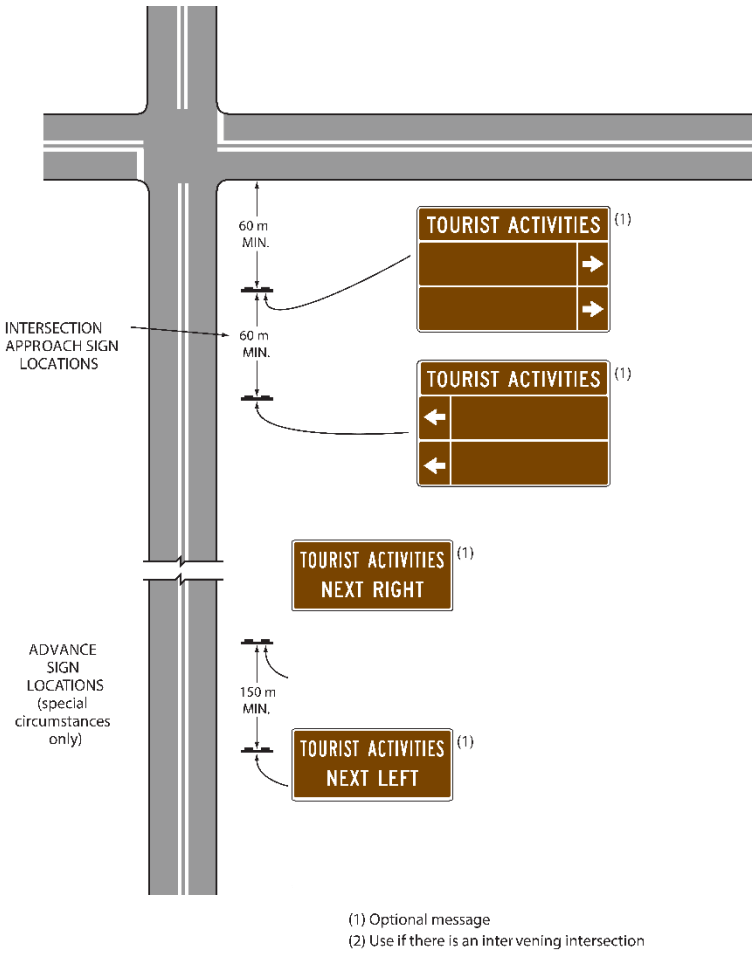


Figure 3-311 Examples of Intersection Approach Signs and Advance Signs

3.11. Dynamic Message Sign (DMS) (D29-1)

A Dynamic Message Sign (DMS) is a traffic control device that is capable of displaying one or more alternative messages. Some DMSs have a blank mode when no message is displayed, while others display multiple messages with only one of the messages displayed at a time. When DMS is used at multiple locations to address a specific situation, the message displays *Should* be consistent along the roadway corridor. The message *Should* be simple, brief, legible, and clear. Examples of safety messages include "Speed Cameras in Use", "No Trucks Allowed" and "No Parking Allowed". Typical applications for which a dynamic message sign can be used are:

- Variable speed zone.
- Work zone areas.
- Weather condition (see Figure 3-312).
- Common congested areas (see Figure 3-313).
- High crash areas (see Figure 3-314).
- Time-restricted applications.
    - All such displays **shall** be authorized by the Roads General Authority (RGA) before implementation. The Roads General Authority (RGA) may develop, update or establish a special policy regarding the display of the types of messages.
    - DMS **shall** display only traffic operational, regulatory, warning, and guidance information. Advertising messages **shall** not be displayed on DMS or its supports or other equipment.
    - Information is displayed in real time and will vary for each use and application. These signs **shall** be used in areas where road conditions vary, and the use of a static sign message may not be applicable.
    - Use of abbreviations should generally be limited to those that are highly recognized, independent of their context or are adequately understood when used with "prompt" words (e.g., prep for prepare if it precedes to stop). Further information in this regard can be found in Section C.1.2 of Appendix C of SHC 601 (Traffic Engineering and Road Safety).

Figure 3-312 Sample Display Message (Limited Visibility) – Example of D29-1 Sign

Figure 3-313 Sample Display Message (Congestion Ahead) - Example of D29-1 Sign

Figure 3-314 Sample Display Message (Crash Ahead) - Example of D29-1 Sign

- DMS **shall** not include advertising, animation, rapid flashing, dissolving, exploding, scrolling, or other dynamic elements. DMS **shall** automatically adjust their brightness under varying light conditions to maintain legibility.
- The following are the Legibility and Visibility of DMS criteria:
  - The message *Should* be designed to be legible from a minimum distance of 180 m for nighttime conditions and 245 m for daylight conditions.
  - DMS *Should* be limited to no more than three lines, with no more than 20 characters per line.
  - The spacing between characters in a word *should* be between 25 to 40 percent of the letter height.
  - The spacing between words in a message *should* be between 75 and 100 percent of the letter height.
  - Spacing between the message lines *should* be between 50 and 75 percent of the letter height.
  - The minimum letter height *Should* be 45 cm for DMS on roadways with speed limits of 70 km/h or higher. The minimum letter height *Should* be 30 cm for DMS on roadways with speed limits of less than 70 km/h.
  - The width-to-height ratio of the sign characters *Should* be between 0.7 and 1.0. The stroke width-to-height ratio *should* be 0.2.
  - Contrast orientation of DMS *should* always be positive, with luminous characters on a dark or less luminous background.

        - If a black background is used, the color used for the legend on DMS *Should* match the background color that would be used on a standard sign for that type of legend, such as white for regulatory, yellow for warning, orange for temporary traffic control, red for stop or yield, fluorescent pink for incident management, and fluorescent yellow-green for bicycle, pedestrian, and school warning.
    - The design of legends, display contents, etc., for DMS **shall** comply with the design and application requirements established in the relevant chapter of SHC 306 (Highway Facilities and Utilities Design – Public Utilities, Highway and Street Lighting, Control and Monitoring Devices).
    - When a DMS that is used in place of a static sign (such as a blank-out or variable legend regulatory sign) *Should* be located in accordance with the provisions of Section 3.1. The following factors *Should* be considered when installing other permanent DMS:
        - DMS *Should* be located sufficiently upstream of known bottlenecks and high crash locations to enable road users to select an alternate route or take other appropriate action in response to a recurring condition.
        - DMS *Should* be located sufficiently upstream of major diversion decision points, such as interchanges, to provide adequate distance over which road users can change lanes to reach one destination or the other.
        - DMS *Should* not be located within an interchange except for toll plazas or managed lanes.
        - DMS *Should* not be positioned at locations where the information load on drivers is already high because of guide signs and other types of information.
        - DMS *Should* not be located in areas where drivers frequently perform lane-changing maneuvers in response to static guide sign information, or because of merging or weaving conditions.

3.12. Recreational and Cultural Interest Area Signs

Recreational or cultural interest areas are attractions or traffic generators that are open to the general public for the purpose of play, amusement, or relaxation. Recreational attractions include such facilities as parks and campgrounds, while examples of cultural attractions include museums, art galleries, and historical buildings or sites.

- Where recreational or cultural interest areas are a significant destination on a numbered highway route, special signs may be posted for such areas - see Figure 3-315. Icons may be used. This is done where the access road to the interest area intersects the highway.
- The shape of the signs **shall** be rectangular, and the colors **shall** be white legend and border on a brown background. The name of the area **shall** be in Arabic and English.
- If the interest area is a major traffic generator, then it will be necessary to install an advance sign some distance ahead of the actual turnoff point. This sign will alert drivers to determine if they want to visit the interest area.
- Recreational and Cultural Interest Areas signs may also be used in the form of supplemental destination signs.

Figure 3-315 Typical Recreational and Cultural Interest Area Sign

3.12.1. Supplemental Destination Emblems Signs (G30-Series)

Supplemental destination signs provide rest, recreational, and cultural areas signing using a mix of standard symbols and text, where appropriate. The signs are brown with white legend and contain symbols that are generally black legend on a white rectangular emblem.

Color or custom symbols may be approved by the responsible authority if they clearly describe the supplemental destination.

Figure 3-316 provides a summary of potential secondary destination emblems that may be used as part of secondary designation signage. Figure 3-317 and Figure 3-318 provide examples of secondary guide signage using symbols. These include chevron and "trailblazer" stack signs (single panel vertical stack) along with "inserts", supplemental signs that are incorporated within larger, standards stack signage. Example of supplemental insert sign (G30-3) is shown in Figure 3-319.

Symbols may be used without descriptive text if it is initially used with text and then repeated as part of trailblazer signage leading to the destination.

Figure 3-316 Supplemental Destination Symbols

Figure 3-317 Supplemental Trailblazer Sign (Example) (G30-1)

Figure 3-318 Supplemental Chevron Sign (Example) (G30-2)

Figure 3-319 Example of Supplemental Insert Sign (G30-3)

3.12.2. Advance Supplemental Sign (G31-2 Series)

Advance supplemental signs **shall** provide the following:

1. Indicates supplemental destinations either in addition to standard advance direction signs, or on their own at intersections that do not warrant standard advance direction signs.
2. Are intended for unfamiliar drivers finding their way from a numbered route to the non-control supplemental destination, i.e., tourist destination, recreational area, religious area etc.
3. Eligible supplemental destinations are indicated on the sign both with text and/or with symbols indicating the nature of the supplemental destination.
4. Advance supplemental signs are generally stand-alone, ground- mounted supplemental guide signs.
5. Supplemental signs are typically brown background for tourist or cultural attractions with white legend along with supplemental logos, or of white background for government offices with black legend and, the specific destination are either green or blue background depending on the highways sign color as identified in Section 3.1.3.2 with white legends and where appropriate, logos or symbols.

Supplemental destination may be shown as an insert onto a standard advance stack or map directional sign in a contrasting color, depending on the type of supplemental destination.

Examples are shown in Figure 3-320, Figure 3-321 and Figure 3-322.

Figure 3-320 Advance Supplemental Sign - Example for Tourist Attractions Sites (Vertical Stack-style) (G31-1)

Figure 3-321 Advance Supplemental Sign - Example for Tourist Attractions Sites (Vertical Stack-style) (G31-2)

Figure 3-322 Advance Supplemental Sign - Example for Government Facility (G31-3)

3.12.3. Supplemental Direction Sign (G32-1)

Supplemental direction signs (Figure 3-323) may be erected between major Advance Direction signs. These signs would show destinations, accessible from an interchange, which are not shown on the standard sequence signing. If these supplemental destinations are other communities, the sign **shall** match the color of other guide signs. For supplemental destinations the signs **shall** follow the background colors and legend and or symbol and logos color as described. The Interchange number *Should* be listed on each sign. Supplemental signing *Should* be used sparingly as too many such signs can reduce the effectiveness of other more important informative signing due to overloading the driver with information.

Example of recreational sign in freeway approach to single-exit interchange with no lane drop and with one lane drop and optional exit from second right lane are shown in Figure 3-324 and Figure 3-325 respectively.

Figure 3-323 Supplemental Direction Sign (G32-1)

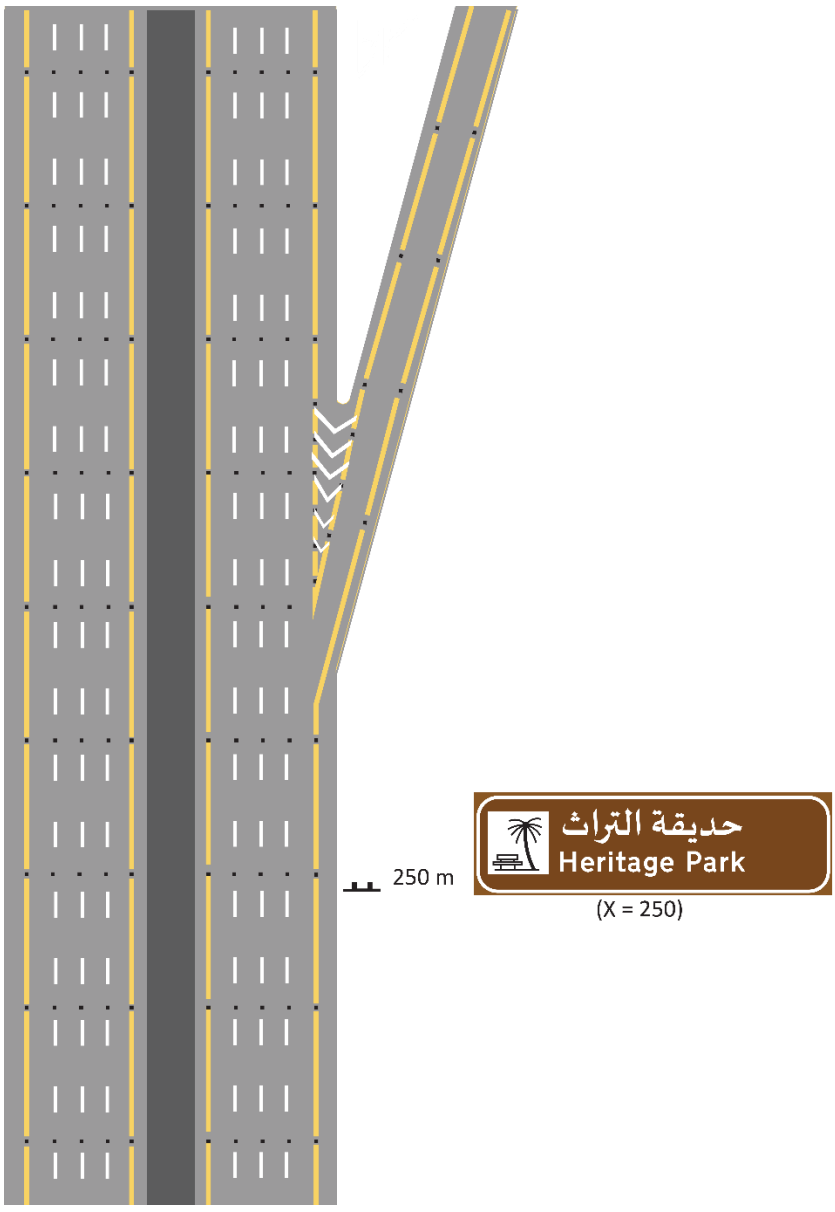


Figure 3-324 Example of Recreational Sign in Freeway Approach to Single-Exit Interchange with No Lane Drop

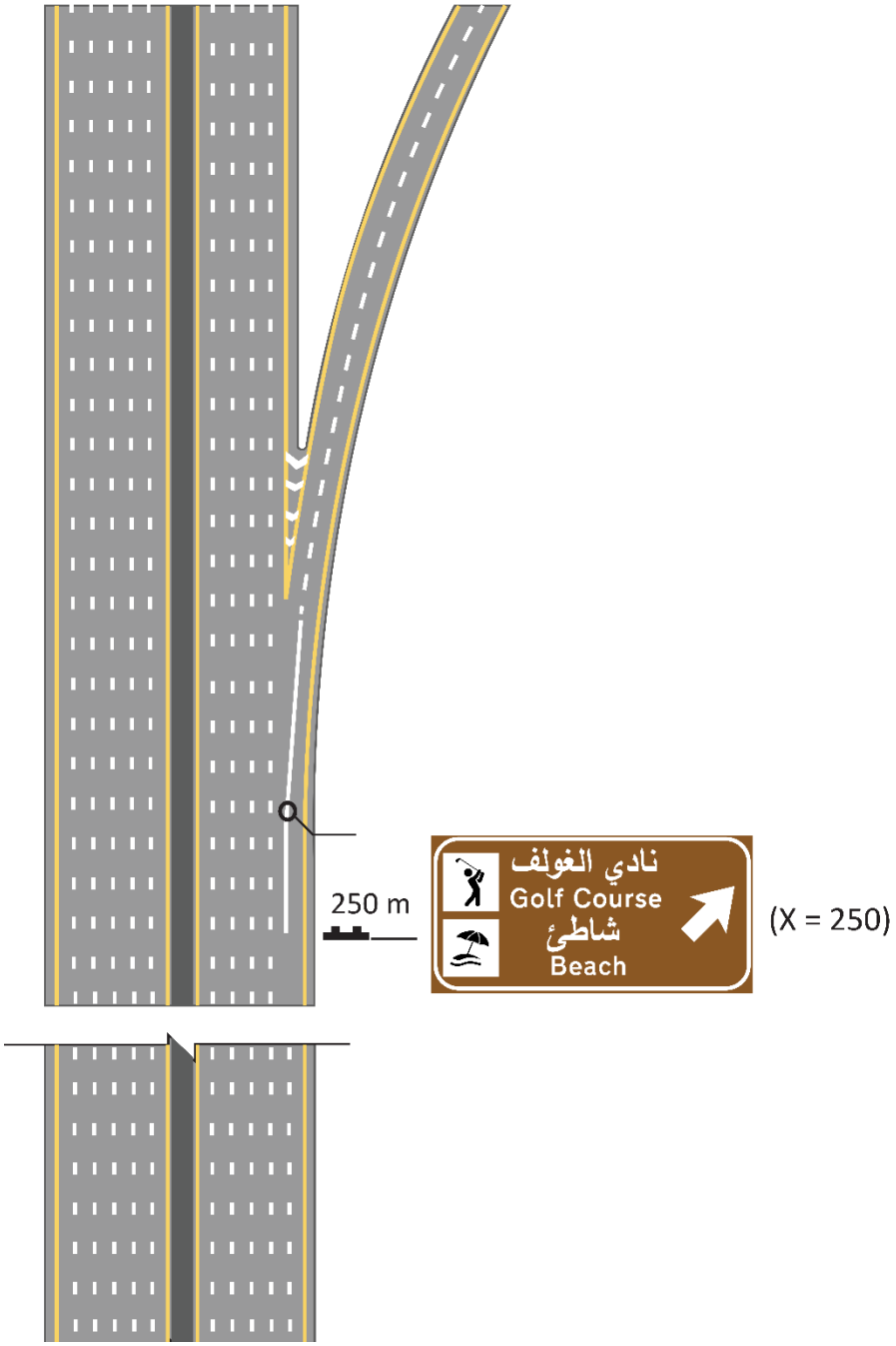


Figure 3-325 Example of Recreational Sign Freeway Approach to Single-Exit Interchanges with One Lane Drop and Optional Exit from Second Right Lane

3.13. Emergency Management Signs

Contingency planning for an emergency evacuation *Should* be considered by all concerned authorities and *Should* consider the use of all applicable highways.

- In the event of a disaster where highways that cannot be used will be closed, a successful contingency plan *Should* account for the following elements:
  - Controlled operation of certain designated highways.
  - Establishment of traffic operations for the management of traffic.

- Provision to accommodate the quick response of the emergency services (Red Crescent, Civil Defense, Highway Security etc.).

Further information regarding traffic control in emergency situations, details can be found in SHC 305 (Highway Facilities and Utilities Design – Work Zone Design).

4. Markings

4.1. General Provision

4.1.1. Introduction

Markings on public and private roadways have important functions in providing regulatory, guidance and information for the road user. Major marking types include:

- Standard Pavement and Curb Markings (Longitudinal and Transverse).
- Channelizing Devices and Markings.
- Raised Pavement Markers and Delineators.

In some cases, markings are used to supplement other traffic control devices such as signs, signals, and other markings. In other instances, markings are used alone to effectively convey regulations, guidance, or warnings in ways not obtainable by the use of other devices.

A variety of factors influence the visibility of a road marking. Visibility is increased when a line is wider, has a higher mark-to-gap ratio, has a higher coefficient of retroreflective luminance in the daytime, or has higher contrast with the roadway surface. Visibility of the markings can be limited by sand, debris and water on or adjacent to the markings. Marking durability is affected by material characteristics, traffic volumes, weather, and location. However, under most highway conditions, markings provide important information while allowing minimal diversion of attention from the roadway.

On roadways with high traffic speeds, wider lines *should* normally be adopted. Similarly, to maintain adequate conspicuity, longitudinal lines need to be wider and longer where speeds are high. Each standard marking **shall** be used only to convey the meaning prescribed for that marking in this volume. When used for applications not described, markings **shall** conform in all respects to the principles and standards set forth in this Volume. Markings that must be visible at night **shall** be adequately reflectorized. Markings that are no longer applicable for roadway layout/conditions or restrictions and that might cause confusion for the road user **shall** be removed to be unidentifiable as a marking as soon as practical. Before any new public road, private road, paved detour, or temporary route is opened to public travel, all necessary markings *should* be in place.

4.1.2. Materials

Pavement and curb markings are commonly placed by using paints or thermoplastics; however, other suitable marking materials, including raised pavement markers and colored pavements, may be used, in conformance with SHC 403 (Construction of Highway Facilities) requirements. Pavement markings **shall** be of non-skid materials and **shall** not protrude more than 6 mm above the level of the carriageway. Studs or similar devices used for marking **shall** not protrude more than 15 mm above the level of the carriageway (or more than 25 mm in the case of studs incorporating reflex reflectors); they *should* be used in accordance with road traffic safety requirements (refer to SHC 309 (Material Specification and Standardized Testing)).

4.1.3. Colors

Painted pavement markings **shall** be either white or yellow, unless stated otherwise in this chapter, where additional colors may be utilized.

- Yellow Longitudinal Markings:
    - The separation of traffic lanes and the hard shoulders.
    - The left-hand edge of roadways of divided roadways (next to the median).
    - Yellow markings are used to show places where parking is prohibited or restricted.
- White Longitudinal Markings:
    - The separation of traffic travelling in opposite directions.
    - The separation of traffic flows in the same direction (lane lines).
- Transverse Markings:
    - White **shall** be used for regulatory pavement/line markings.
    - Yellow **shall** be used for curb markings indicating parking restrictions, loading zone, or warning of barrier edge/nose.
- Symbols & Worded Markings:
    - White **shall** be used for all symbol and worded markings.

4.2. Standard Pavement and Curb Markings

4.2.1. Center Lines (L1-1 Series)

Marking L1-1 is a center line that **shall** separate traffic traveling in opposite directions. It need not be at the geometrical center of the pavement. Center lines provide important guidance to motorists and *should* be used on most paved roadways. On roadways where a continuous center line is not used, short sections may be used to control the position of traffic at specific locations, such as around curves, over hills, and on approaches to intersections, railroad crossings, and bridges. Double white lines may also be utilized to separate directions on single carriageway roadways. Center line patters are shown in Table 4-1.

The center line markings on undivided two-way highways **shall** be a normal broken white line where passing is permitted in either direction. Use of this line is only permissible on roadways with only one lane in each direction (see Figure 4-1).

Center lines **shall** be required on paved highways under the following conditions:

- In rural highways, with two-lane carriageway 6 m or more in width, with prevailing speeds of greater than 60 km/h.
- In residence or business districts on all through highways and streets where significant traffic volumes exist.
- At other locations where an engineering study indicates a need.
- On temporary detours in place for long or short periods (see Chapter 7).

Table 4-1 Center Line Patterns

Marking Designation	Design Speed km/h	Lane Line Dimensions (mm)		
		Line Length (A) (mm)	Gap Length (B) (mm)	Line Width (C) (mm)
L1-1a	≥100	6,000	12,000	150
L1-1b	80 - 100	3,000	6,000	150
L1-1c	< 80	2,000	4,000	100 - 150

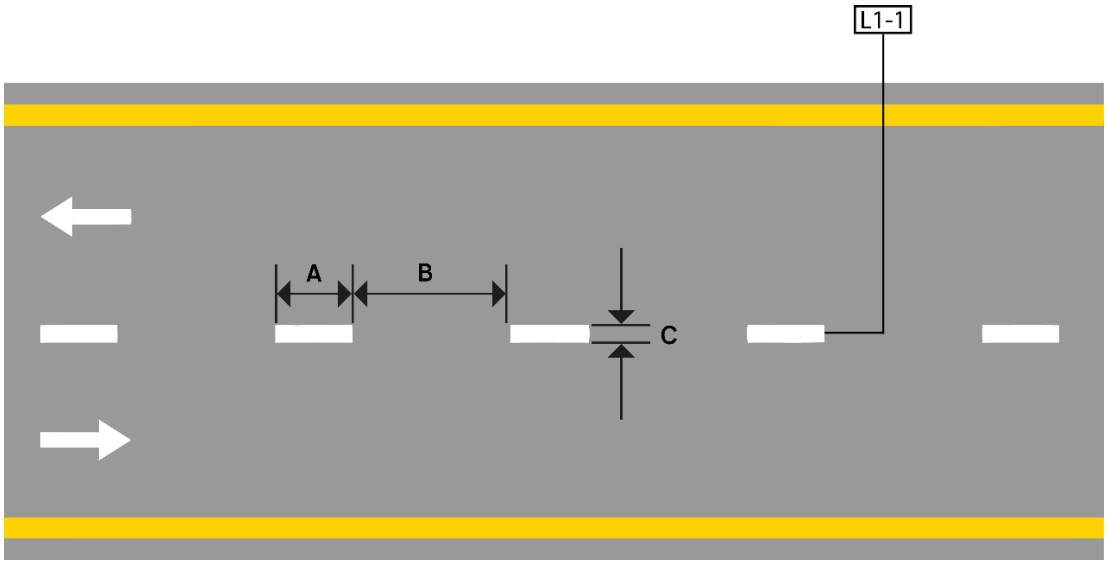


Figure 4-1 Example of Center Line (L1-1) on Two-Way Single Highway Marking

4.2.2. Lane Lines (L2-1 Series)

Lane Lines (L2-1) (see Figure 4-2) **shall** be used to separate lanes of traffic traveling in the same direction. These lines **shall** be used on all multi-lane highways and *should* be used at congested locations where the roadway will accommodate more lanes of traffic than would be the case without the use of lane lines. Lane line patters are shown in Table 4-2.

- Lane lines are usually normal width broken white lines which permit lane changing with care. A broken line is formed by segments and gaps usually in the ratio of 1:2.
- A normal solid continuous white line may be used as the lane line in critical areas where it is advisable to discourage lane changing. Typical locations for such applications arc tunnels or bridges having width restrictions and interchange areas where lane changing disrupts traffic now.
- A continuous white line (L4-1) may be used to separate through traffic lanes from special secondary lanes, such as uphill truck lanes, left or right turn lanes, and reserved bus lanes or bicycle lanes (see Maximum Speed Limit Sign (R3-Series)- Section 3.2.4).

Table 4-2 Lane Line (L2-1) Patterns

Marking Designation	Design Speed (km/h)	Lane Line Dimensions (mm)		
		Line Length (A) (mm)	Gap Length (B) (mm)	Line Width (C) (mm)
L2-1a	≥100	6,000	12,000	200
L2-1b	80 - 100	3,000	6,000	150
L2-1c	< 80	2,000	4,000	100 - 150

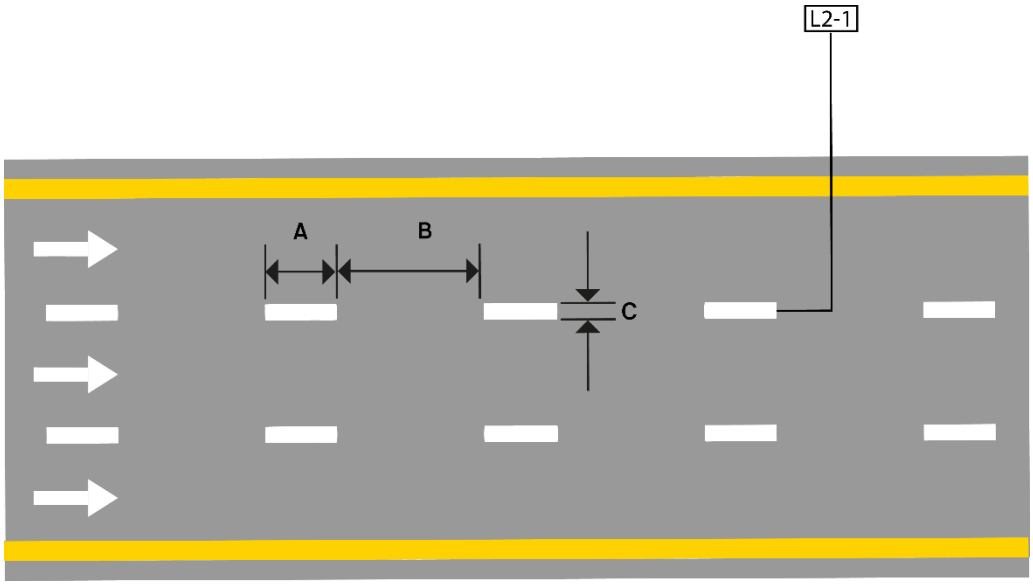


Figure 4-2 Typical Lane Line (L2-1) Marking

4.2.3. No-Passing Zone (L3-1 Series)

Where center lines (L1-1) are installed, no-passing zones (L3-1 and L3-2) **shall** be established at vertical and horizontal curves and elsewhere on two-lane highways where an engineering study indicates passing must be prohibited because of inadequate sight distances or other special conditions:

- A no-passing zone **shall** be marked by a continuous white line in either a two-direction no-passing marking (L3-1) (see Figure 4-3), or a one-direction no passing marking (L3-2) (see Figure 4-4).
- On a two-lane highway, the no-passing marking **shall** be parallel to and extended along the center line throughout the no-passing zone.
- In addition to the pavement marking where prescribed, Overtaking Prohibited signs (see Section 3.2.15) **shall** be used to emphasize the existence and extent of a no-passing zone.

- The no-passing marking **shall** be used on two-way roadways at pavement width transitions and on approaches to obstructions which must be passed on the right.
- Where the distance between successive no-passing zones is less than 120 m, the appropriate no-passing marking (one direction or two direction) *should* connect the zones.
- The no-passing marking may be used on approaches to railroad at-grade crossings and other locations where passing *should* be prohibited.

Table 4-3 No Passing Zone Marking Patterns

Marking Designation	Design Speed (km/h)	Line Width (mm)
L3-1a	> 80	150
L3-1b	< 80	100
L3-2a	> 80	150
L3-2b	< 80	100

Figure 4-3 Typical Two Direction No Passing Zone Marking (L3-1)

Figure 4-4 Typical One Direction No Passing Zone Marking (L3-2)

- A no-passing zone at a horizontal curve or vertical curve is warranted where the passing sight distance, as defined in SHC 301 (Highway Geometric Design), cannot be met (see Table 4-3 and Table 4-4).
- An example of two-lane, two-way marking with no-passing zones is shown in Figure 4-5.

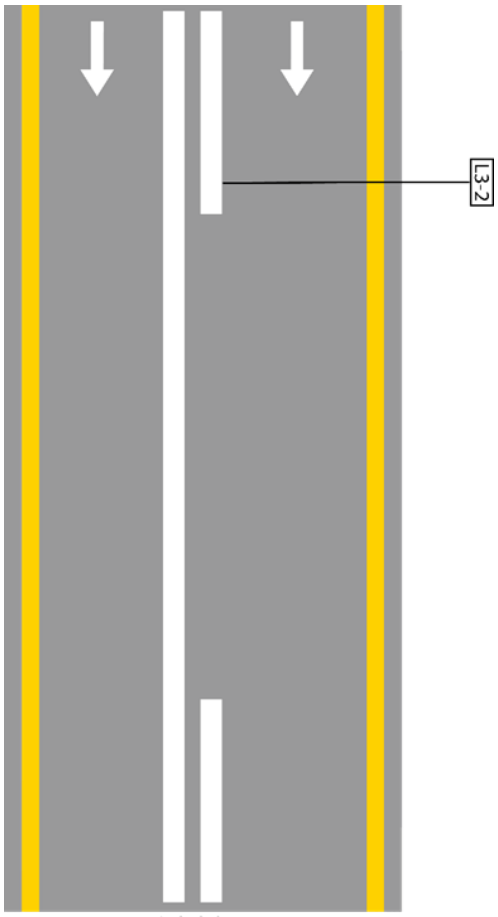


Figure 4-5 Example of Two-Lane, Two-Way Marking with No-Passing Zones

Table 4-4 Minimum Passing Sight Distances with Respect to the Design Speed

Design Speed (km/h)	Minimum Passing Sight Distance (m)
50	345
60	410
70	485
80	540
90	615
100	670
110	730

The beginning of a no-passing zone (point "a") is that point at which the sight distance first becomes less than that specified in the above table. The end of the zone (point "b") is that point at which the sight distance again becomes greater than the minimum specified (See Figure 4-6).

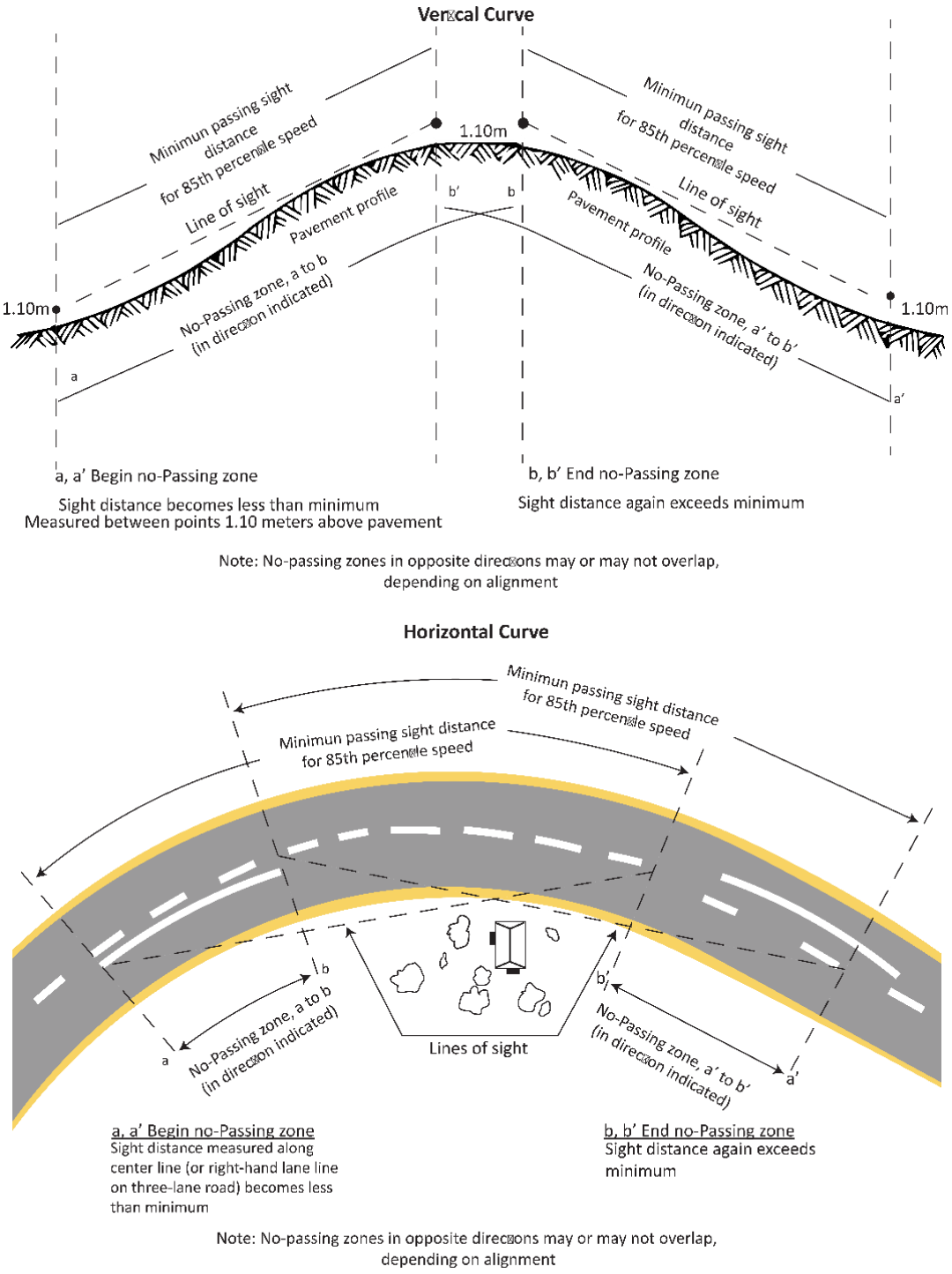


Figure 4-6 Method of Locating and Determining the Limits of No-Passing Zones at Vertical and Horizontal Curves

4.2.4. Prohibitory Lines (L4-1 Series)

Prohibitory Lines (L4-1) indicate to drivers that they may not leave the lane in which they are travelling (see Figure 4-7). Prohibitory lines **shall** be used at priority intersections, signal-controlled intersections, and roundabouts to prevent weaving movements in the immediate vicinity of the intersection, and **shall** extend a minimum of 25 m from the Stop or Yield line as provided in Table 4-5.

The following highlights various applications of prohibitory line marking:

- Prohibitory lines marking **shall** be used on approaches to speed humps where opposing flows are not separated by physical measures. On an undivided roadway with opposing traffic, the marking **shall** be yellow.
- Prohibitory lines **shall** have a width of 200 mm on roadways where the posted speed is greater than 100 km/h.
- Prohibitory lines **shall** have a width of 150 mm on roadways where the posted speed is greater than 80 km/h but less than or equal to 100 km/h.
- Prohibitory lines **shall** have a width of 120 mm on roadways where the posted speed is 80 km/h or less, unless it is the centerline on an undivided roadway, in which case a width of 150 mm **shall** be used.
- Prohibitory lines marking may be used in the center of a roadway on the approach to an isolated rural intersection to provide warning of no lane changing or passing through the intersection.

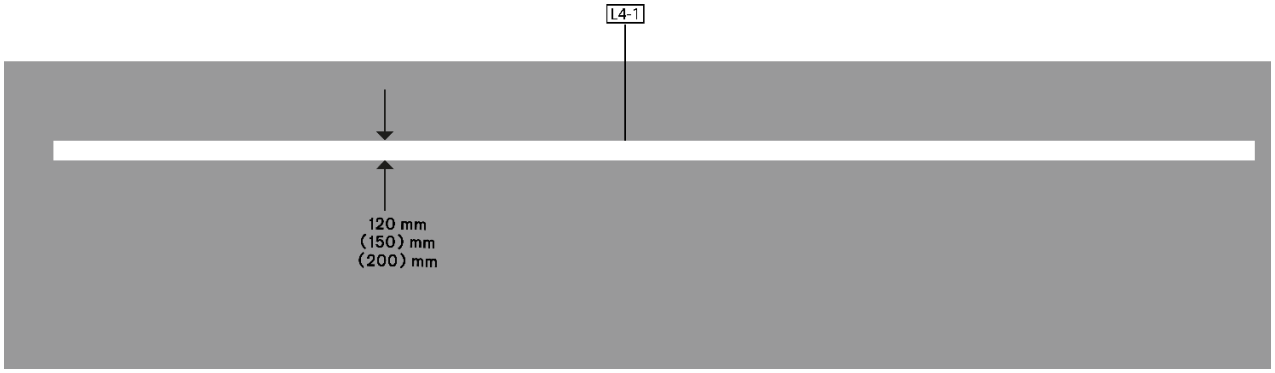


Figure 4-7 Prohibitory Lines Widths (L4-1)

Table 4-5 Prohibitory Lines Applications and Widths

Marking Designation	Posted Speed (km/h)	Roadway Configuration	Application	Lane Marking Color	Lane Marking Width (mm)
L4-1a	≤ 80	Undivided Roadway with one lane in each direction	Prohibitory Center Line separating vehicles travelling in opposite directions	White	150
L4-1b	≤ 80	Divided Roadway	Prohibitory Lane Line – separating vehicles travelling in the same direction	White	120
L4-1c	from 80 to 100	Divided Roadway	Prohibitory Lane Line – separating vehicles travelling in the same direction	White	150
L4-1d	> 100	Divided Roadway	Prohibitory Lane Line – separating vehicles travelling in the same direction	White	200

4.2.5. Pavement Edge Lines (L5-1 Series)

Pavement edge line markings (L5-1) (see Figure 4-8) provide an edge-of-pavement guide for drivers. These lines have a unique value as a visual reference for the guidance of drivers during adverse weather and visibility conditions:

- Edge lines on both single and dual carriageway roadways **shall** be yellow.
- Edge lines **shall** not be continued through intersections.
- Edge lines *Should* not be broken for driveways.
- The lines also may be used where edge delineation is desirable to reduce driving on paved shoulders or refuge areas of lesser structural strength than the adjacent pavement.

Edge line markings **shall** be 200 mm wide on highways with a posted speed greater than 100 km/h, applications and widths of the edge lines shown in Table 4-6.

Table 4-6 Edge Lines Applications and Widths

Marking Designation	Posted Speed (km/h)	Roadway Configuration	Application	Lane Marking Color	Lane Marking Width (mm)
L5-1a	≤ 100	Undivided Roadway with one lane in each direction	Edge of Roadway Line – Separating the right-hand shoulder from the travel lanes	Yellow	150
L5-1b	≤ 100	Divided Roadway	Edge of Roadway Line – Separating the right-hand shoulder from the travel lanes	Yellow	150
L5-1c	> 100	Divided Roadway	Edge of Roadway Line – Separating the right-hand shoulder from the travel lanes	Yellow	200

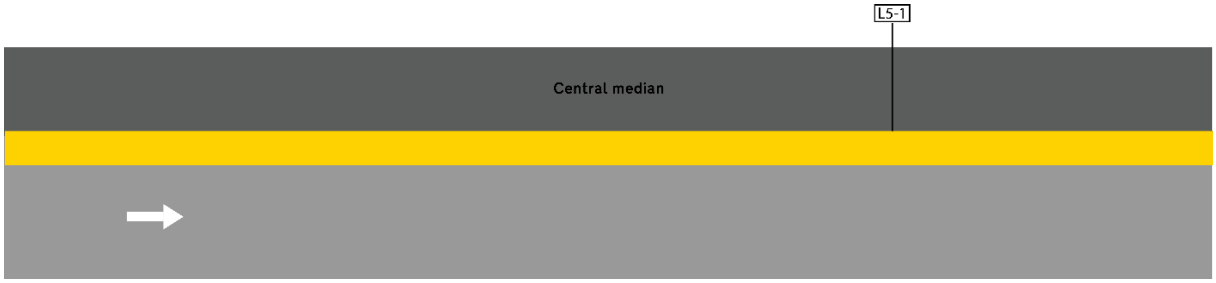


Figure 4-8 Pavement Edge Line Marking (L5-1)

4.2.6. Raised Pavement Markings RPMs (L3-xR)

Raised Pavement Markers (RPMs) (L3-xR) are either raised retro-reflective or non-reflective pavement markers (Studs). RPMs may be used to supplement other types of pavement markings or in combination with non-reflectorized raised pavement markers as a substitute for other types of materials. Studs may be used to provide improved nighttime visibility, especially during adverse weather conditions, such as rain, blowing sand, or dust. They are generally bi-directional, with the direction facing traffic matching the line color, and the direction facing opposite (i.e., the "wrong way") showing red. These markers may be used as a supplement to or a substitute for standard types of marking materials, such as paint or thermoplastic. Raised pavement markers, generally less than 25 mm in height, may be used

for pavement marking purposes. These markers may be round, square, or rectangular in shape with dimensions, in accordance with SHC 403 (Construction of Highway Facilities) requirements:

- Edge line studs are set on the roadway side of the line when standard markings (paint or thermoplastic) are used but are set in line with non-reflective RPMs when the latter are used in lieu of standard markings. Markers placed adjacent to a painted line **shall** be offset by 30 mm.
- Studs *should* be placed in alternate gaps to supplement a broken line (L2-1) and at a reduced spacing to supplement a continuous line (L4-1).
- The spacing for non-reflective RPM's when used as a substitute for broken or continuous lines is generally a minimum of 1,000 mm, as shown in Figure 4-9 through Figure 4-12.
- Figure 4-13 illustrates applications on high-speed highways in exit ramps.
- The determination of the normal spacing of the raised markers *Should* be established in relation to the existing pattern of segments and gaps used with broken lines.
- For special situations, closer spacing may be used. This reduced spacing may be used if there are special hazardous locations (e.g., at sharp curves, approaches to problematic intersections, locations where there is a predominance of bad weather), at high traffic volume locations, or through transition areas where the number of lanes is reduced.
- The color **shall** conform to the color of the markings these RPMs supplement or the markings for which they are substituted, except were used for special situations (i.e., use of green unidirectional retro-reflective RPM for exit ramp channelization).

Recommended raised pavement marking spacing's dimensions are shown in following Tables:

- Table 4-7 for dual centerline.
- Table 4-8 for dashed lane line.
- Table 4-9 for solid channelizing line.
- Table 4-10 for solid edge line.

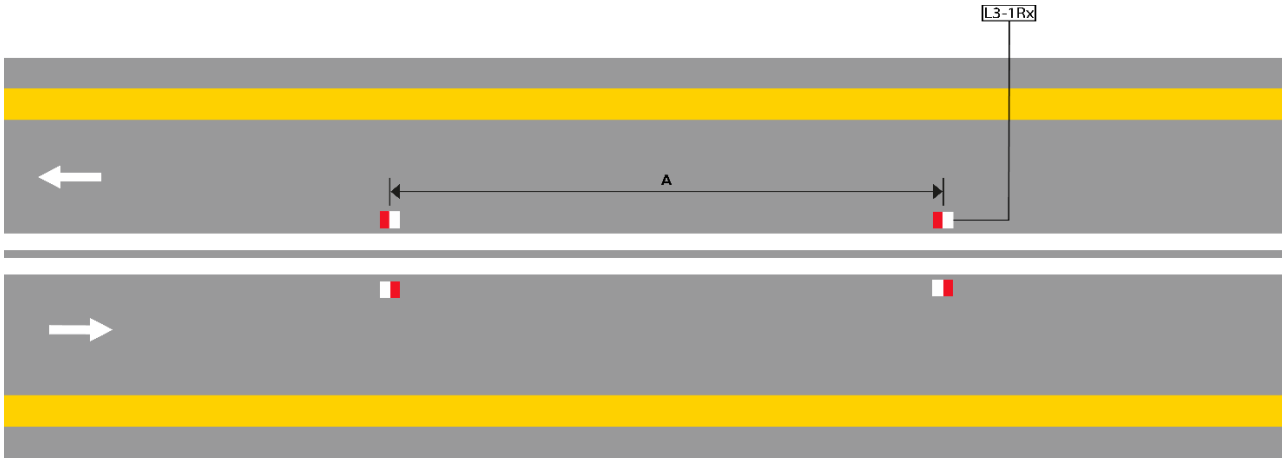


Figure 4-9 Recommended Raised Pavement Marking Spacing's for Dual Centerline

Table 4-7 Recommended Raised Pavement Marking Spacing's Dimensions for Dual Centerline

Marking Designation	Travel Speed (km/h)	A (mm)
L3-1Ra	>100	9,000
L3-1Rb	80 to 100	6,000
L3-1Rc	< 80	4,000

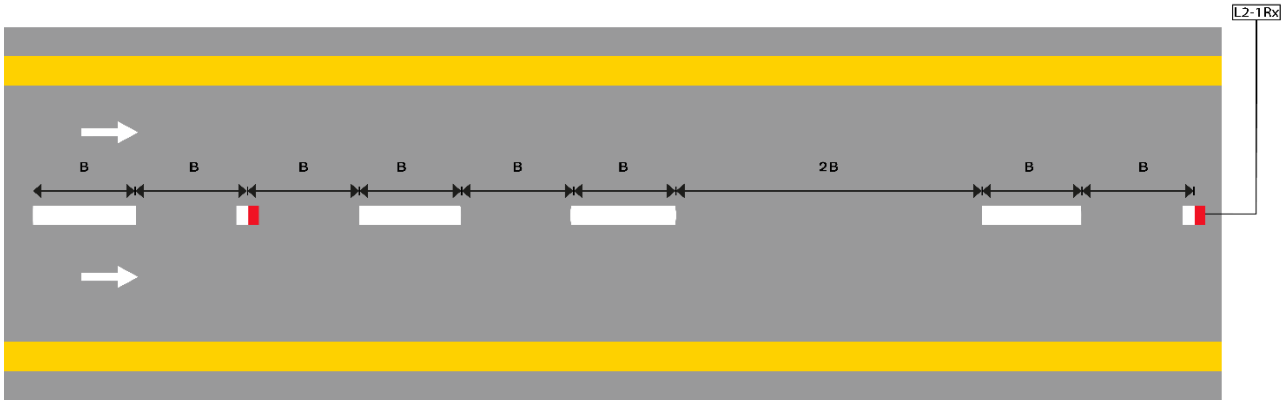


Figure 4-10 Recommended Raised Pavement Marking Spacing's for Dashed Lane Line

Table 4-8 Recommended Raised Pavement Marking Spacing's Dimensions for Dashed Lane Line

Marking Designation	Travel Speed (km/h)	B (mm)
L2-1Ra	>100	6,000
L2-1Rb	80 to 100	3,000
L2-1Rc	< 80	2,000

Figure 4-11 Recommended Raised Pavement Marking Spacing's for Solid Channelizing Line

Table 4-9 Recommended Raised Pavement Marking Spacing's Dimensions for Solid Channelizing Line

Marking Designation	Travel Speed (km/h)	C (mm)
L4-1Ra	>100	18,000
L4-1Rb	80 to 100	9,000
L4-1Rc	< 80	6,000

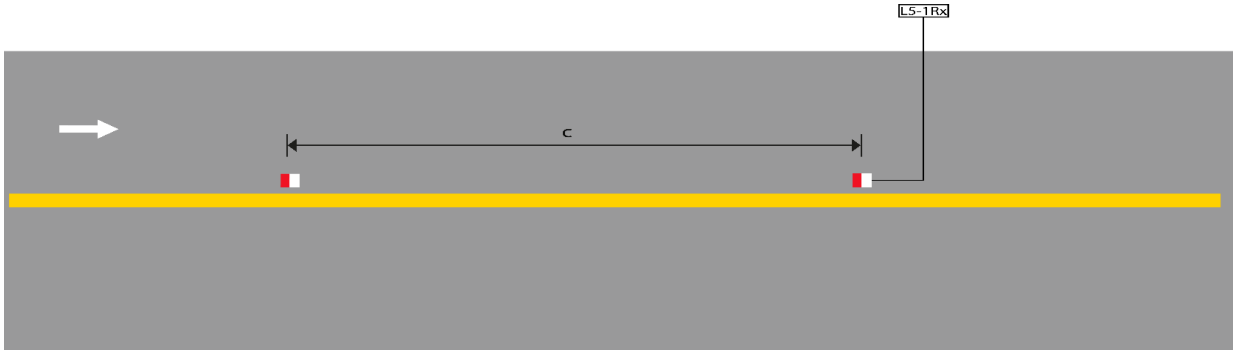


Figure 4-12 Recommended Raised Pavement Marking Spacing's for Solid Edge Line

Table 4-10 Recommended Raised Pavement Marking Spacing's Dimensions for Solid Edge Line

Marking Designation	Travel Speed (km/h)	C (mm)
L5-1Ra	>100	18,000
L5-1Rb	80 to 100	9,000
L5-1Rc	< 80	6,000

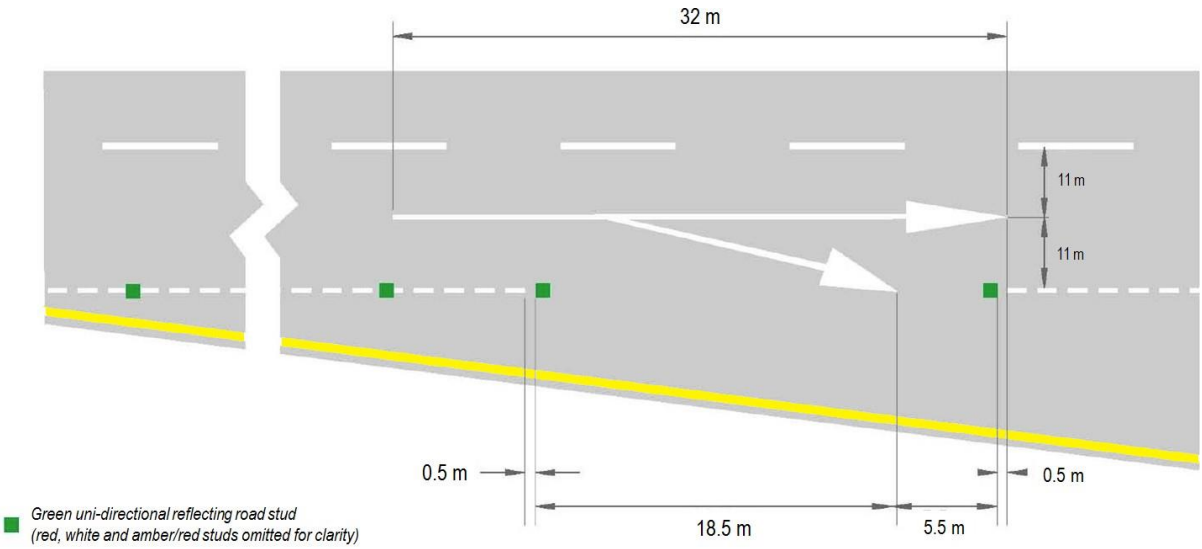


Figure 4-13 Special Reflective Raised Pavement Marking (Stud) Applications for Highway and High-Speed Exit Ramps[2].

4.2.7. Hatched Markings (L6-1 Series)

Hatched Marking **shall** be used to provide warning to stay clear of a physical danger that is adjacent to their travel lane. Hatched marking *should* consist of repeated diagonal white lines situated as depicted in Figure 4-14, Figure 4-15, Figure 4-16 and Figure 4-17. The dimensions and layout requirements for the Hatched marking *should* be similar to Chevron marking shown in Section 4.2.8. A common usage of Hatched markings is in a median or gore area that separates traffic that is moving in opposite directions of travel. Where there is adequate roadway space, hatched marking **shall** be used:

- Marking (L6-1a) **shall** be used to separate opposing flows of traffic on undivided roadways where the posted speed is greater than 80 km/h. Where roadway space is limited, No Passing zone marking (L3-1) *should* be used.
- Marking (L6-1b) **shall** be used to indicate the approach to a place on divided roadway, or ramp where the number of lanes is reduced, or an area of roadway not available to traffic.
- Marking (L6-1c) **shall** be used on low-speed roadways to mark off an area at the edge of the roadway that drivers *should* not enter unless safe to do so; for example, to guide traffic past buildouts in traffic calming projects.
- Marking (L6-1d) **shall** be used to indicate termination of the shoulder. Hatched marking **shall** be 150 mm wide for posted speeds less than 100 km/h and 200 mm wide for posted speeds 100 km/h and greater. The longitudinal lines may be formed by Pavement Edge line marking or Rumble Strips marking, as appropriate. Where two terminations are in quick succession, the shoulder between them *Should* be hatched off to discourage its use, as rejoining the freeway/expressway from the isolated section is likely to be difficult.

[2] Note: Above lane channelization for exit ramp is a white dotted lane line with 1 m segments and 1 m gaps.

- Only in areas not intended for travel or parking and *should* always be separated from a travel area by a no passing line marking or edge line marking.
- Hatched markings may be used to mark the shoulders of particularly hazardous or unusual conditions (e.g., dangerous curves, lane ends, or roadside obstructions). However, these situations *should* be thoroughly evaluated by an engineering study that hatched markings may significantly contribute to the delineation and warning of these conditions. Consideration *should* be given to the use of rumble strips marking.
- The routine usage of hatched markings *should* be avoided.
- Table 4-11 contains the pattern for hatched markings.

Table 4-11 Hatched Markings Pattern

Marking Designation	Posted Speed (km/h)	Roadway Configuration	Application	Lane Marking Color[3]	Lane Marking Width (mm)
L6-1a	> 80	Undivided Roadway with one lane in each direction	Hatched Markings used to separate opposing flows of traffic on undivided roadways	Yellow/White	150
L6-1b	> 80	Undivided Roadway with one lane in each direction	Hatched Markings used to indicate the approach to a place on divided roadway, or ramp where the number of lanes is reduced, or an area of roadway not available to traffic	Yellow/White	150
L6-1c	> 100	Divided Roadway	Hatched Markings used on low-speed roadways to mark off an area at the edge of the roadway	Yellow/White	200
L6-1d	<100	Divided Roadway	Hatched Markings used to indicate termination of the shoulder	Yellow/White	150
	>100				200

[3] The diagonal lines **shall** be white, and the border line **shall** be yellow.

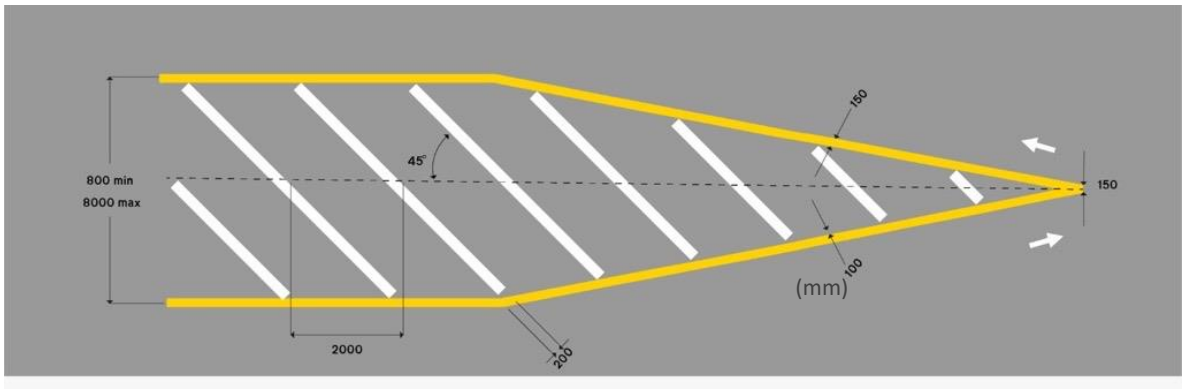


Figure 4-14 Typical Hatched Markings (L6-1a)

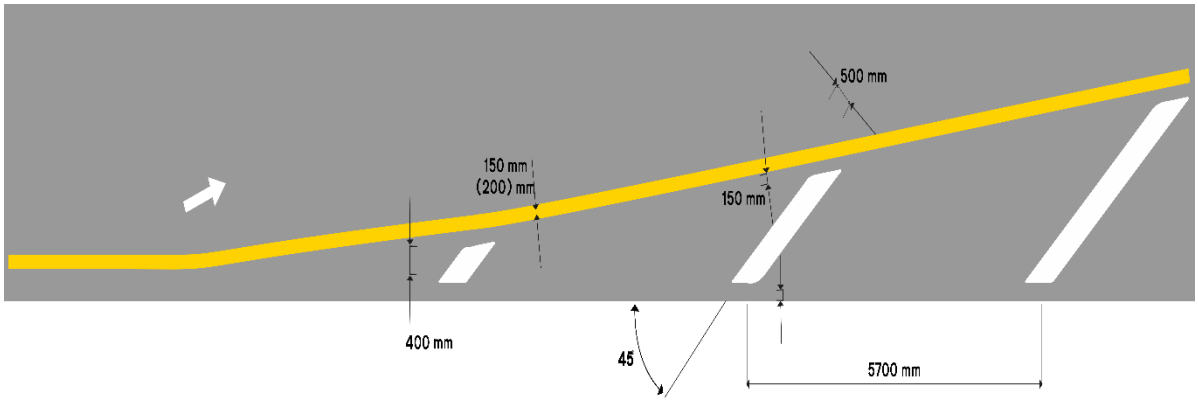


Figure 4-15 Typical Hatched Markings (L6-1b)

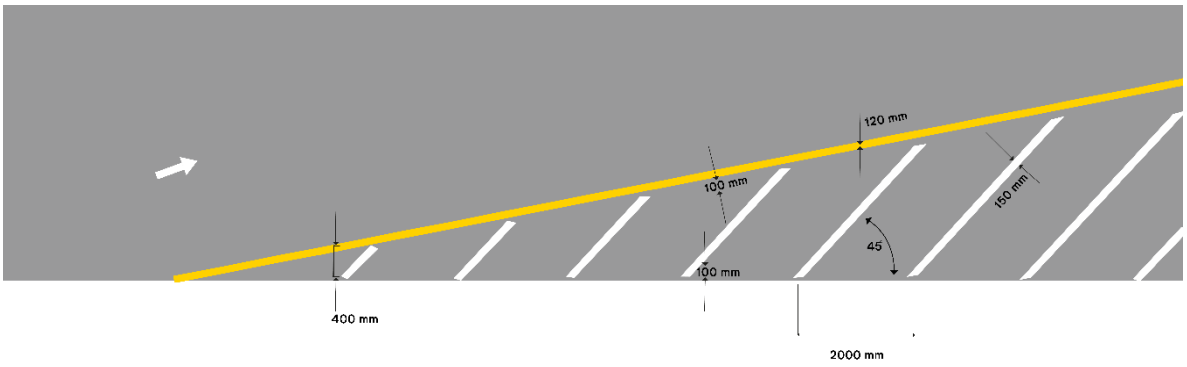


Figure 4-16 Typical Hatched Markings (L6-1c)

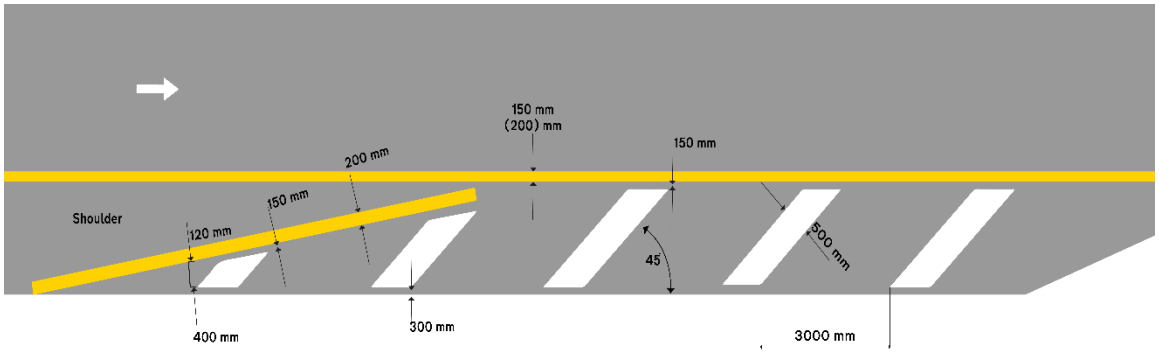


Figure 4-17 Typical Hatched Markings (L6-1d)

4.2.8. Chevron Markings (L7-Series)

Chevron markings (L7-1, L7-2) (Figure 4-18 and Figure 4-19 accordingly) **shall** be used to separate streams of traffic travelling in the same direction, e.g., on the approach to an intersection or to a pedestrian refuge in a one-way roadway. The chevrons must point toward approaching traffic.

- Marking (L7-1) **shall** be used to separate adjacent streams of traffic travelling in the same direction in advance of a physical separation. The marking may be used, with the direction of the chevrons reversed, to extend a physical separation to control merging streams of traffic.
- Marking (L7-2) **shall** be substituted for (L7-1) on high-speed routs. It may be used at the bifurcation or convergence of two freeways or similar roadways.

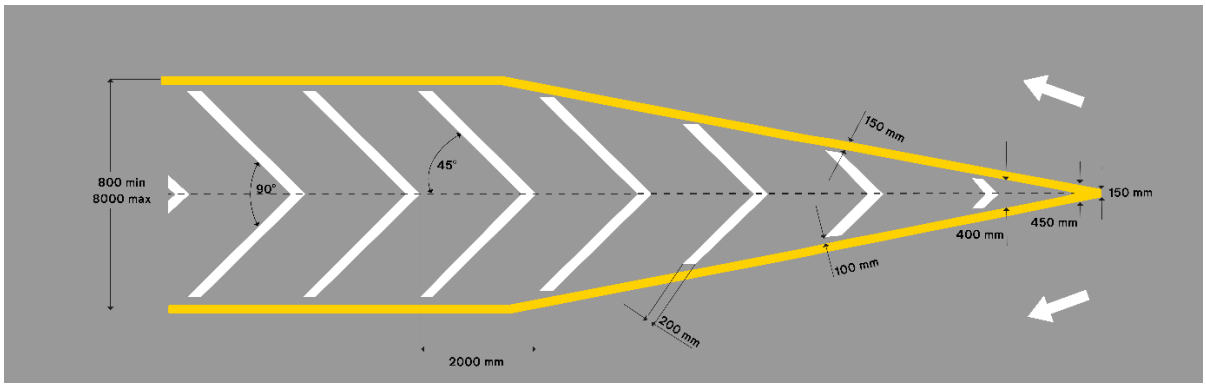


Figure 4-18 Exit and Entrance Ramp Markings (L7-1)

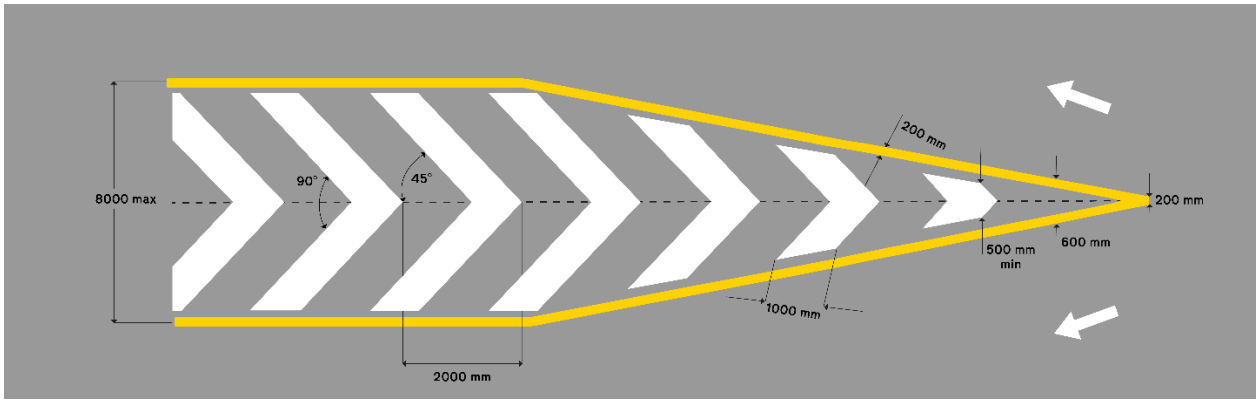


Figure 4-19 High-Speed Routes Exit and Entrance Ramp Markings (L7-2)

4.2.9. Parking Space Markings (L8-1)

The marking of parking space (L8-1) limits on urban streets encourages more orderly and efficient use of parking spaces where parking demand is substantial (see Figure 4-20). It tends to prevent encroachment on fire hydrant zones, bus stops, loading zones, approaches to intersections, approaches to corners, clearance spaces for islands, and other zones where parking is prohibited. Parking space markings *Should* be white and 120 mm in width.

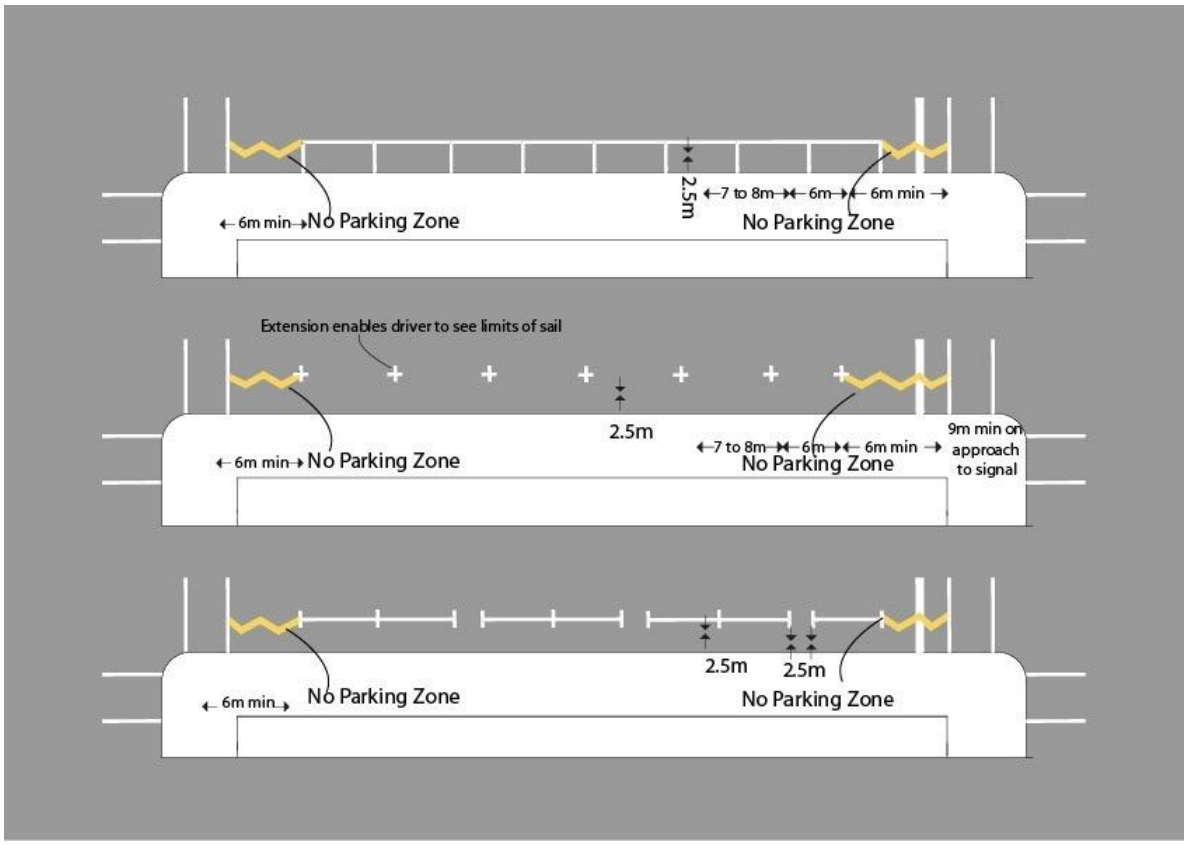


Figure 4-20 Examples of Typical Parking Space Limit Markings

4.2.10. Curb Markings (L9-1 Series)

Curb markings (L9-1) apply as follows:

- Alternating reflectorized yellow and non-reflectorized black curb markings (L9-1a) **shall** be used to indicate dangerous areas and where parking is prohibited (see Figure 4-21).
- Alternating reflectorized white and non-reflectorized black curb marking (L9-1b) may be used where parking is permitted.
- Red curb markings (L9-1c) **shall** be used for no parking zones due to fire hydrants, parking for emergency vehicles, or other situations where no parking or standing is allowed (see Figure 4-22).
- Roads General Authority (RGA) may use other colors to represent special local parking regulations including pay parking marking (L9-1d, see Figure 4-23).
- Table 4-12 contains the patterns for curb marking.

Table 4-12 Curb Marking Pattern

Marking Designation	Application	Curb Marking Color
L9-1a	Curb markings used to indicate dangerous areas and where parking is prohibited	Reflectorized Yellow & Non-reflectorized Black
L9-1b	Curb markings used where parking is permitted	Reflectorized White & Non-reflectorized Black
L9-1c	Curb markings used to indicate No Parking Except for Emergences	Red
L9-1d	Paid Parking used to indicate the presence of pay parking	Dark gray-and-turquoise or white-and-turquoise

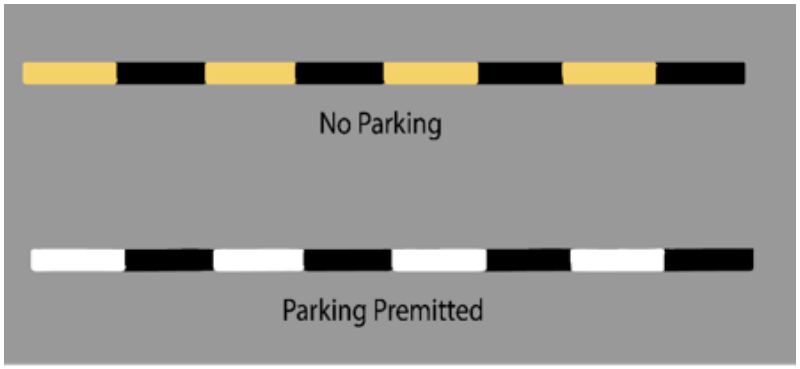


Figure 4-21 Typical Curb Patterns (L9-1)

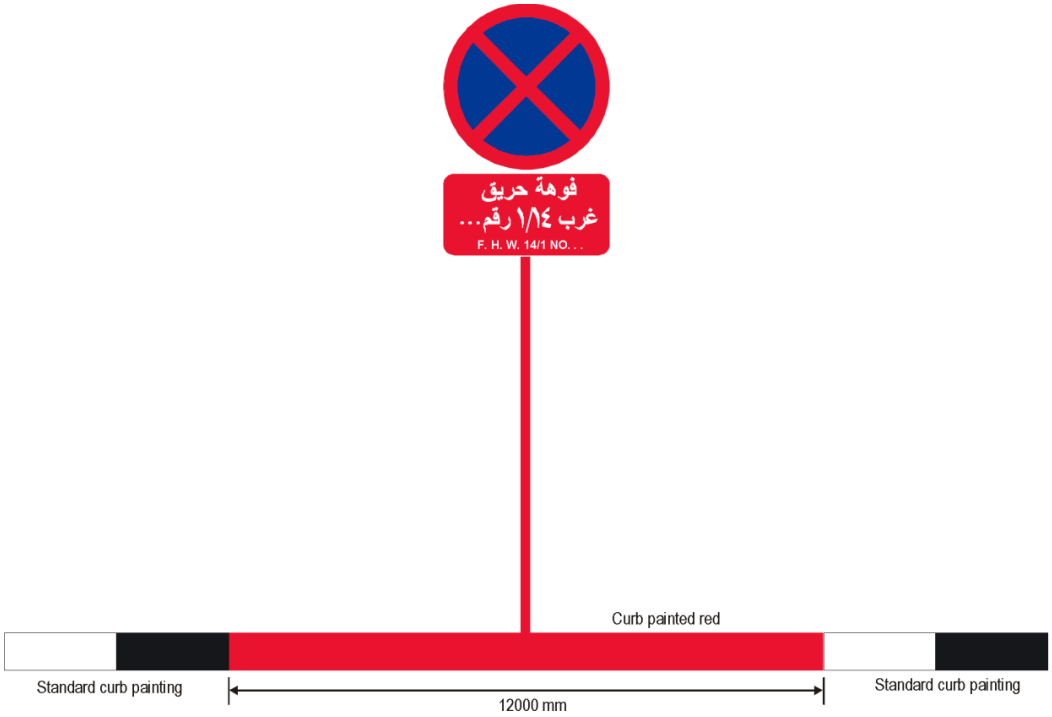


Figure 4-22 Example No Parking Zone Configuration (L9-1c)

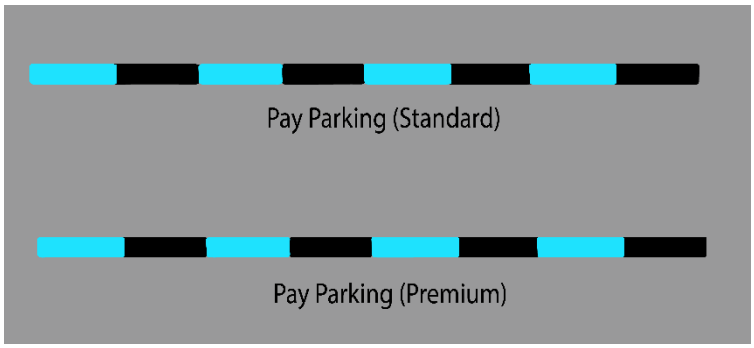


Figure 4-23 Paid Parking Configuration (L9-1d)

4.3. Islands Markings

4.3.1. Approach-End Treatment

This section addresses the characteristics of islands as traffic-control devices. Criteria for the design of islands are set forth in SHC 301 (Highway Geometric Design). An island may be designated by curbs, pavement edges, pavement markings, channelizing devices, or other devices:

- Channelizing devices, when used in advance of islands having raised curbs, **shall** not be placed in such a manner as to constitute an unexpected obstacle.
- The ends of islands first approached by traffic **shall** be preceded by diverging longitudinal pavement markings on the road surface, to guide vehicles into desired paths of travel along the island edge.
- When raised bars or buttons are used in these neutral areas, they **shall** be marked with white or yellow retroreflective materials, as determined by the direction or directions of travel they separate.
- Pavement markings for the approach to an obstruction may be omitted on the approach to a particular island based on engineering judgment.

4.3.2. Island Marking Colors

- Islands outlined by curbs or pavement markings **shall** be marked with retroreflective white or yellow material as determined by the direction or directions of travel they separate.
- The retroreflective area **shall** be of sufficient length to denote the general alignment of the edge of the island along which vehicles travel, including the approach end, when viewed from the approach to the island.
- On long islands (medians for example), curb retro-reflection may be discontinued such that it does not extend for the entire length of the curb, especially if the island is illuminated or marked with delineators or edge lines.

4.3.3. Island Delineation

- Delineators installed on islands **shall** have reflectors that will be the same colors as the related edge lines except that, when facing opposing traffic, they **shall** be red.
- Each road through an intersection **shall** be considered separately in positioning delineators to assure maximum effectiveness.
- Retroreflective or internally illuminated raised pavement markers (L1-xR) of the appropriate color may be placed on the pavement in front of the curb and/or on the top of curbed approach ends of raised medians and curbs of islands, as a supplement to or as a substitute for retroreflective curb markings (L9-1).

4.3.4. Channelizing Line and Island Separation (L10-1)

- The channelizing line (L10-1) **shall** be a "wide" and continuous yellow line.

- Other markings in the island area such as cross-hatching **shall** also be white (Figure 4-24).
- The channelizing line may be used to form traffic islands where travel in the same direction is permitted on both sides.

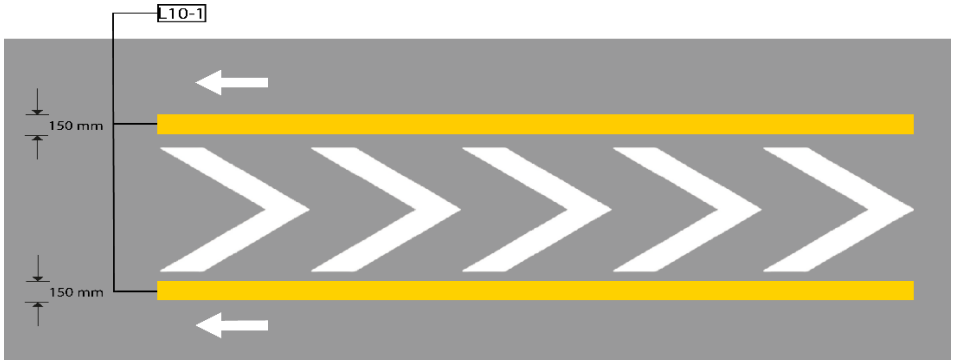


Figure 4-24 Island Separation Example (Traffic in Same Direction Each Side) (L10-1)

4.3.5. Median Island Formed by Pavement Markings (L11-1)

- Two continuous double yellow lines (L11-1) **shall** be used to form narrow median islands where the islands separate travel in opposite directions (see Figure 4-25).
- Other markings in the median island area such as crosshatching **shall** be provided to further emphasize the median.

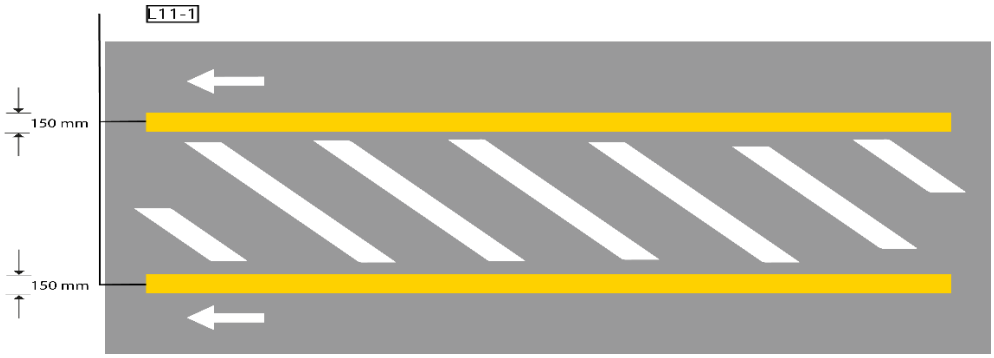


Figure 4-25 Painted Median Example (Traffic in Opposing Directions Each Side) (L11-1)

4.4. Intersections and Interchanges Markings

4.4.1. Crosswalk and Transverse Crosswalk Markings (L12-Series)

Crosswalks *Should* be marked at all intersections where there is substantial conflict between vehicle and pedestrian movements. Marked crosswalks *Should* also be provided at other appropriate points of pedestrian concentration, such as at loading islands, midblock pedestrian crossings, or where pedestrians could not otherwise recognize the proper place to cross. Crosswalk markings (12-1) *Should* not be used in a random manner. An engineering

study *Should* be conducted before they are installed at locations away from traffic signals or STOP signs:

- Crosswalk markings (L12-1) (see Figure 4-26) **shall** serve primarily to guide pedestrians in the proper paths and warn motorists of pedestrian crossing points.
- Transverse crosswalk lines (L12-2) **shall** be continuous white lines, marking both edges of the crosswalk (see Figure 4-27). These lines **shall** be not less than 200 mm in width and *Should* not be spaced less than 2 m apart.
- Since mid-block pedestrian crossings are generally unexpected by the motorist. Pedestrian crossing signs (see Section 3.3.46) **shall** be installed, and adequate visibility provided.
- The area of the crosswalk may be marked with white longitudinal lines (or "zebra" lines) at a 90 degrees angle to the line of the cross walk. These lines *Should* be approximately 500 mm wide and spaced 500 mm apart. When longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted.
- Under special circumstances where a stop line is not provided, or where vehicular speeds exceeds 60 km/h or where crosswalk are unexpected, it may be desirable to increase the width of the crosswalk line up to 600 mm in width.

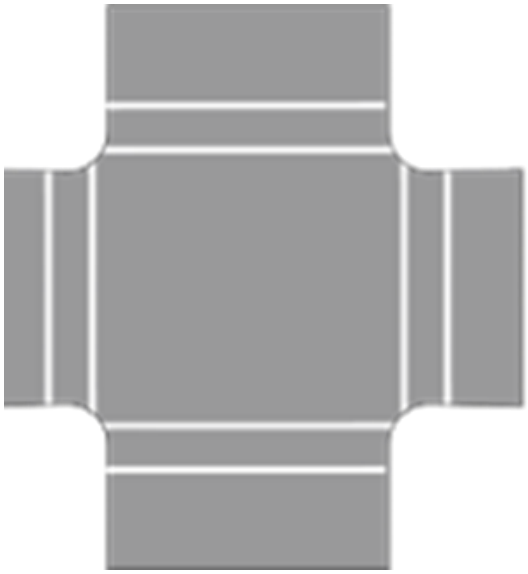


Figure 4-26 Typical Crosswalk Markings (L12-1)

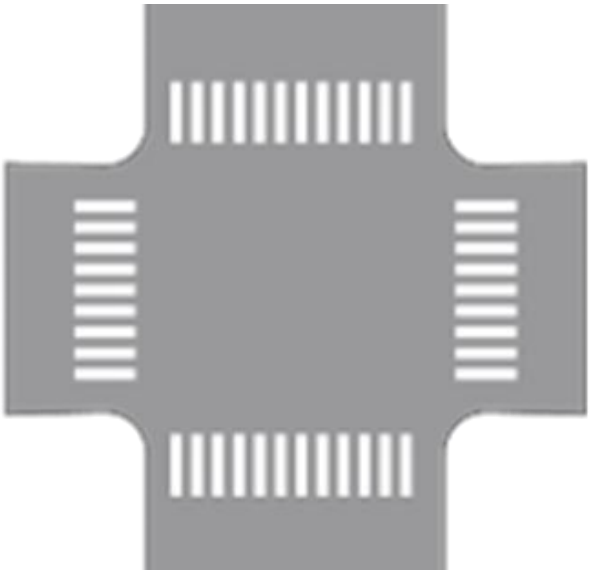


Figure 4-27 Typical Transverse Crossing Marking (L12-2)

4.4.2. Pavement Words, Arrows, and Symbols (L13-Series, L14-1, L15-1)

Word and symbol markings on the pavement may be used for the purpose of guiding, warning, or regulating traffic. Symbol arrows (L13-1, L13-2, L13-3, L13-4, L13-5, L13-6, L13-7) (see Figure 4-28 through Figure 4-34) may be used to convey either guidance or mandatory messages. Signs or markings *Should* be repeated in advance of mandatory turn lanes when necessary to help motorists select the appropriate lane before reaching the end of the line of waiting vehicles. Where speeds are low, smaller characters may be used.

- The markings **shall** be white in color.
- On freeways/expressways and high-speed arterials, bifurcation arrows (L13-8) **shall** be used in advance of mandatory turn lanes when necessary to prevent entrapment and help drivers select the appropriate lane before reaching the end of the line of waiting vehicles (example in Figure 4-35).
- The Stop symbol (L14-1) - see Figure 4-37 - **shall** not be used on the pavement unless accompanied by a stop line (L16-1) (Section 4.4.3) and Stop sign (Section 3.2.1) and unless every vehicle is required to stop at all times.
- The Yield symbol (L15-1) - see Figure 4-38 - **shall** not be used on the pavement unless accompanied by a Yield line (L17-1) (Section 4.4.4) and Yield sign (Section 3.2.3).
  Th typical symbol markings for yield and stop in terms of dimensions are shown in Figure 4-40.
- Large arrows *Should* also be used to mark exit ramps to aid in discouraging wrong-way movement by complementing the No Entry signs.
- The words used *Should* preferably be either place names, highway numbers or words which are easily understandable for all road-users (e.g., "Stop", "Bus", "Taxi"). The typical word marking for STOP is shown in Figure 4-39.
- Where approach speeds exceed 50 km/h, the letters *Should* be at least 2.5 m in height.
- Pavement messages *Should* generally be no more than one lane in width.
- Symbol messages are generally preferable to word messages.

A typical regulatory arrow pavement marking for motorways and other high-speed routes with exit ramps is shown in Figure 4-36.

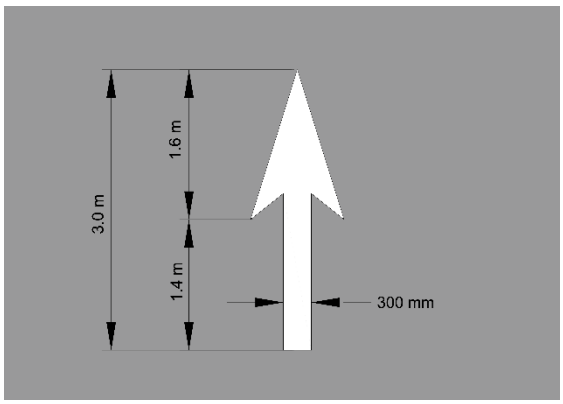


Figure 4-28 Typical Regulatory Arrow Pavement Markings (Urban) (L13-1)

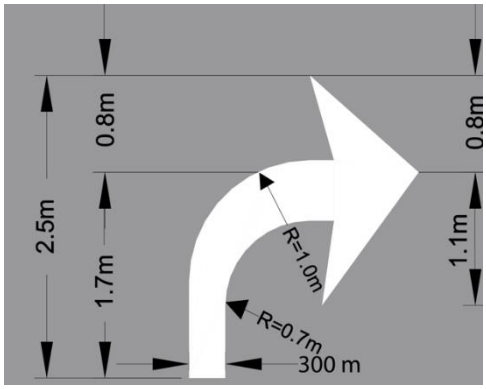


Figure 4-29 Typical Regulatory Arrow Pavement Markings (Urban) (L13-2)

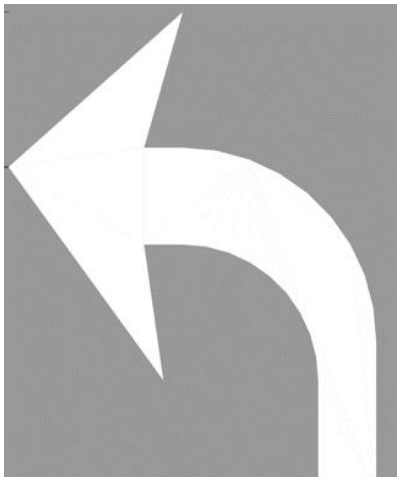


Figure 4-30 Typical Regulatory Arrow Pavement Markings (Urban) (L13-3)

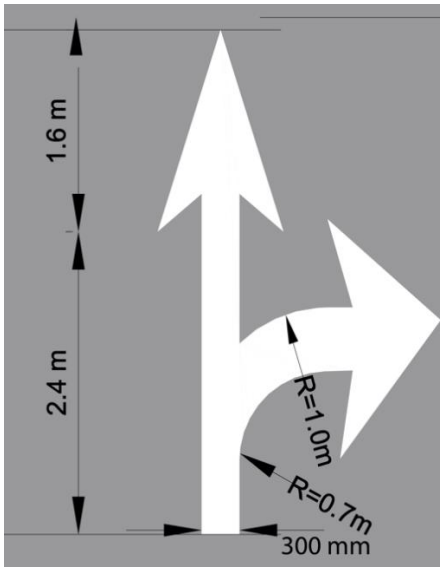


Figure 4-31 Typical Regulatory Arrow Pavement Markings (Urban) (L13-4)

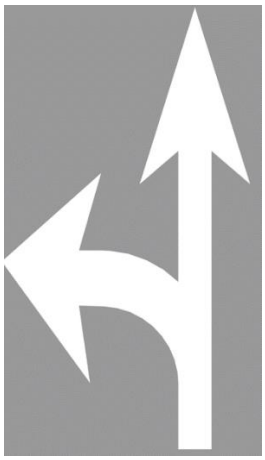


Figure 4-32 Typical Regulatory Arrow Pavement Markings (Urban) (L13-5)

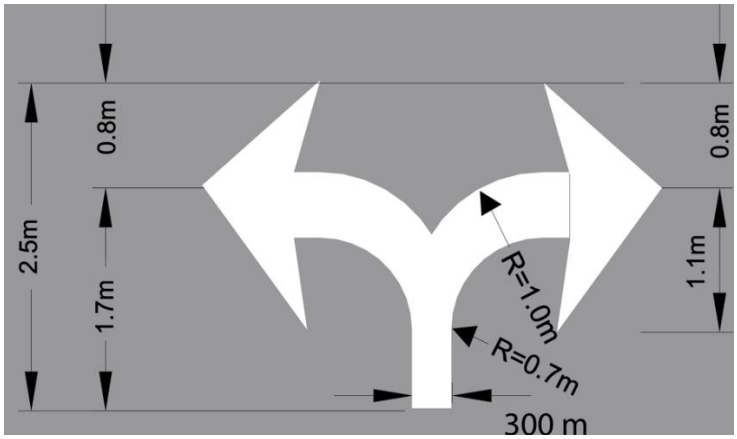


Figure 4-33 Typical Regulatory Arrow Pavement Markings (Urban) (L13-6)

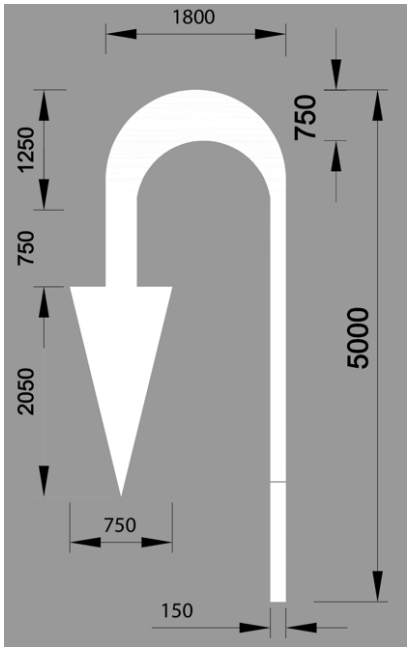


Figure 4-34 Typical Regulatory Arrow Pavement Markings (Urban) (L13-7)

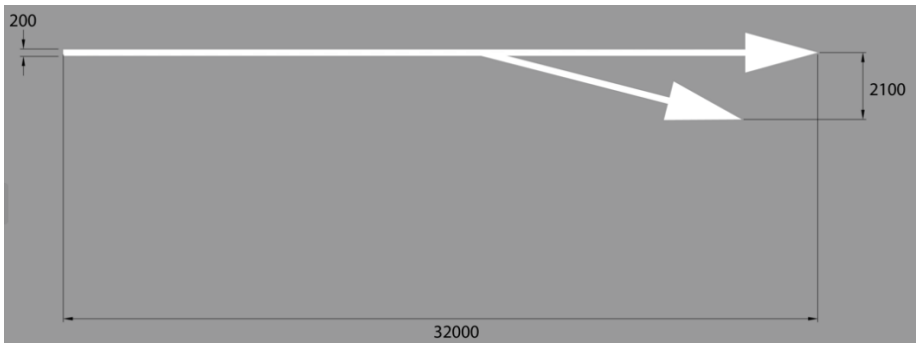


Figure 4-35 Typical Regulatory Bifurcation Arrow Marking (L13-8)

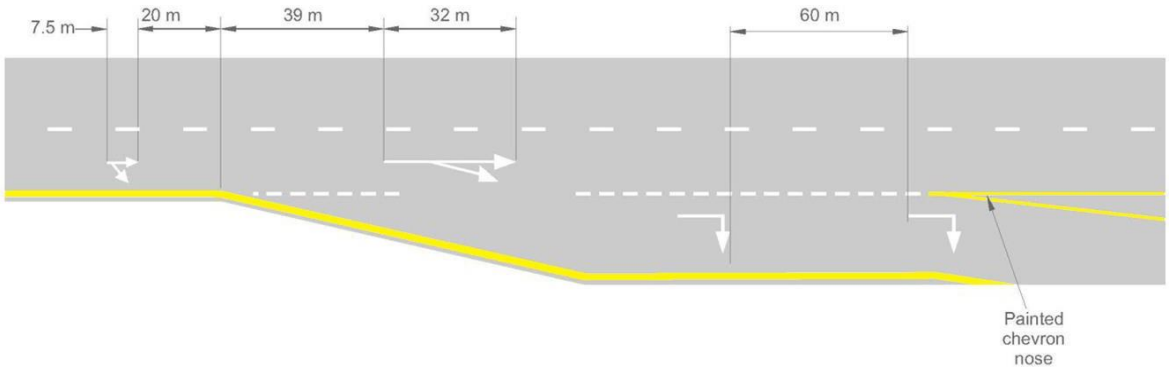


Figure 4-36 Typical Regulatory Arrow Pavement Markings (Motorways and Other High-Speed Routes with Exit Ramps)

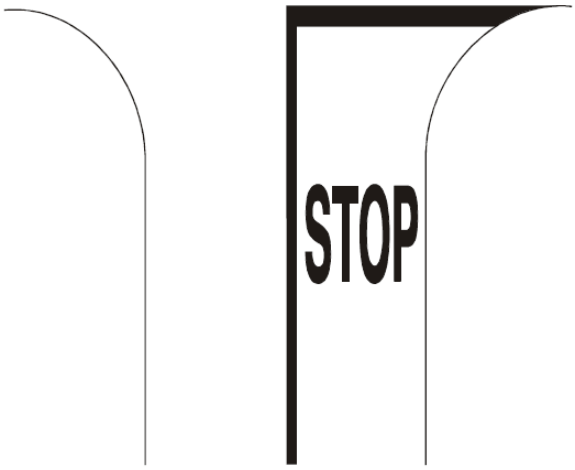


Figure 4-37 Typical Stop Markings (L14-1)

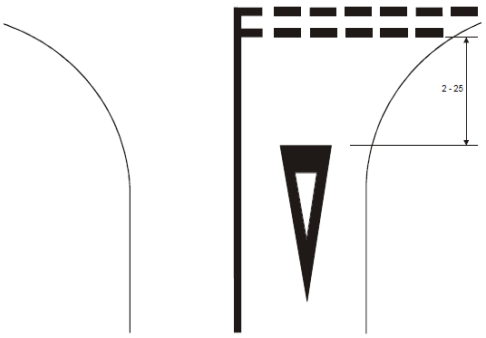


Figure 4-38 Typical Yield Markings (L15-1)

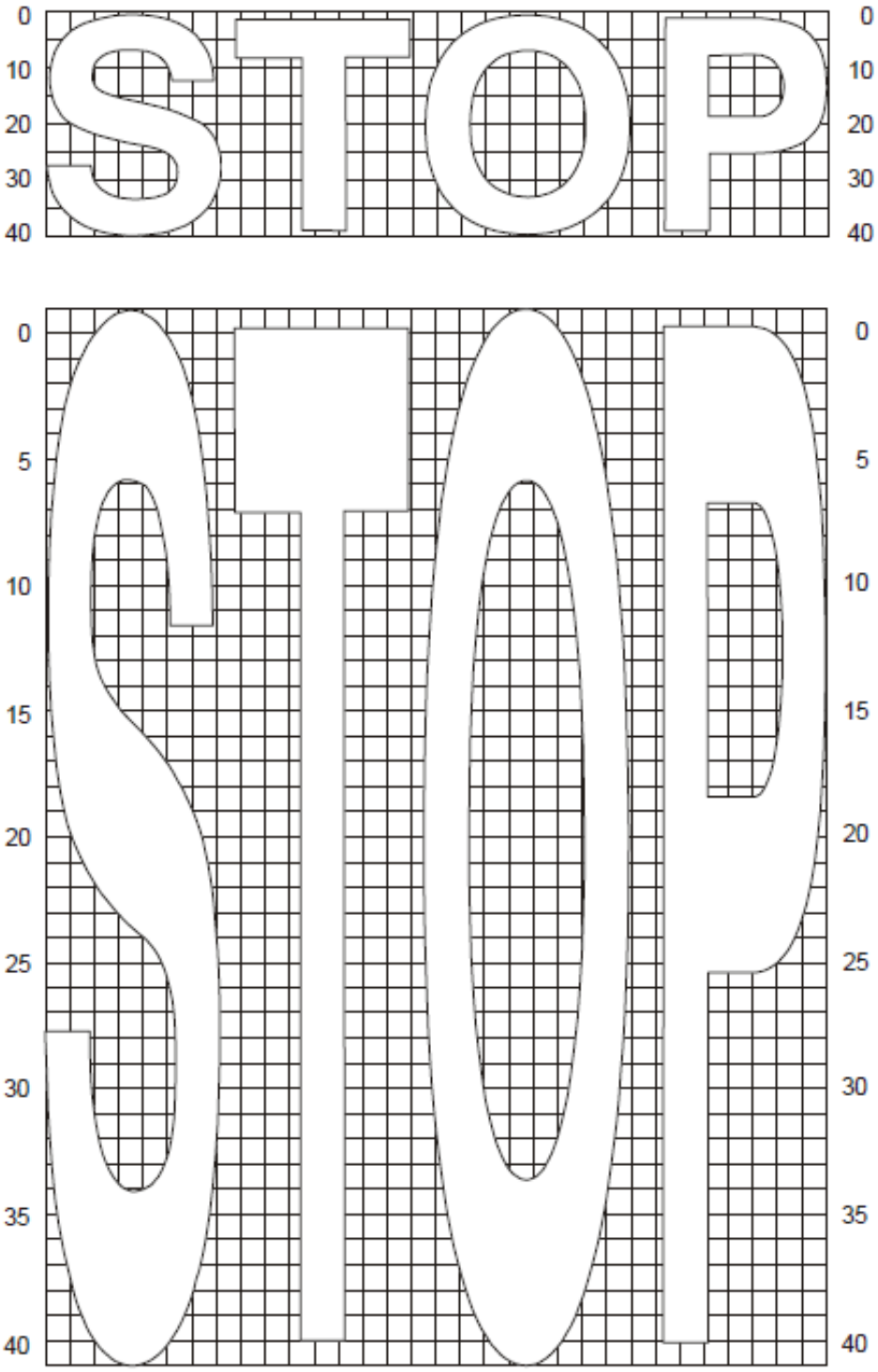


Figure 4-39 Typical Word Markings (Stop)

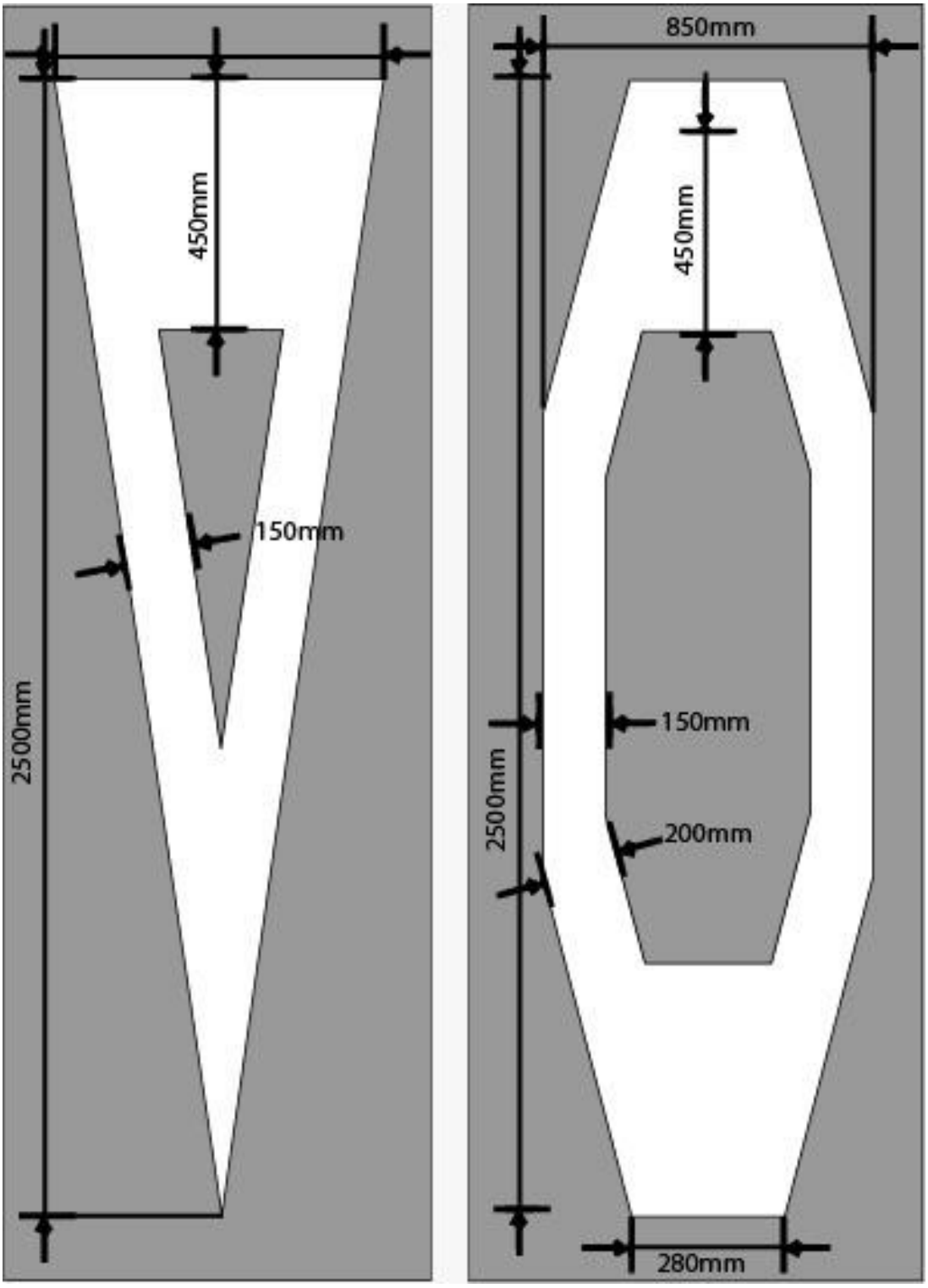


Figure 4-40 Typical Symbol Marking for Yield and Stop

4.4.3. Stop Lines (L16-1)

Stop lines (L16-1) *Should* be used in rural and urban areas where it is important to indicate the point, behind which vehicles are required to stop in compliance with a Stop sign, traffic signal, or railroad crossing signal.

- Stop lines **shall** be a continuous white line, normally 300 mm wide, extending across all approach lanes. The minimum width of the line is 200 mm and the maximum is 600 mm (see Figure 4-41).
- Stop lines, where used, *Should* ordinarily be placed 1 m in advance of and parallel to the nearest crosswalk line. In the absence of a marked crosswalk, the Stop line *Should* be placed at the desired stopping point, in no case more than 10 m or less than 1 m from the nearest edge of the intersecting roadway.
- If a Stop line is used in conjunction with a Stop sign, it *Should* ordinarily be placed in line with the Stop sign. However, if the sign cannot be located exactly where vehicles are expected to stop, the stop line *Should* be placed at the stopping point.

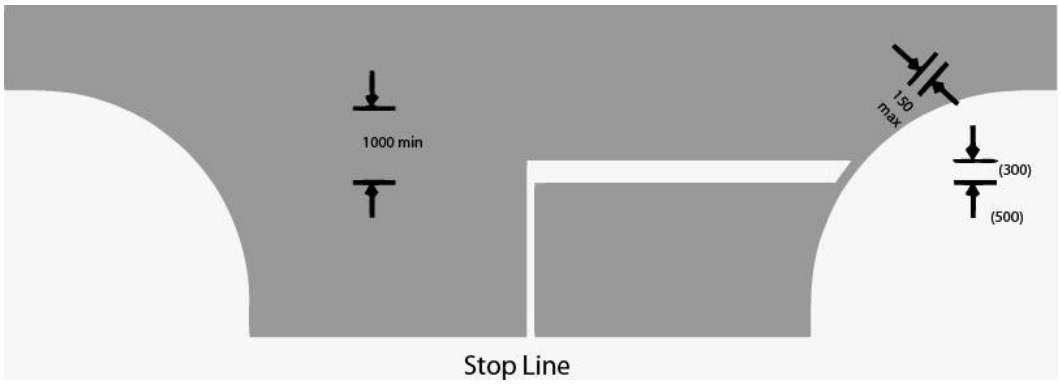


Figure 4-41 Typical Stop Line Marking (L16-1)

4.4.4. Yield Lines (L17-1)

Yield lines (L17-1) **shall** be used at priority intersections controlled by yield sign to indicate where drivers *should* yield to vehicles on the major roadway (Figure 4-42). Yield lines **shall** be accompanied by Yield signs. The lines are used at the mouth of the minor roadway. Transverse markings are used for yield lines with Pedestrian Zebra crossings as in Figure 4-43.

- Yield line use broken 500 mm long dashes with 200 mm spaces between them (See Figure 4-42).
- Widths shown below represent minimums (values in parentheses in Figure 4-42 are for main route design speeds over 80 km/h).

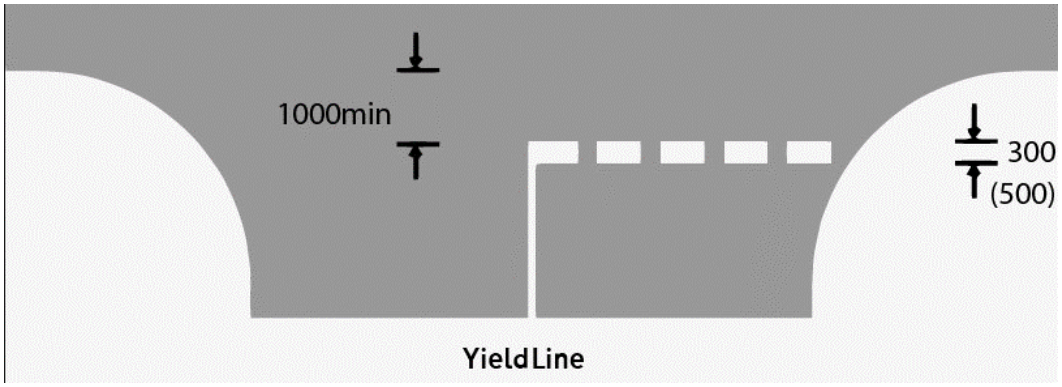


Figure 4-42 Typical Yield Line (L17-1)

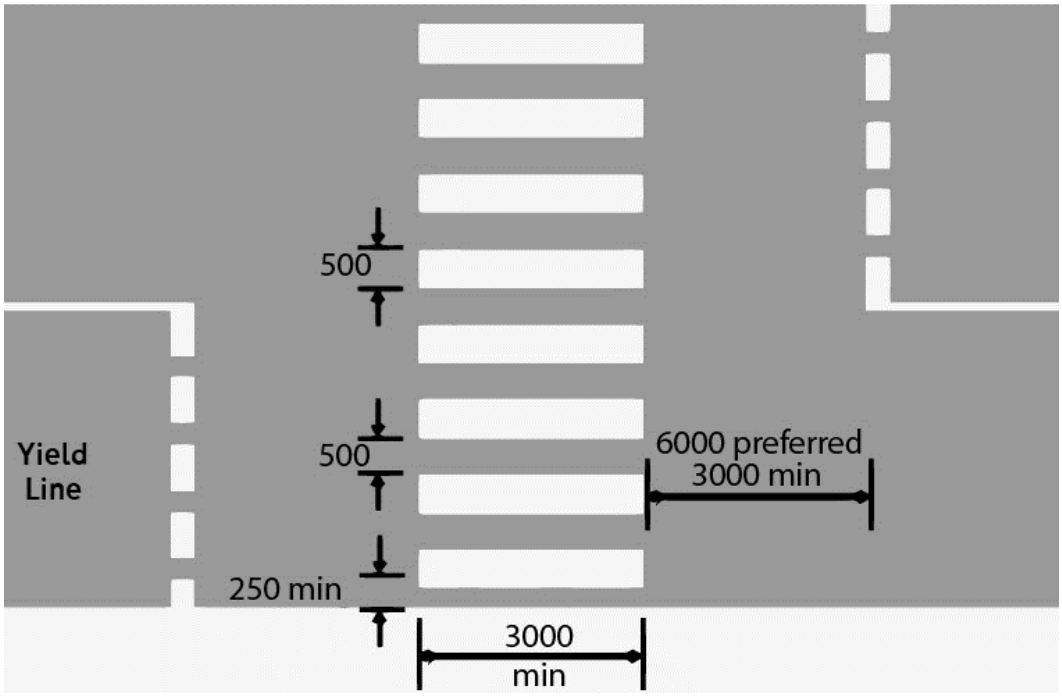


Figure 4-43 Typical Pedestrian Crossing Pavement Markings (L12-2)

4.4.5. Auxiliary Lanes Markings (L13-8)

This section details for the use auxiliary lanes (L13-8) including diverging to and converging from auxiliary turn lanes, dedicated right-turn lanes at signalized intersections and at roundabouts, slow-vehicle turnouts, and interchange ramps (see Figure 4-44). The provision of auxiliary turn lanes as left-turn facilities on single carriageway is to shelter left-turning traffic on the major roadway and prevent passing. It also can be used where the traffic turning left out of the minor roadway needs to make the maneuver in two stages.

- The design features of the auxiliary turning lane layout are detailed in SHC 301 (Highway Geometric Design).
- A bifurcation arrow marking is used at the start of the direct taper length. Lane arrow markings **shall** be introduced. Except for a short-left turn lane for the left/right stagger,

at least two arrows per lane *Should* be provided whenever possible, the last being opposite the minor roadway entry.

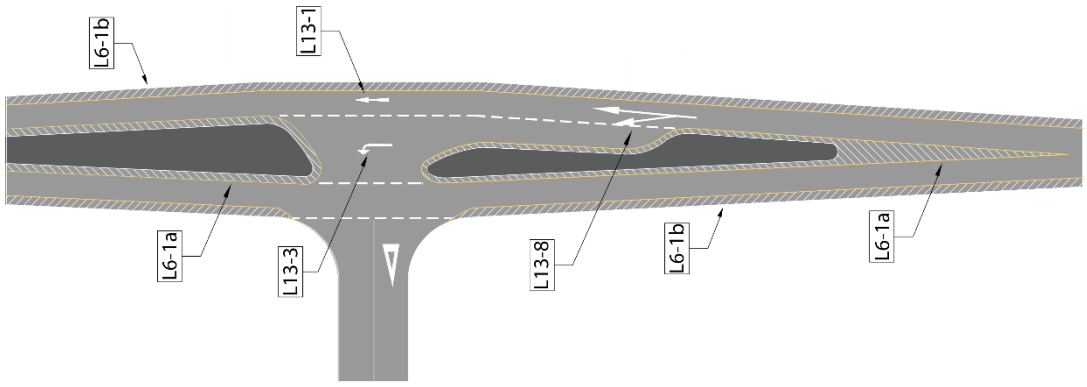


Figure 4-44 Typical Auxiliary Turn Lanes Markings (L13-8)

1.1.1.1. Diverging and merging auxiliary lanes at priority intersections

- Where vehicles make left turns into the minor roadway (generally on undivided roadways), Yield lines L17-1 **shall** be provided at the end of the auxiliary lane. Where there is no left-turn movement into the side roadway, these markings are not required. The use of the raised marking **shall** be considered for use, as well as Channelization marking L10-1 and tubular device, to discourage late movements into the auxiliary lane.
- Providing a merging auxiliary lane allows the minor roadway traffic to accelerate before joining the faster traffic streams on the mainline. The standard layout and general road marking arrangements for the auxiliary merging lane are shown in Figure 4-45. Deflection arrows marking **shall** be provided at the distances with the measurement taken from the start of the taper, to ensure adequate warning is provided of the requirement to merge with the mainline. Table for the minimum auxiliary lane lengths can be found in SHC 301 (Highway Geometric Design).

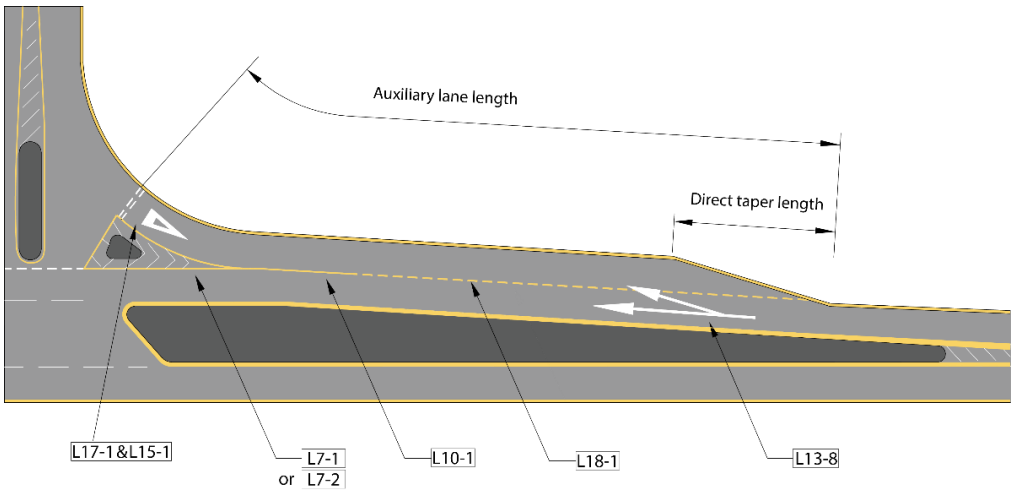


Figure 4-45 Typical Diverging and Merging Auxiliary Lanes at Priority Intersections Markings

1.1.1.2. Dedicated right-turn lanes at traffic signals

- Dedicated right-turn lanes may be provided at traffic signals to enable vehicles to proceed to the first exit without interacting with the center of the intersection (see Figure 4-46). The exit from a dedicated right-turn lane may be either Yield or an auxiliary acceleration lane and merge. The choice of exit treatment depends on vehicle flow and speed. A signal-controlled right-turn lane may be incorporated with a pedestrian crossing where there is high pedestrian demand.

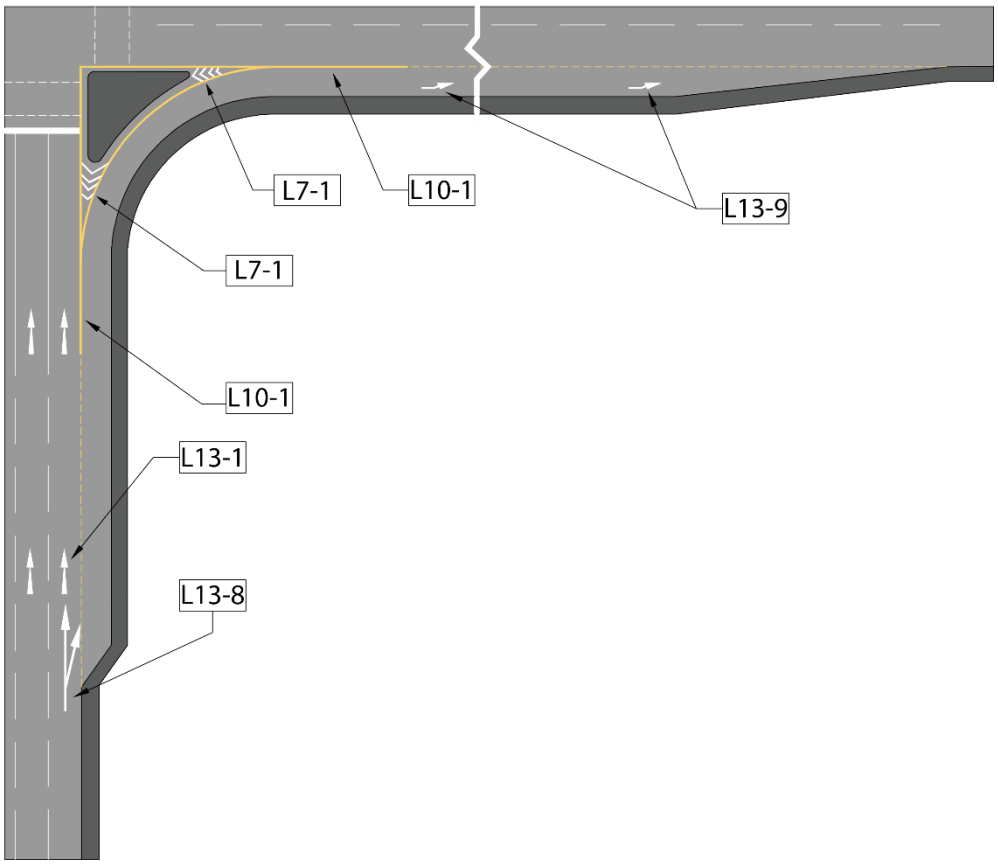


Figure 4-46 Typical Dedicated Right-Turn Lanes at Traffic Signals Markings

1.1.1.3. Dedicated right-turn lanes at roundabouts

The layout of the approach and exit for a right-turn lane can consist of a dedicated lane on entry and exit or a diverge and merge taper arrangement. Dedicated lanes on approach and exit provide the highest capacity to a dedicated right-turn lane.

- Lane destination arrow markings L13-1 **shall** be used on approach to the roundabout, along with lane use sign. Lane guidance marking and chevron marking *Should* also be used on approach and exit for the separation island.
- Diverging layouts are necessary where the approach is a single lane. Chevron marking **shall** be used on both approach and exit to the dedicated right-turn lane; this can be supplemented by channelization marking and plastic delineators.

- Edge of roadway marking **shall** be used on entry and exit along with raised pavement markers. At the start of the diverge a bifurcation arrow marking **shall** be used.
- Refer to Section 4.5, for additional details on roundabout markings.

1.1.1.4. Passing lanes

Passing lanes *Should* be used to provide an additional lane to enable faster moving traffic to pass slower traffic (see Figure 4-47). The right-hand lane *Should* continue, and the widening *Should* be to the left, so that slower vehicles do not need to change lanes at either end. Passing lanes may be provided on rural roadways where it has been documented that slow-moving vehicles result in platoons of at least five vehicles.

- A passing lane is marked with a lane line L2-1 separating the two adjacent lanes and a double line separating opposing traffic streams. The double-line L3-1 system will feature a continuous line on the side of the passing traffic in the passing lane. Under no circumstances **shall** the opposing traffic stream be permitted to cross into the passing lane.

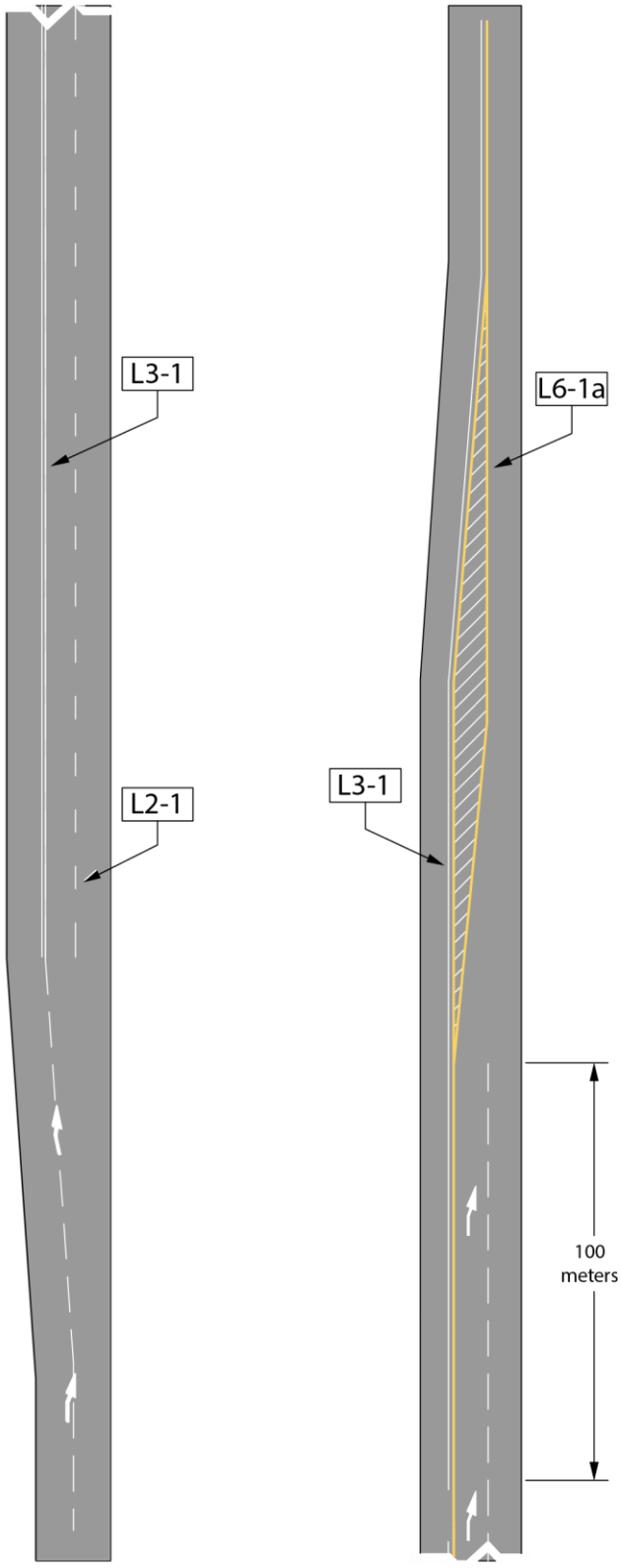


Figure 4-47 Typical Passing Lanes Markings

1.1.1.5. Merging/diverging ramps

- For each merge and diverge location, an auxiliary lane **shall** be used, with the lane being the same width as the rightmost lane on the main roadway. When selecting a suitable layout for principal dimensions of geometric parameters, an example of a simple grade-separated interchange is shown on Figure 4-48.

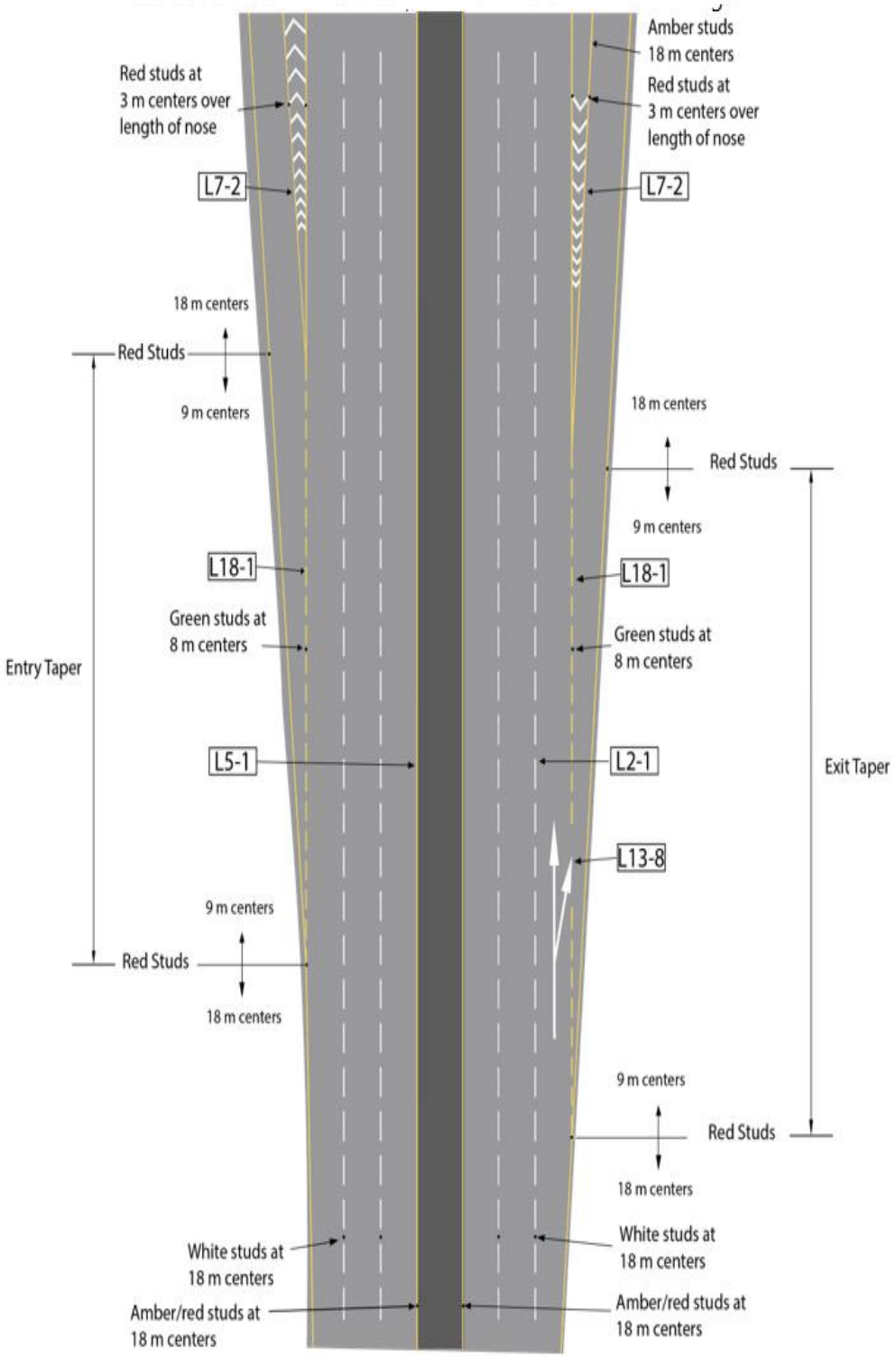


Figure 4-48 Typical Merging/Diverging Ramps Markings

- The nosing of the ramp shall be marked using delineation marking. Red raised pavement markers *Should* be provided at 3 m centers along the outside of both edges of marking.
- The edge line marking L5-1 *Should* be continued along the ramp. Red retroreflective raised pavement markers *should* be used to the right of the rightmost lane and amber retroreflective raised pavement markers *should* be used to the left of the leftmost lane, both at 18 m centers.
- The main roadway edge line marking *should* change to raised marking, with green retroreflective raised pavement markers *should* be used at 8 m centers along the left edge of the ramp. Along the same length, the spacing of the red retroreflective raised pavement markers associated with Edge line marking along the right edge of the ramp *Should* be reduced from 18 to 9 m. Bifurcation Arrow marking and deflection Arrows **shall** be used within the merge lanes.
- Conventional lane lines on the main roadway should be continued through the intersection, while Edge Line marking may be used at the end of the nose to aid in averting early merge maneuvers.
- Two-lane merges are not desirable, but where the mainline has three or more upstream lanes, a two-lane merge without a lane gain may be introduced. An entry layout for a two-lane ramp is shown in Figure 4-49. The road markings and raised pavement markers are the same as detailed in Figure 4-48 .
- For two-lane diverges, a staggered layout similar to that for two-lane merges shall be used, as detailed in Figure 4-50.
- Refer to Section 4.4, for additional details on interchange marking.

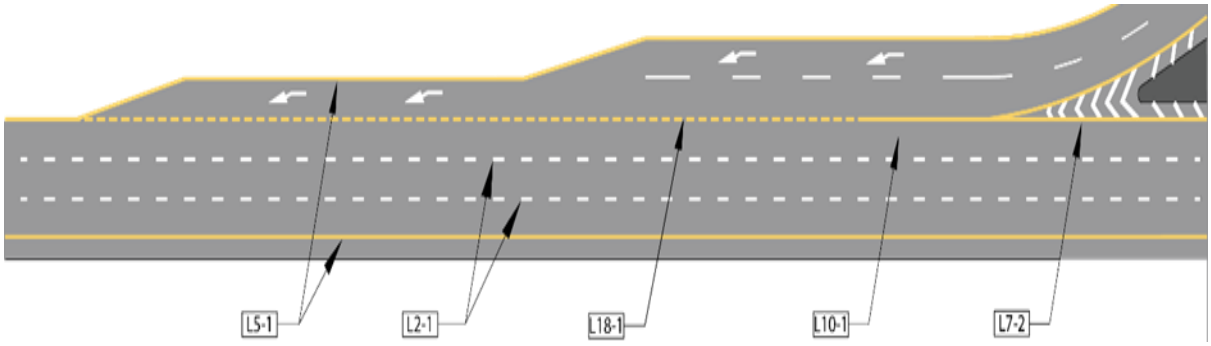


Figure 4-49 Layout for Two-Lane Merge

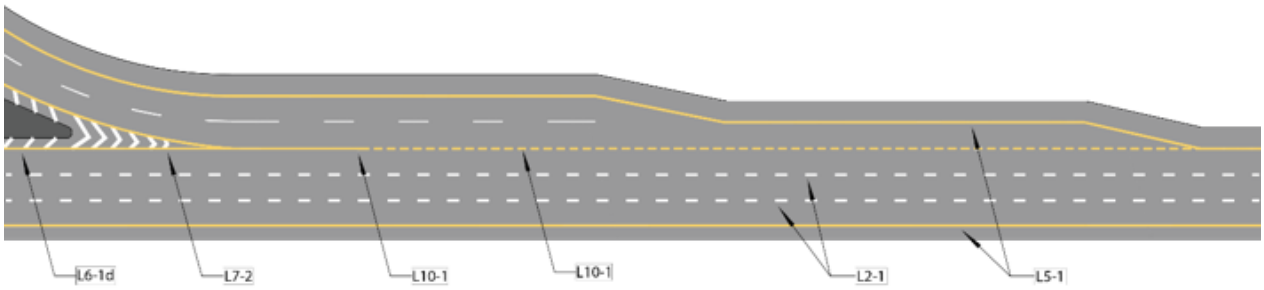


Figure 4-50 Layout for Two-Lane Diverge

1.1.1.6. Added lane

- Figure 4-51 and Figure 4-52 detail the standard road marking arrangement for three separate added lane layouts. The layouts provided are for high-speed highways and, therefore, the longer sizes of arrow markings are denoted on the layouts. When added lanes are implemented on lower-speed highways, then the shorter sizes of marking **shall** be used.
- In added lane situations, the lane markings L2-1 or on both the main roadway and the ramp **shall** change to lane guidance marking for a distance of least 200 m from the tip of the nose on approach to the added lane and **shall** continue for at least 200 m beyond the end of nose.
- The straight-ahead arrow marking **shall** be placed on the joining (additional) lane or lanes and on the original right lane of the main roadway at the point they come together, to discourage premature lane changing. Channelization marking and the tubular channelizing device may also be used for this purpose.
- In a merge/added lane situation, the pavement markings **shall** be used on the right-hand lane of the merge/added lane. Figure 4-51 details the layout of a two-added lane situation, where the straight-ahead arrow marking **shall** be placed in both new lanes and in the original main roadway lane. For added lane situations, the information guide signs **shall** be used on both the main roadway and the lane or lanes that are gained. The signs *should* be altered by adding or reducing straight-ahead or added lane arrows marking to suit the roadway layout.

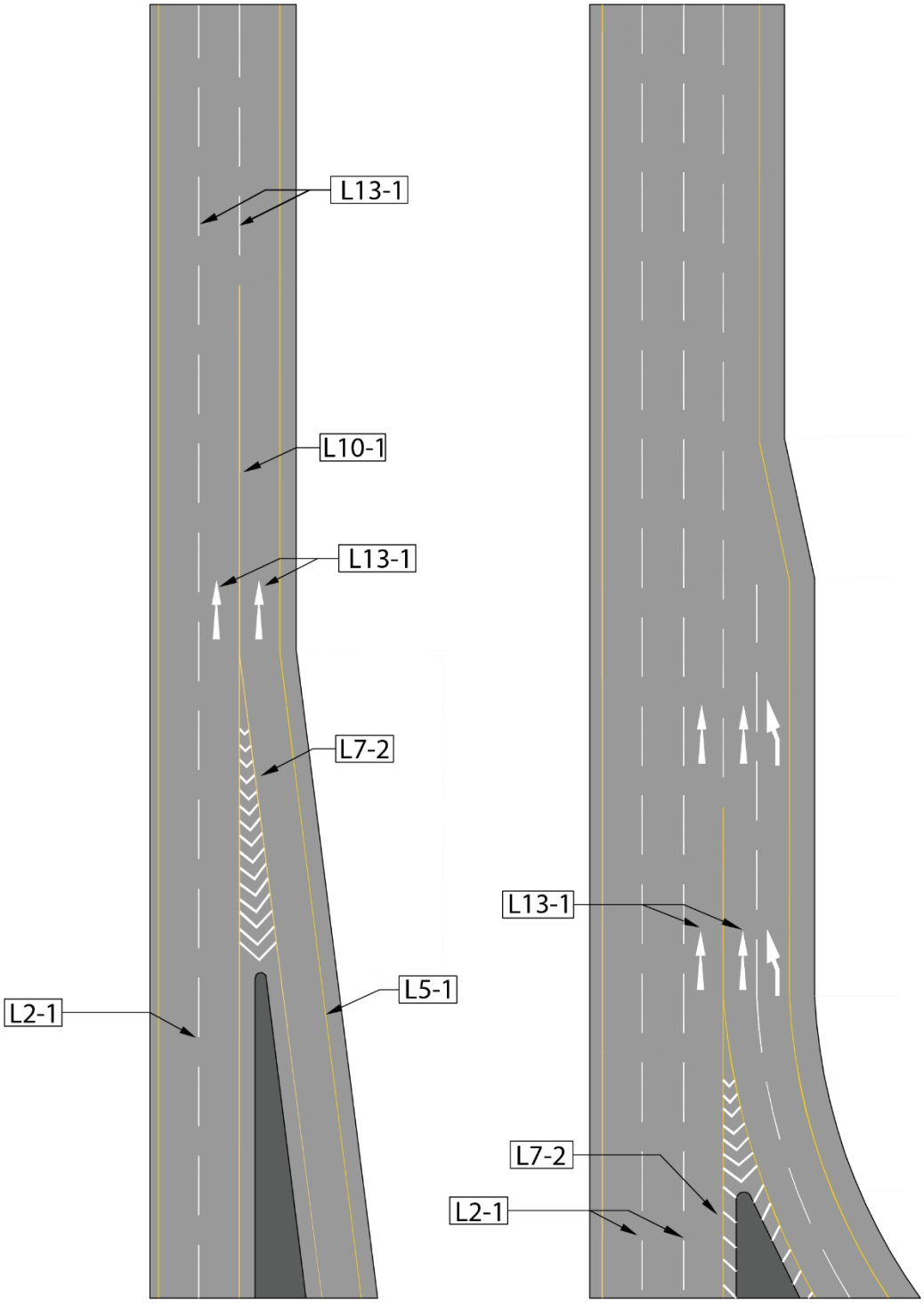


Figure 4-51 Single Added Lane and Added Lane with Parallel Merge

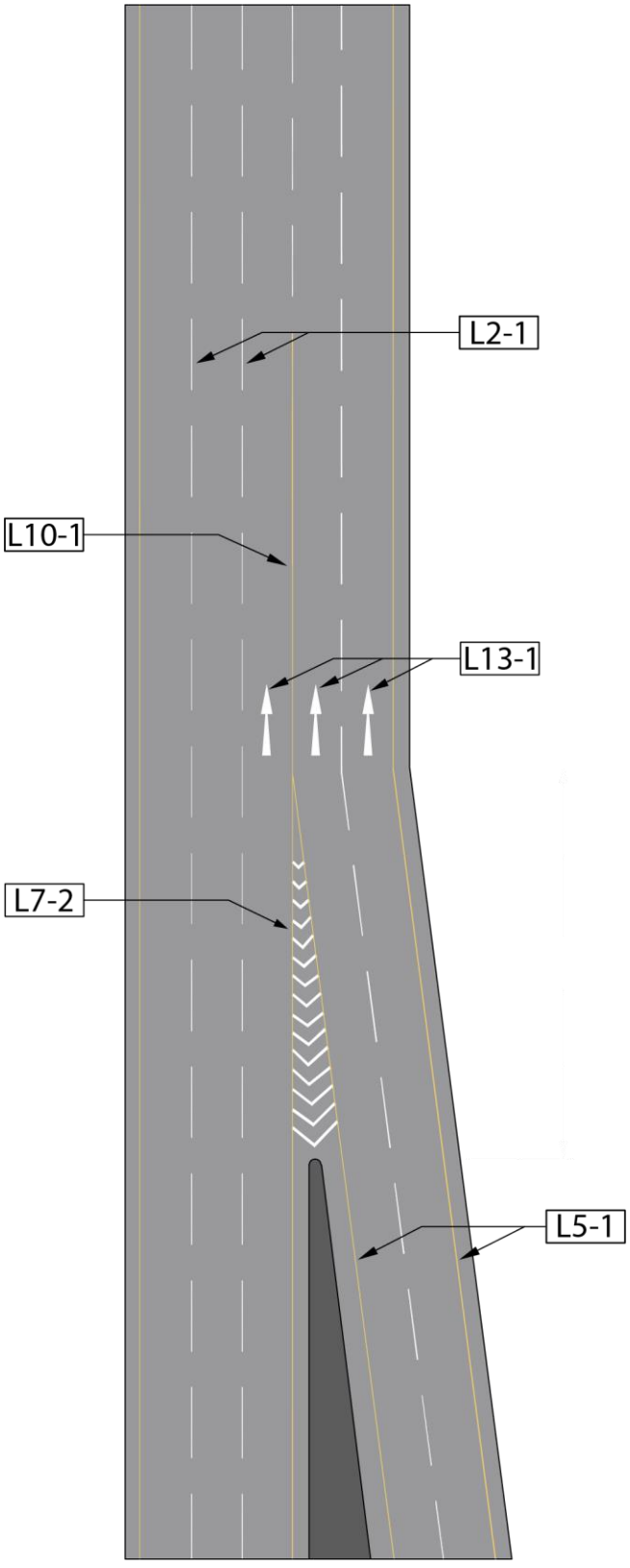


Figure 4-52 Double Added Lane

1.1.1.7. Lane drops

- A standard lane drop layout for high-speed roadways is shown on Figure 4-53. On lower speed highways, or where the advance directional guide signs are sited at less than 500 m from the intersection, the lane drop markings will commence later and the raised pavement marker spacing adjusted to suit.
- Figure 4-53 details a lane-drop with a diverge scenarios. To discourage late entry on a single standard lane drop, Channelization marking L10-1 may replace the final section of marking, The length over which the channelization line develops may be varied; in most instances, will only be required for the final approach to the lane loss.
- Figure 4-54 details the pavement markings required for a two-lane drop scenario. The lane drop markings are the same as those detailed for single lane drop situation; except that the dividing line marking between the lanes being dropped are divided with lane line markings.

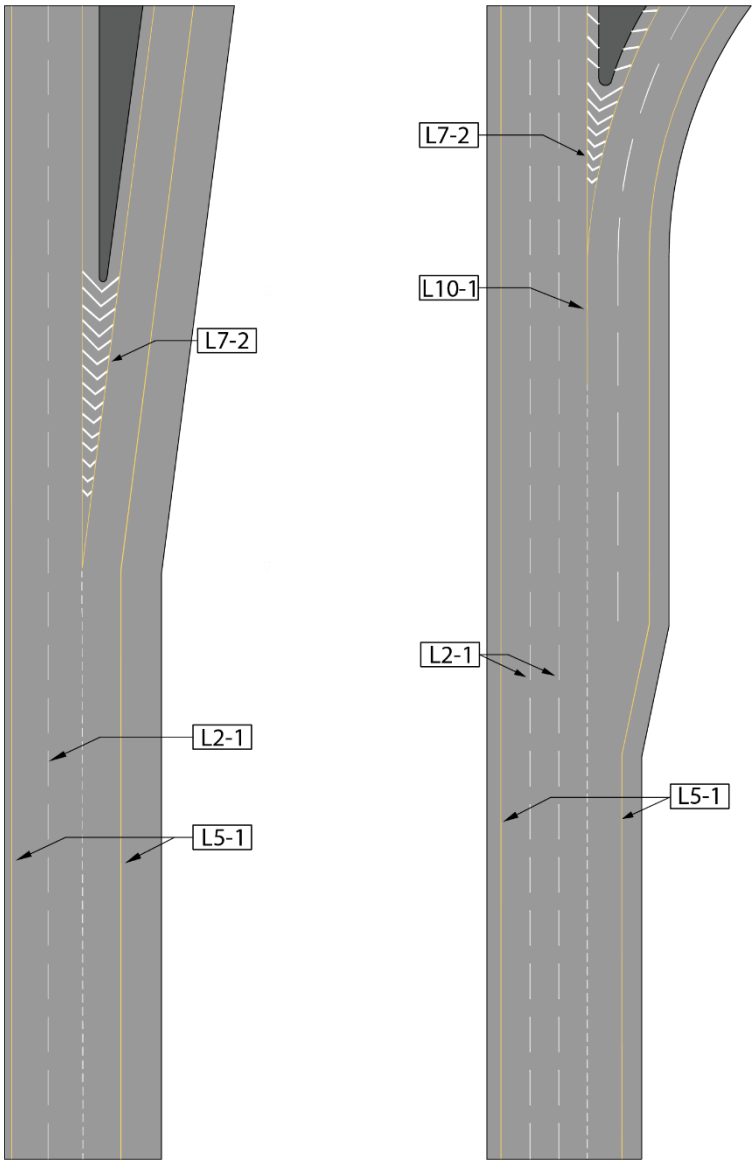


Figure 4-53 Standard Lane Drop and Lane Drop with Diverge

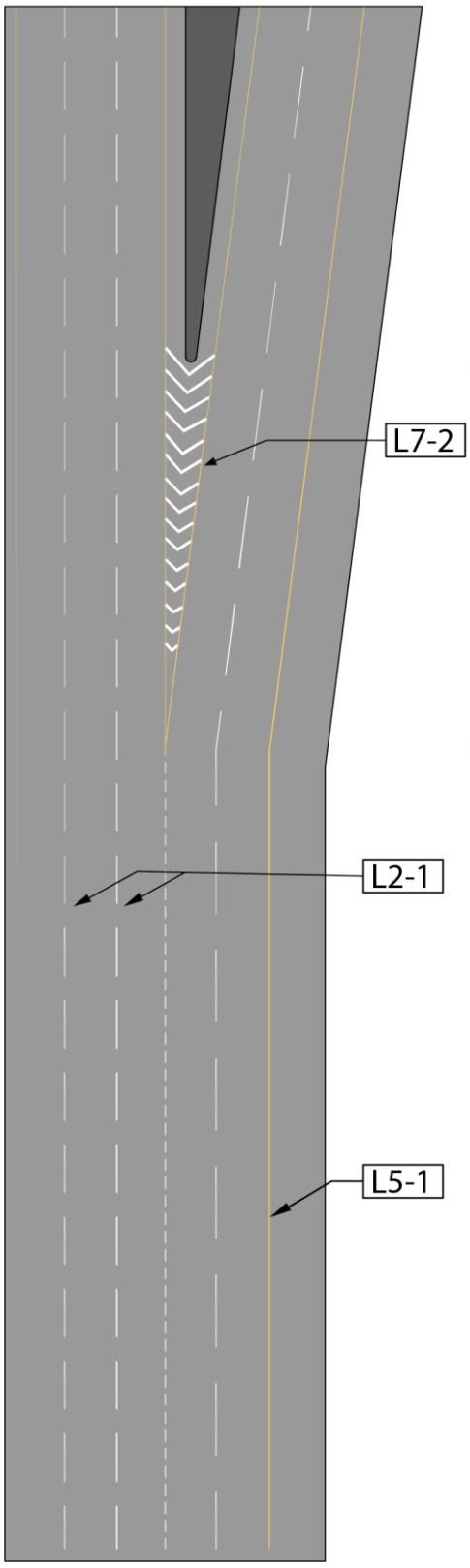


Figure 4-54 Double Lane Drop

1.1.1.8. Typical rural intersection

- Typical rural intersections will use on/off ramps to join to the minor roadway. Depending on traffic volume and other factors, the ramps generally will end at a roundabout intersection, priority intersection, or in rare circumstances signal control. A typical layout is shown in Figure 4-55.

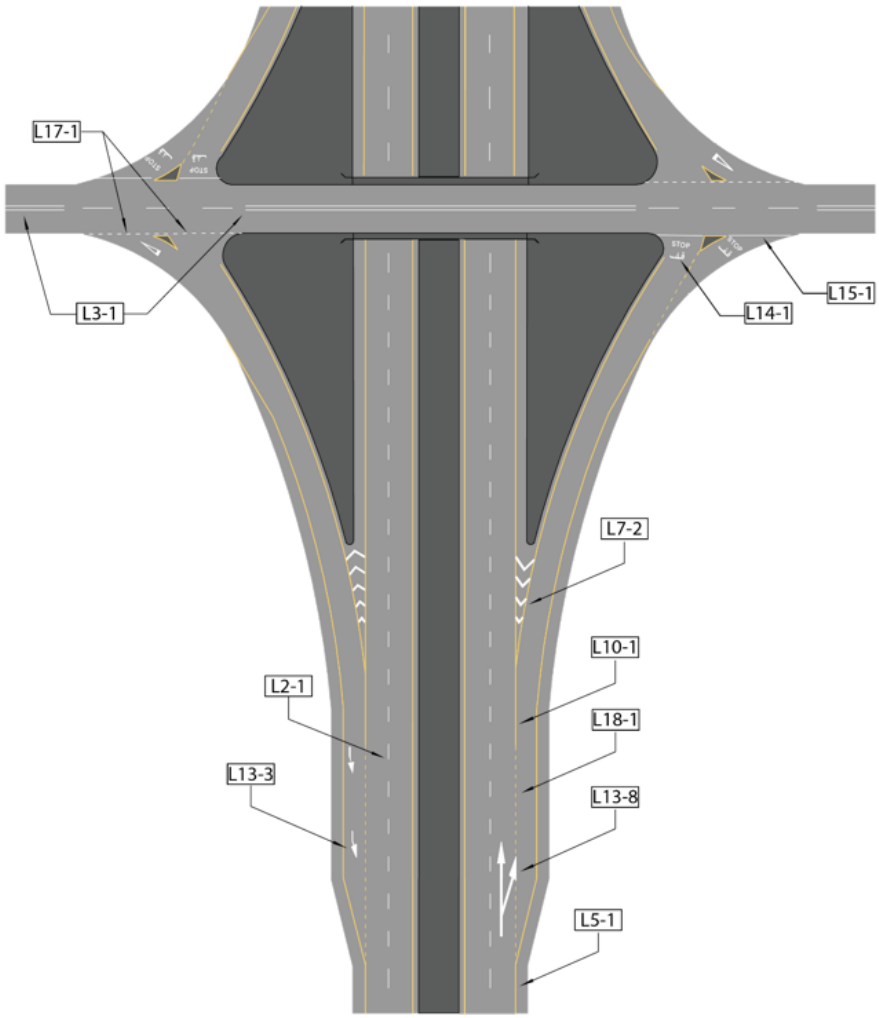


Figure 4-55 Typical Rural Grade-Separated Intersection

1.1.1.9. Trap lanes at expressway exits

- A "Trap Lane" occurs when an on-ramp merging lane becomes the exit lane for a closely spaced downstream off-ramp. The use of warning markings, lane directional arrows, and bifurcation arrows is essential in "Trap Lane" situations to provide as much guidance to drivers as possible, as shown on Figure 4-56.

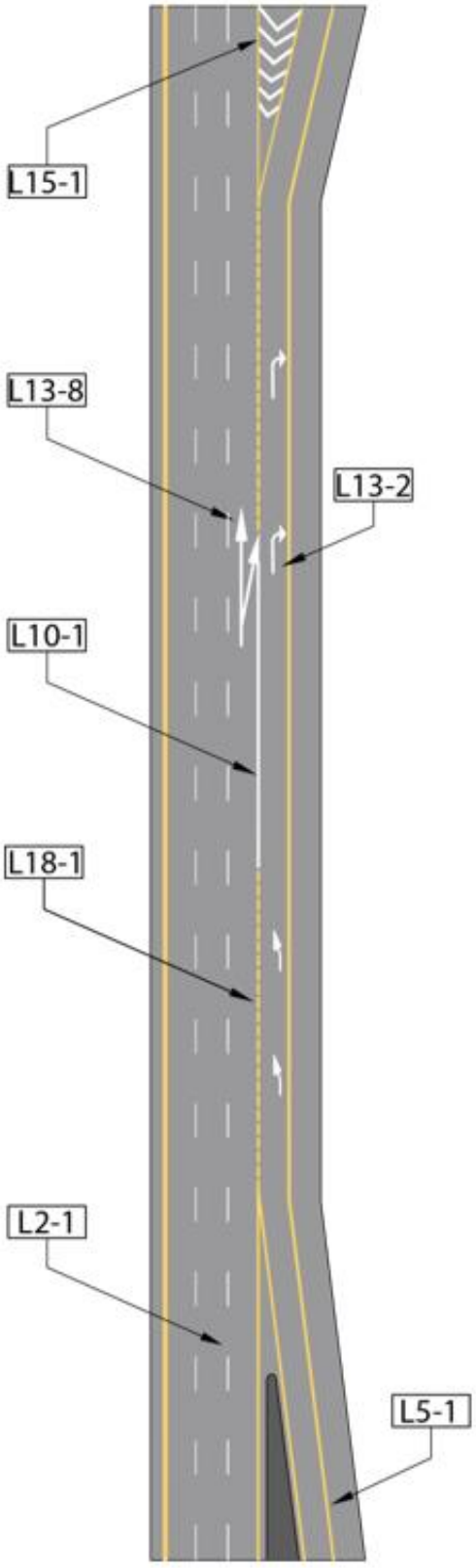


Figure 4-56 Trapped Lane Markings

4.4.6. Lane Guidance Marking (Pavement Marking Extensions) Through Intersections or Interchanges and Acceleration and Deceleration Splays (L18-1)

- Lane guidance markings (L18-1) are used where highway design or reduced visibility conditions make it desirable to provide control or to guide vehicles through an interchange or intersection, (such as at offset, skewed, complex multi-legged intersections or where multiple turn lanes are used) -see Figure 4-57-.
- Marking (L18-1) are used at acceleration and deceleration splays in yellow, and for emphasizing lane drops. Green raised pavement markers should be used at lane drops and along acceleration and deceleration lanes.
- A dotted line may be used to extend markings as necessary through the intersection area or interchange and acceleration and deceleration splays (an example is shown in Figure 4-58).
- Where a greater degree of restriction is required, continuous lane lines or channelizing lines may be continued through intersections. A frequent use for the channelizing line is to separate turning movements from through movements.

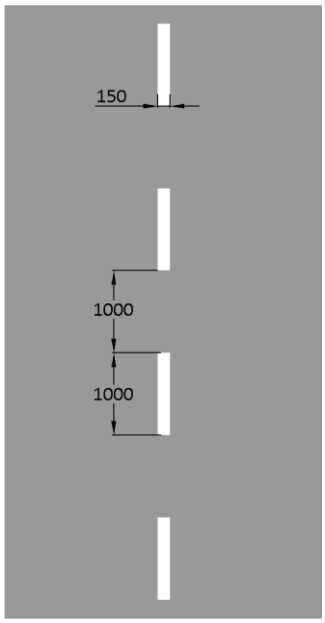


Figure 4-57 Typical Lane Guidance Marking (L18-1)

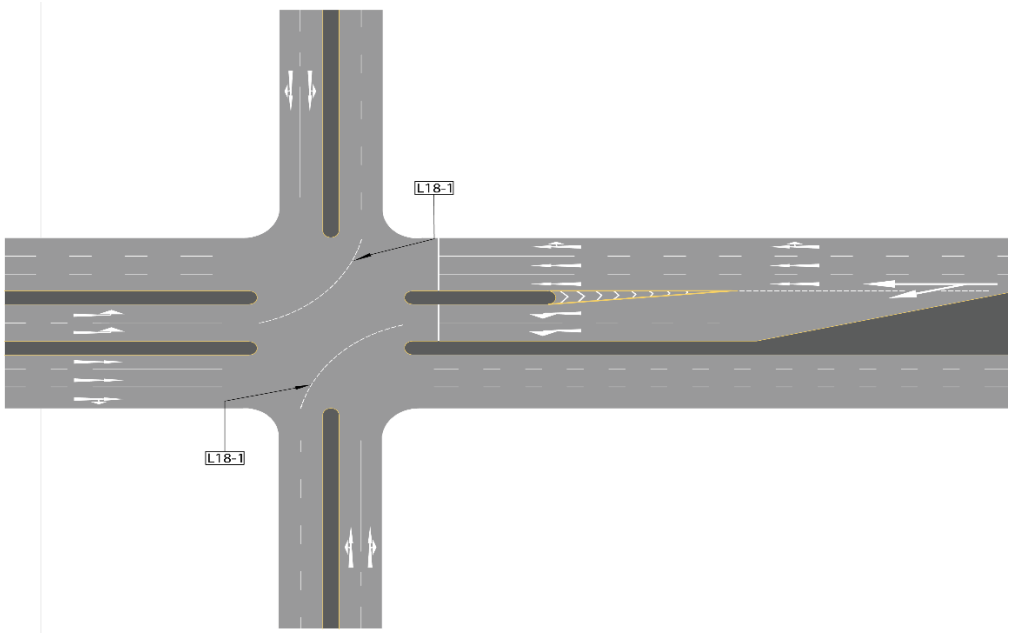


Figure 4-58 Example of Lane Guidance Markings (L18-1) in a Junction

4.4.7. Do Not Block Intersection (L19-Series)

'Do Not Block' Intersection markings (L19-1) may be used to mark the edges of an intersection area that is near a signalized intersection, railroad crossing, or other nearby traffic control that might cause vehicles to stop within the intersection and impede other traffic entering the intersection. If authorized by law, 'Do Not Block' Intersection markings with appropriate signs may also be used at other locations.

'Do Not Block Intersection' markings **shall** consist of one of the following alternatives:

- Wide solid yellow lines that outline the intersection area that vehicles must not block and yellow cross-hatching marking (L19-1) within the intersection area (see Figure 4-59).
- Wide solid yellow lines that outline the intersection area that vehicles must not block and a word message such as Do Not Block or Keep Clear (L19-2) (see Figure 4-60).
- A yellow word message, such as Do Not Block or Keep Clear, within the intersection area that vehicles must not block (L19-3) (see Figure 4-61).
- Wide solid yellow lines that outline the intersection area that vehicles must not block (L19-4) (see Figure 4-62).

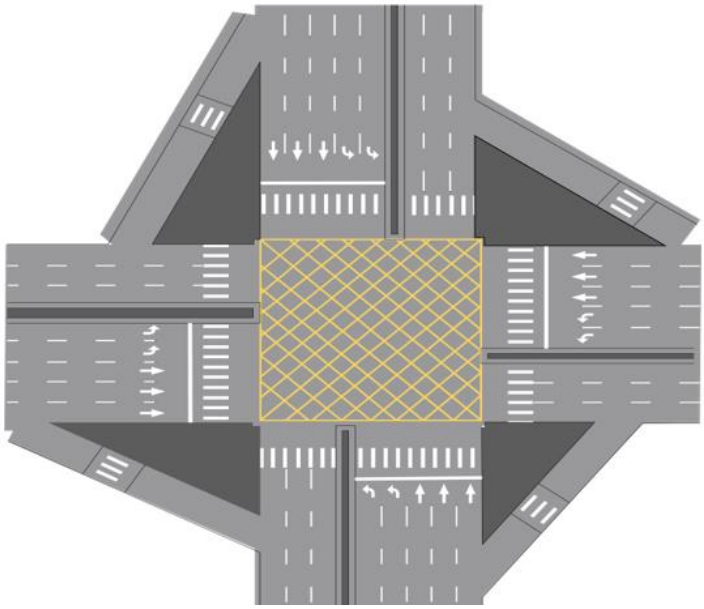


Figure 4-59 Typical Do not Block Intersection Marking (Box with Solid Crosshatch Lines) (L19-1)

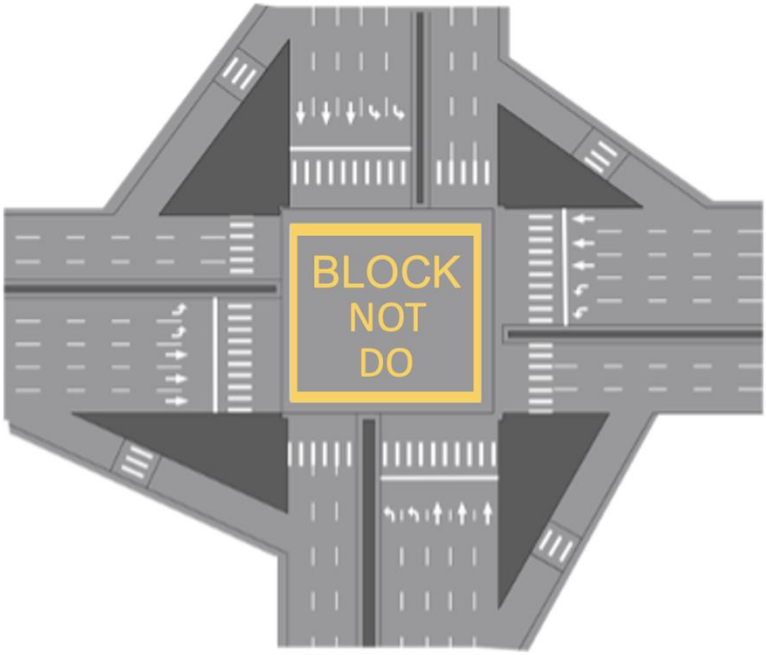


Figure 4-60 Typical Do not Block Intersection Marking (Box with Do Not Block Message) (L19-2)

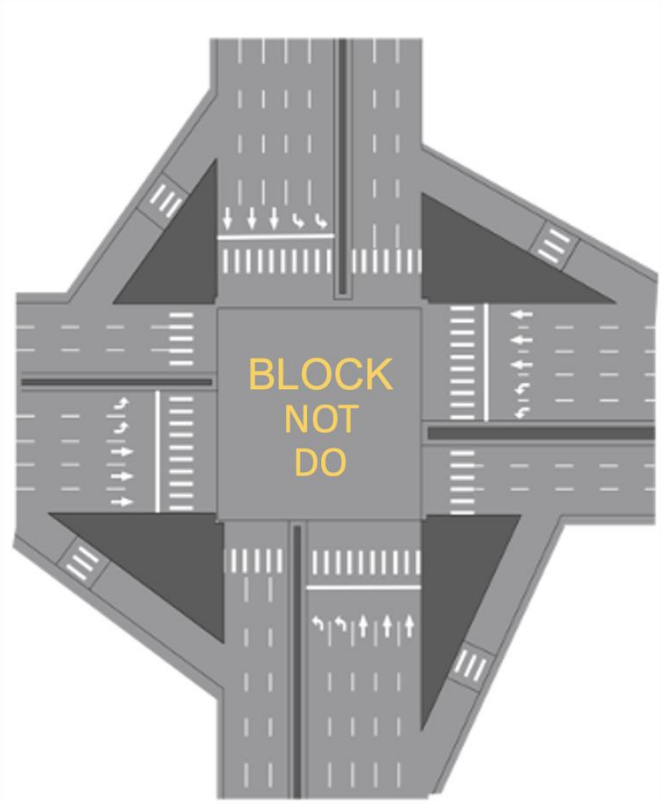


Figure 4-61 Typical Do not Block Intersection Marking (No Box with Do Not Block Message) (L19-3)

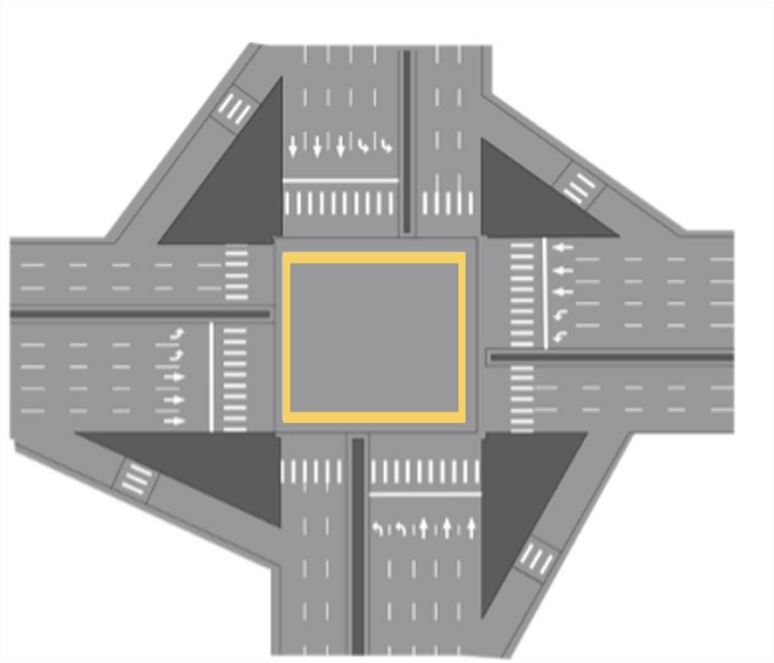


Figure 4-62 Typical Do not Block Intersection Marking (Box with Solid Lines) (L19-4)

4.4.8. Approach Markings to an Obstruction

- Pavement markings **shall** be used to guide traffic on the approach to fixed obstructions within a paved roadway. An obstruction may be located such that all traffic must keep to the right of it, or it may be between two lanes of traffic moving in the same direction. The markings in either case must be designated to guide traffic away from the obstruction. The use of channelizing lines or no-passing marking is generally effective.
- Obstruction approach markings for bridge supports, refuge islands, median islands and channelization islands **shall** consist of a diagonal line or lines, extending from the center line or the lane line to a point about 0.6 m to the right side, or both sides of the approach end of the obstruction.
- If the traffic is required to pass only to the right of the obstruction the marking **shall** consist of a no-passing marking at least twice the length of the diagonal portion determined by the applicable taper formula.
- In advance of the point of divergence, a wide continuous single or double white line **shall** be extended equal to the length of the diverging lines.
- Additional white markings may be placed in the triangular area between the channelizing lines. Diagonal white markings may be placed in the triangular area as shown in the figure.
- The length of the diagonal markings (taper length) Should be computed by Table 4-13.
- Typical approach markings for obstruction in the roadway is shown in Figure 4-63.

Table 4-13 Taper Lengths in Meters for Required Lateral Movement

Speed (km/h)	Distance (m) that Traffic is to be Moved Right or Left						
	1.5	2.5	2.75	3	3.25	3.5	3.75
30	9	15	16	17	19	20	22
35	11	20	22	24	26	28	30
40	15	26	28	31	34	36	39
45	20	33	36	39	42	46	49
50	24	40	44	48	52	56	60
55	29	49	54	58	63	68	73
60	35	58	64	70	75	81	87
65	41	68	75	82	88	95	102
70	65	109	102	131	141	152	163
75	70	117	128	140	152	163	175

Speed (km/h)	Distance (m) that Traffic is to be Moved Right or Left						
	1.5	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**
80	75	124	137	179	162	174	186
85	79	132	145	158	172	185	198
90	84	140	154	168	182	196	210
95	89	148	162	177	192	207	221
100	93	155	171	186	202	218	233
105	98	163	179	196	212	228	245
110	103	171	188	205	222	239	256
115	107	179	197	214	232	250	268
120	112	184	205	224	261	261	280

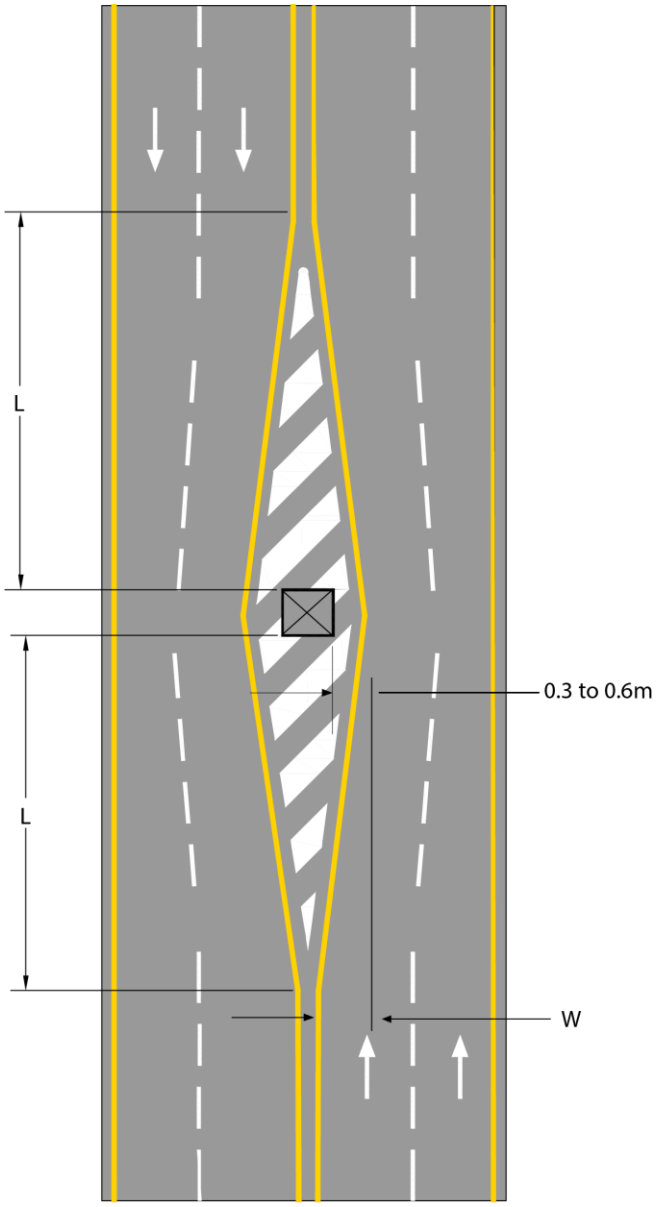


Figure 4-63 Typical Approach Markings for Obstruction in the Roadway

4.5. Roundabout Markings

A roundabout is a specific type of circular intersection designed to control speeds and having specific traffic control features. Pavement markings on the approaches to a roundabout and on the circular roadway *Should* be compatible with each other to provide a consistent message to road users and *Should* facilitate movement through the roundabout so that vehicles do not have to change lanes within the circulatory roadway to exit the roundabout in each direction.

Pavement markings and signing for a roundabout *Should* be integrally designed to correspond to the geometric design guidelines in SHC 301 (Highway Geometric Design).

- Figure 4-64 provides an example of the pavement markings for the approaches and circulatory roadways at a roundabout.
- Figure 4-66 through to Figure 4-77 show the options that are applicable for lane designation marking arrows on approaches to roundabouts.
- Traffic control signals or pedestrian hybrid beacons (see Chapter 5) are sometimes used at roundabouts to facilitate the crossing of pedestrians or to meter traffic.

4.5.1. Lane Markings for Roundabouts

- Multi-lane approaches to roundabouts **shall** have adequate lane marking clearly delineating each lane.
- A through lane on a roadway that becomes a trapped lane (mandatory turn lane) at a roundabout **shall** be marked with a dotted white lane line in accordance with Section 4.2.4.
- Continuous concentric lane lines **shall** not be used within the circulatory roadway of roundabouts.
- Multi-lane roundabouts *Should* have lane markings within the circulatory roadway to channelize traffic to the appropriate exit lane.
- Roundabout with heavy vehicles should be validated using swept path analysis for the lane marking design. Further information in this regard can be found in Section 10.3.3 of SHC 301 (Highway Geometric Design).

4.5.2. Edge Line Pavement Markings for Roundabout Circulatory Roadways

- Edge lines (L5-1) and edge line extensions **shall** not be placed across the exits from the circulatory roadway at roundabouts.
- A white (circulatory roadway) edge line *Should* be used on the outer (right-hand) side of the circulatory roadway. Where a white edge line is used, it *Should* be as follows (see Figure 4-64):
    - A solid line adjacent to the splitter island, and
    - A wide dotted line across the lane(s) entering the roundabout.
- A yellow edge line may be placed around the inner (left-hand) edge of the circulatory roadway (Figure 4-66) and may be used to channelize traffic (see Figure 4-67).

4.5.3. Crosswalk Markings at Roundabouts

- If pedestrian facilities are provided, crosswalks marking (L12-1) *Should* be marked across roundabout entrances and exits to indicate where pedestrians are intended to cross.
- Pedestrian crosswalks **shall** not be marked to or from the central island of roundabouts.
- Crosswalks *Should* be a minimum of 6 m from the edge of the circulatory roadway.

4.5.4. Word, Symbol, and Arrow Pavement Markings for Roundabouts

- Within the circulatory roadway of multi-lane roundabouts, normal lane designation arrows *Should* be used.
- On multi-lane approaches with double left-turn and/or double right-turn lanes, lane designation arrows as shown in Figure 4-71, Figure 4-72 , and Figure 4-73 *Should* be used.
- Lane designation arrows (13-1) may be used on any approach to and within the circulatory roadway of roundabouts.
- Yield (word) and Yield Ahead (symbol or word) pavement markings may be used on approaches to roundabouts (see Figure 4-64).
- Word and/or route shield pavement markings may be used on an approach to or within the circulatory roadway of a roundabout to provide route and/or destination guidance information to road users (see Figure 4-77).
- If used on approaches to a roundabout, lane designation arrows may be either normal or fish-hook arrows, either with or without an oval symbolizing the central island, as shown in Figure 4-65.

4.5.5. Markings for Other Circular Intersections

- The markings shown in this Section may be used at other circular intersections if engineering judgment indicates that their presence will benefit drivers, pedestrians, or other road users.
- Other circular intersections include, but are not limited to, rotaries, traffic circles, and residential traffic calming measures.

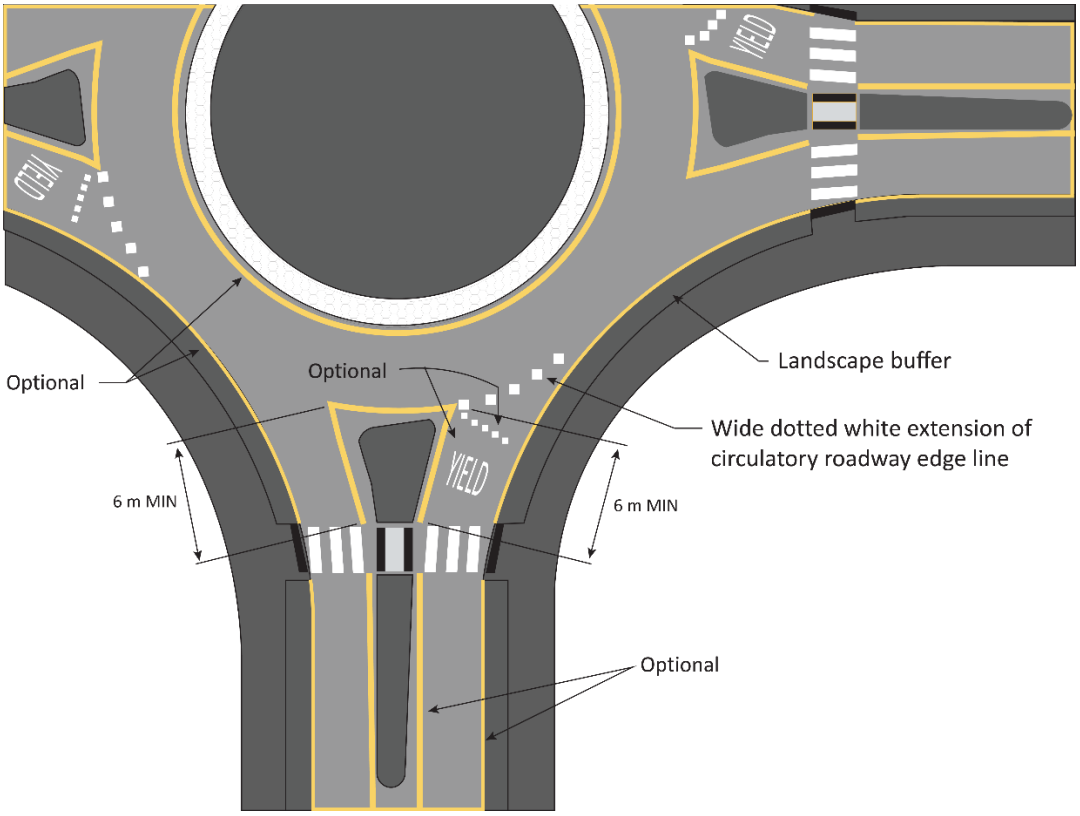


Figure 4-64 Example of Markings for Approach and Circulatory Roadways at a Roundabout

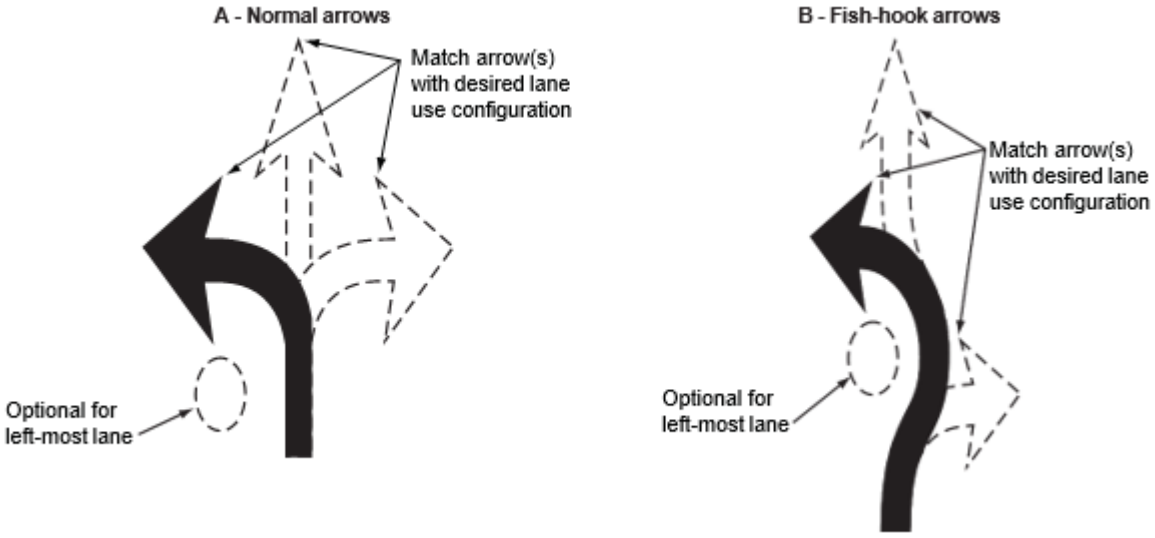


Figure 4-65 Lane Designation Arrow Pavement Marking Options for Roundabout Approaches

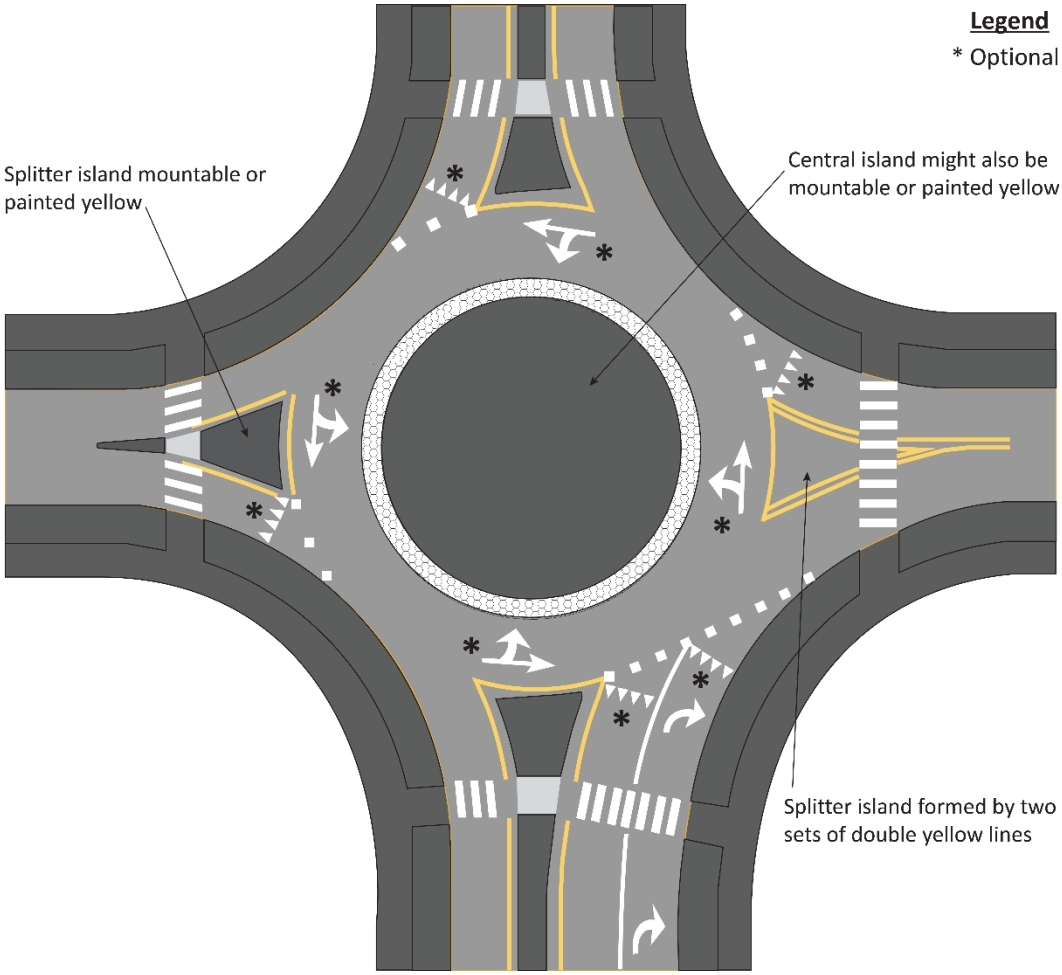


Figure 4-66 Example of Markings for a One-Lane Roundabout

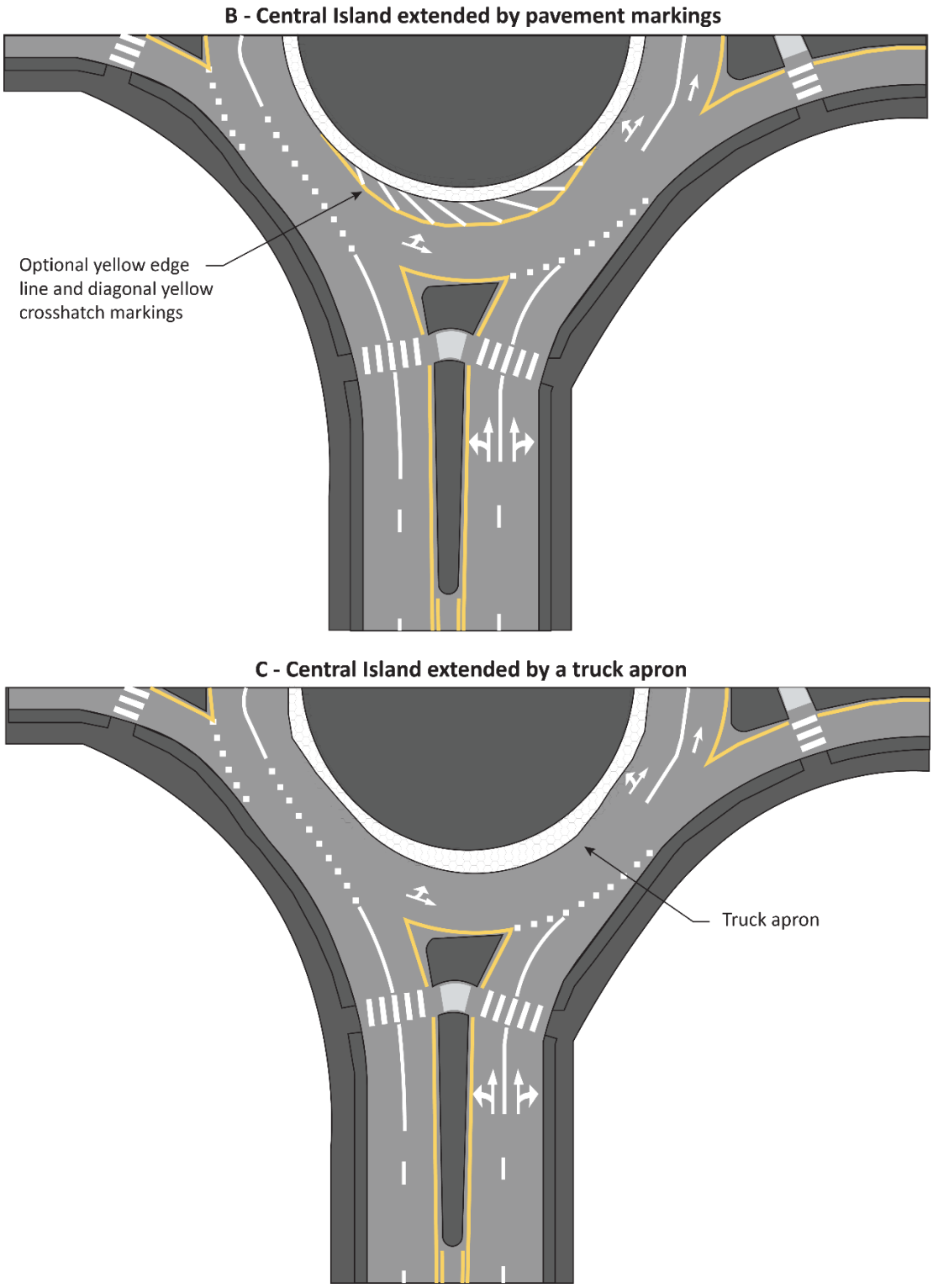


Figure 4-67 Example of Markings for a Two-Lane Roundabout with One (top) and Two-Lane (bottom) Approaches

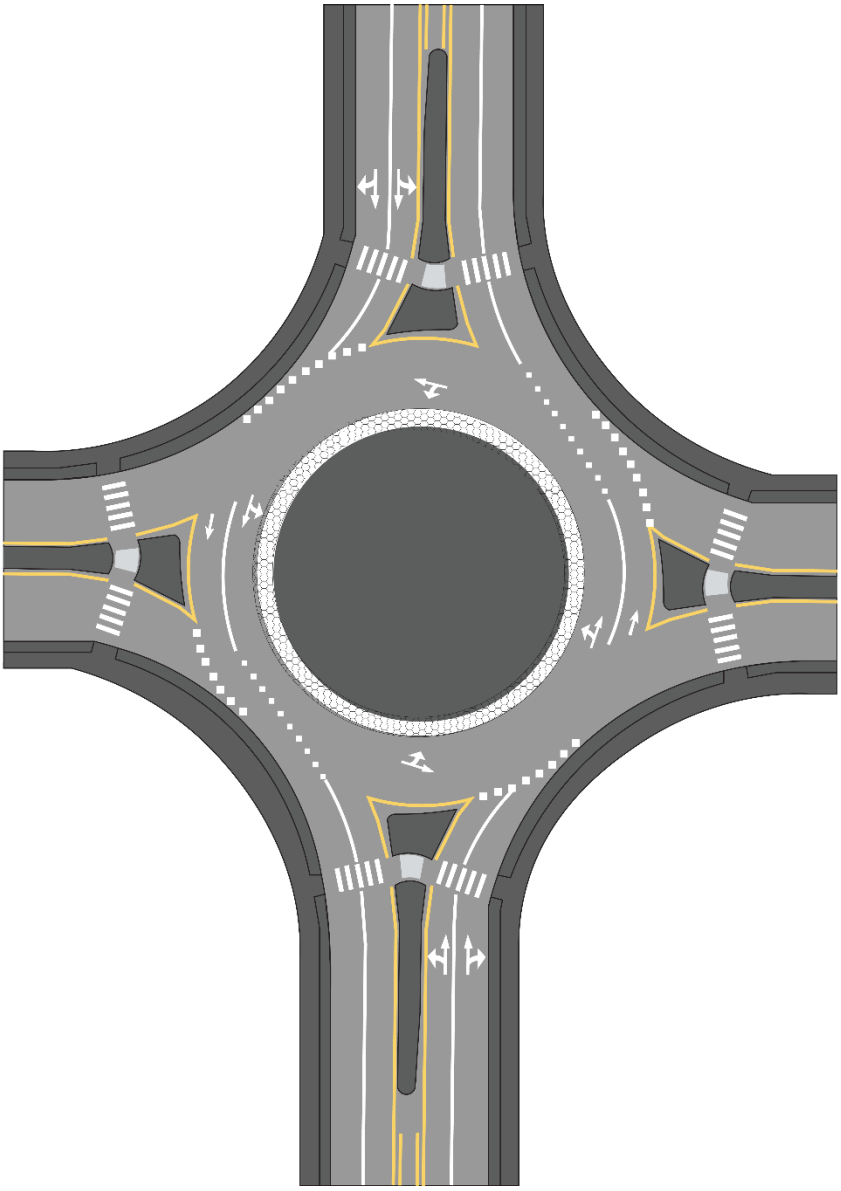


Figure 4-68 Example of Markings for a Two-Lane Roundabout with One-Lane Exits – Drawing A

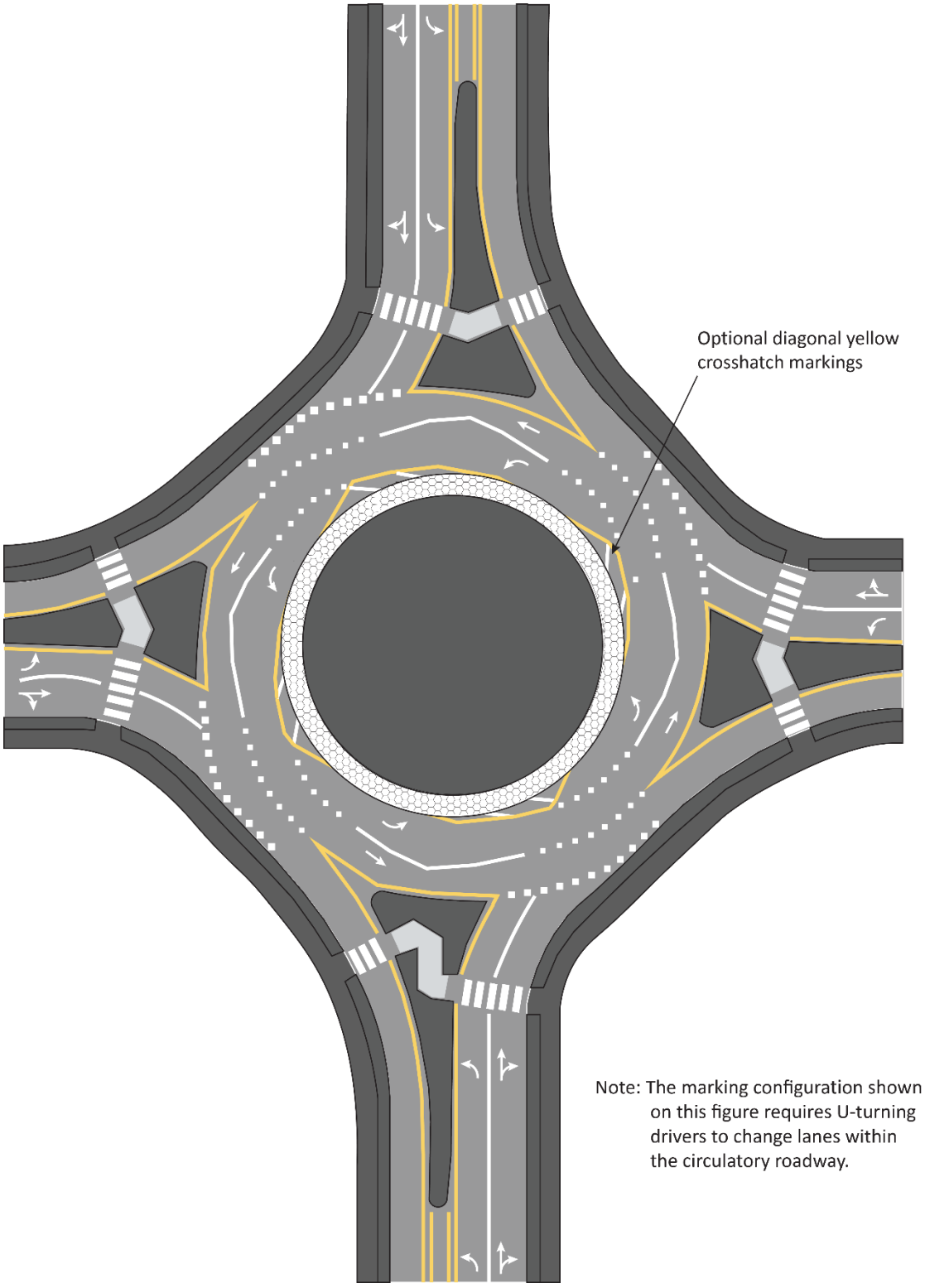


Figure 4-69 Example of Markings for a Two-Lane Roundabout with One-Lane Exits – Drawing B

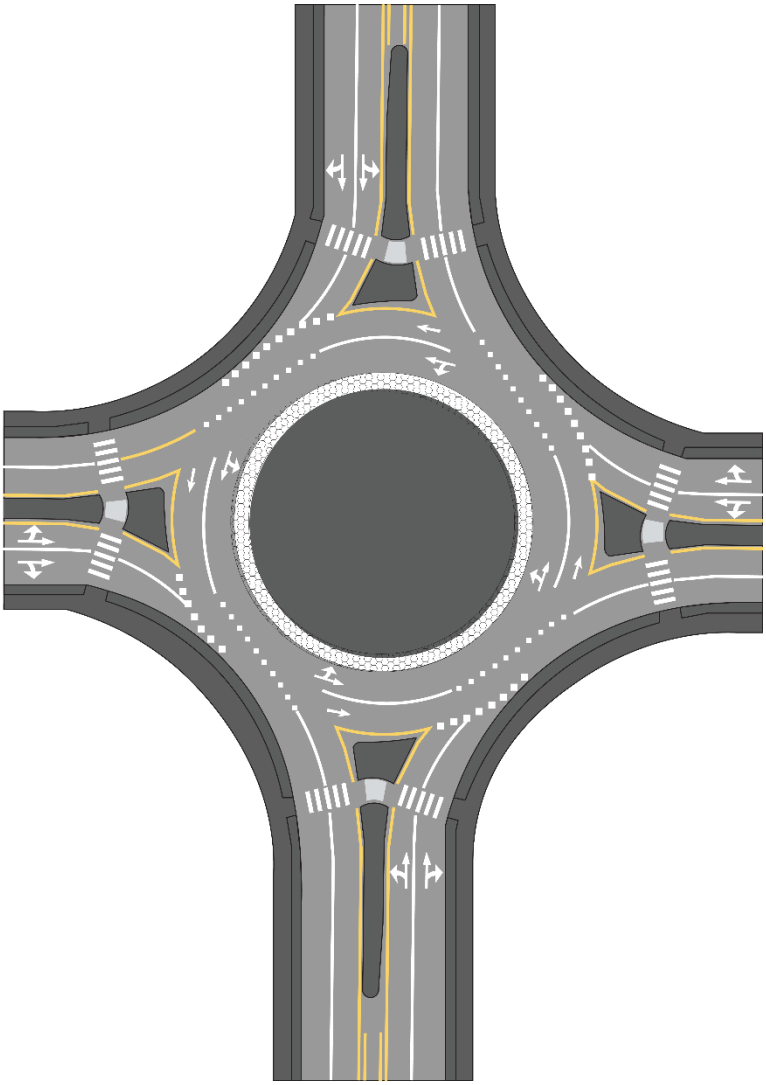


Figure 4-70 Example of Markings for a Two-Lane Roundabout with Two-Lane Exits

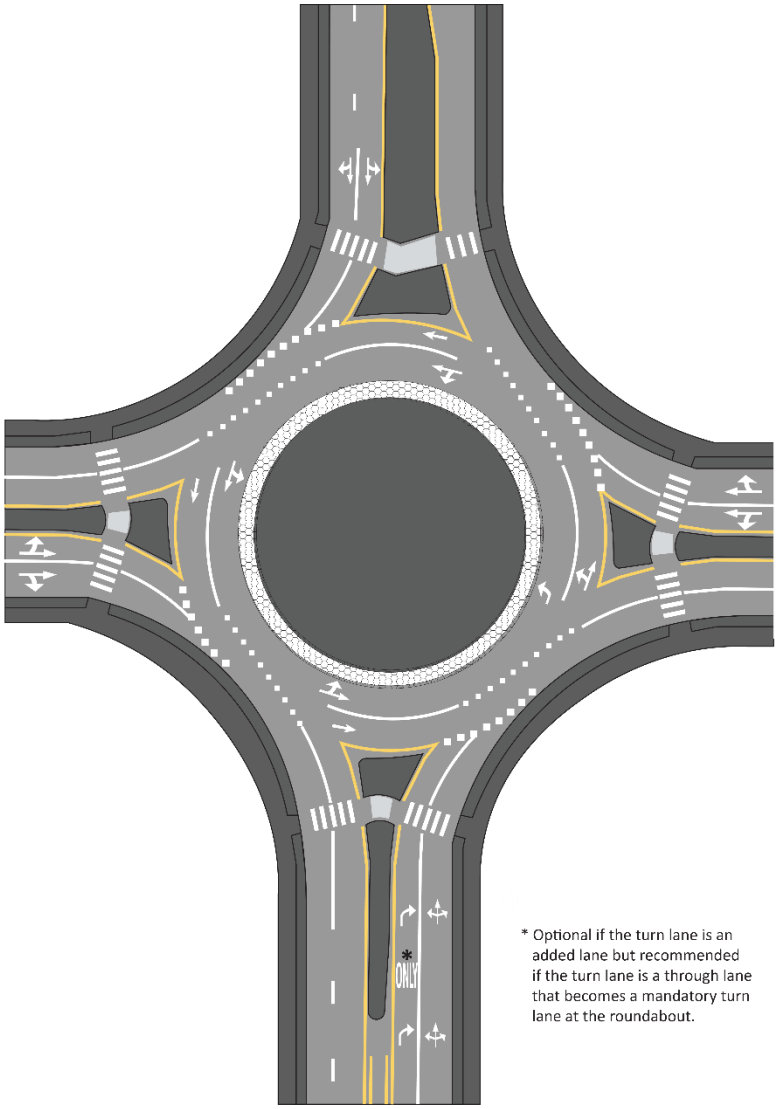


Figure 4-71 Example of Markings for a Two-Lane Roundabout with a Double Left Turn

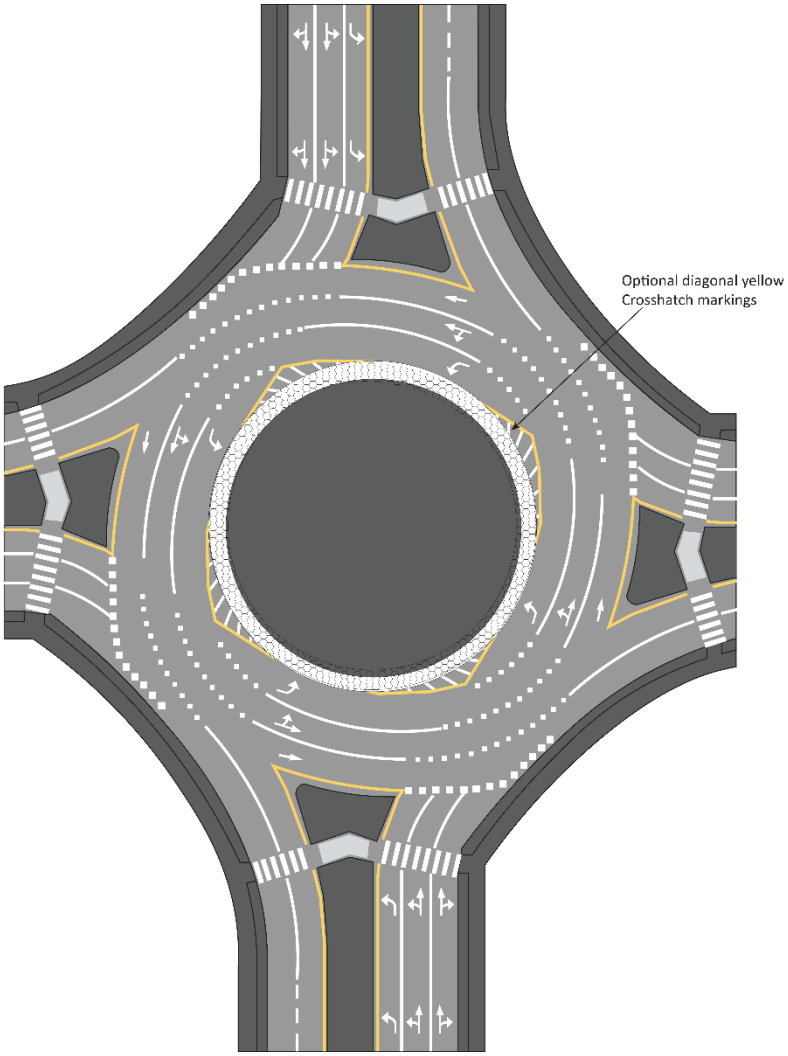


Figure 4-72 Example of Markings for a Two-Lane Roundabout with a Double Right Turn

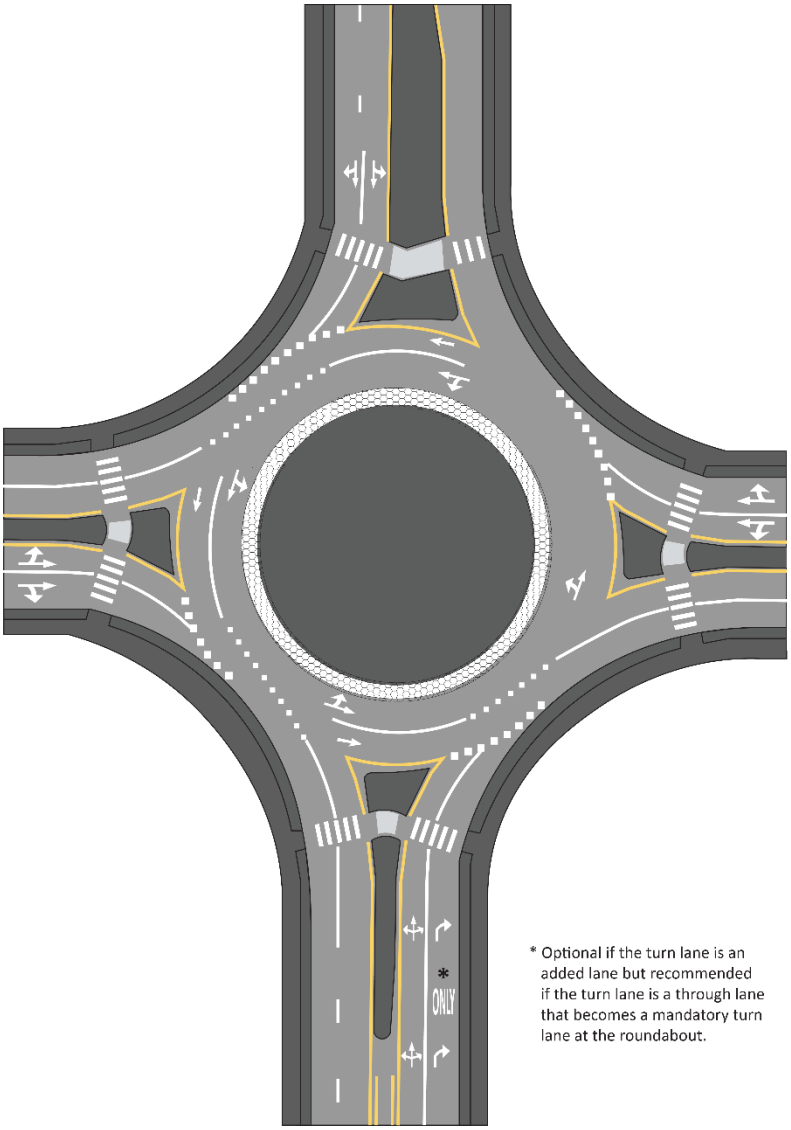


Figure 4-73 Example of Markings for a Two-Lane Roundabout with Consecutive Double Left Turns

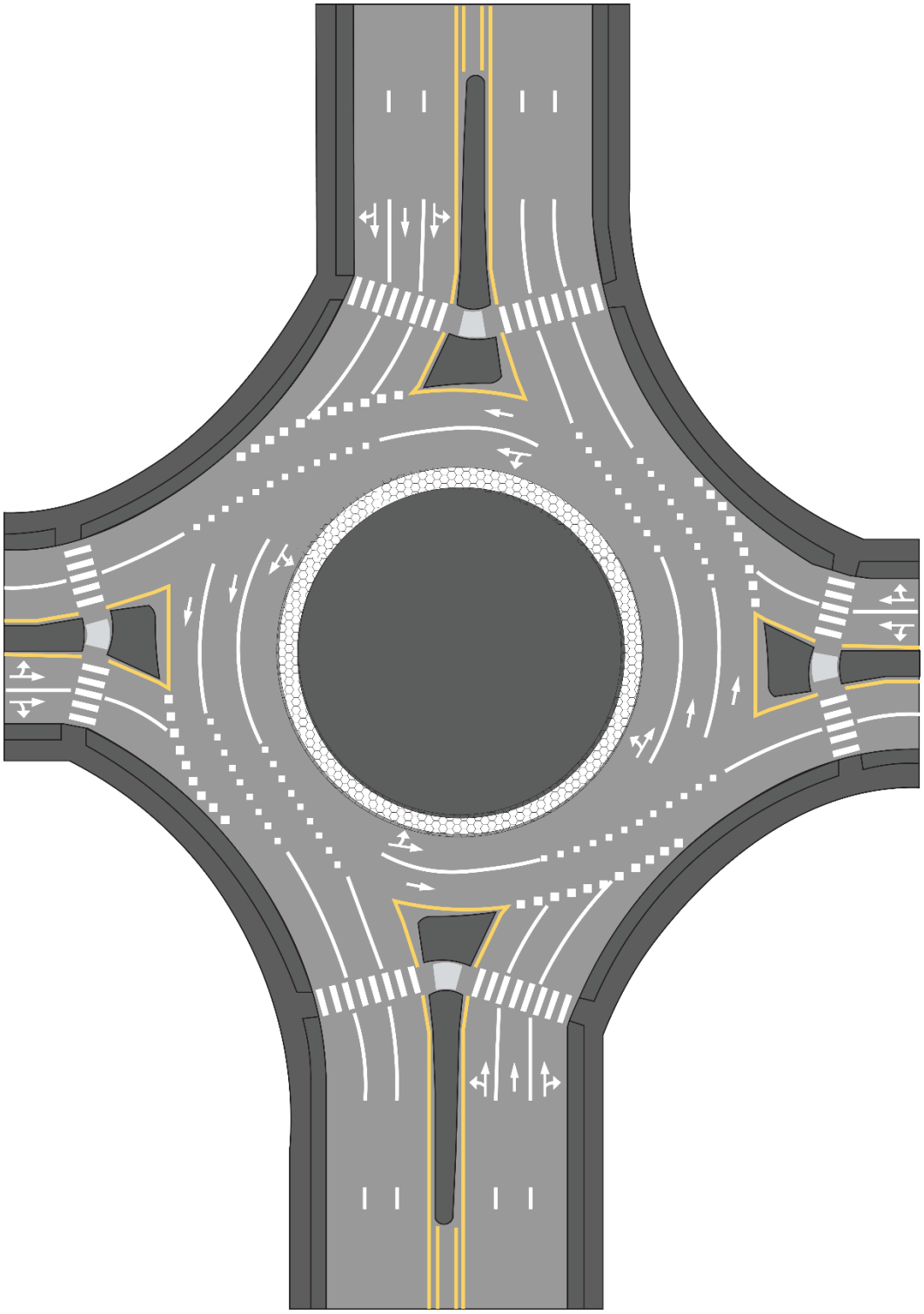


Figure 4-74 Example of Markings for a Three-Lane Roundabout with Two- and Three-Lane Approaches

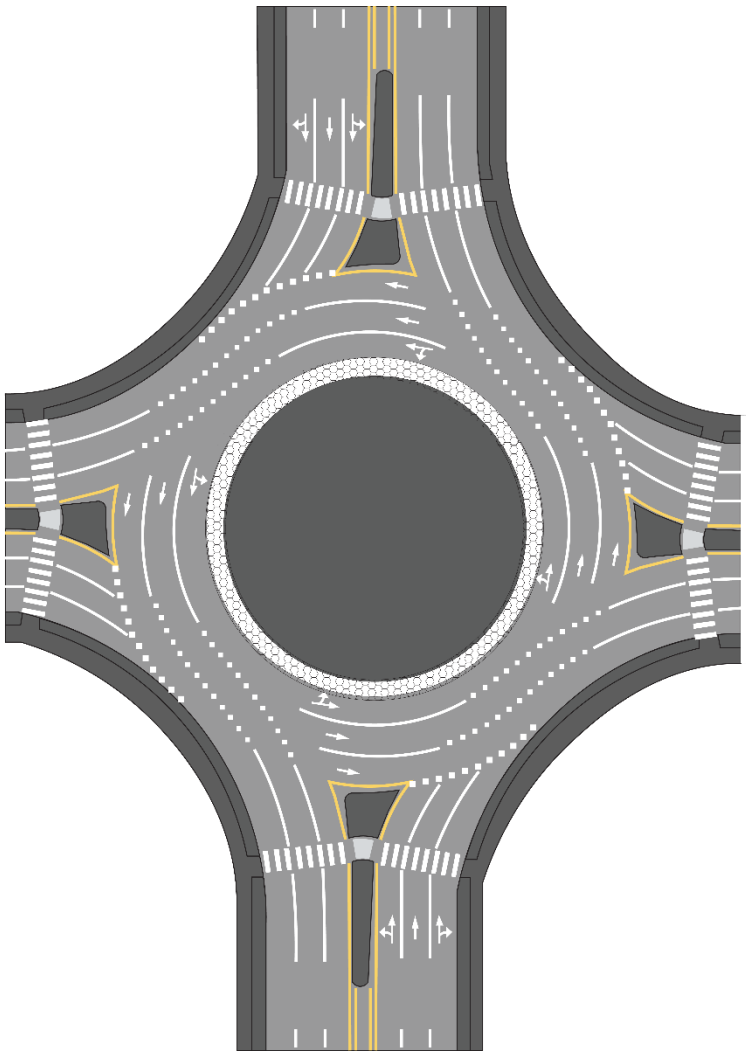


Figure 4-75 Example of Markings for a Three-Lane Roundabout with Three-Lane Approaches

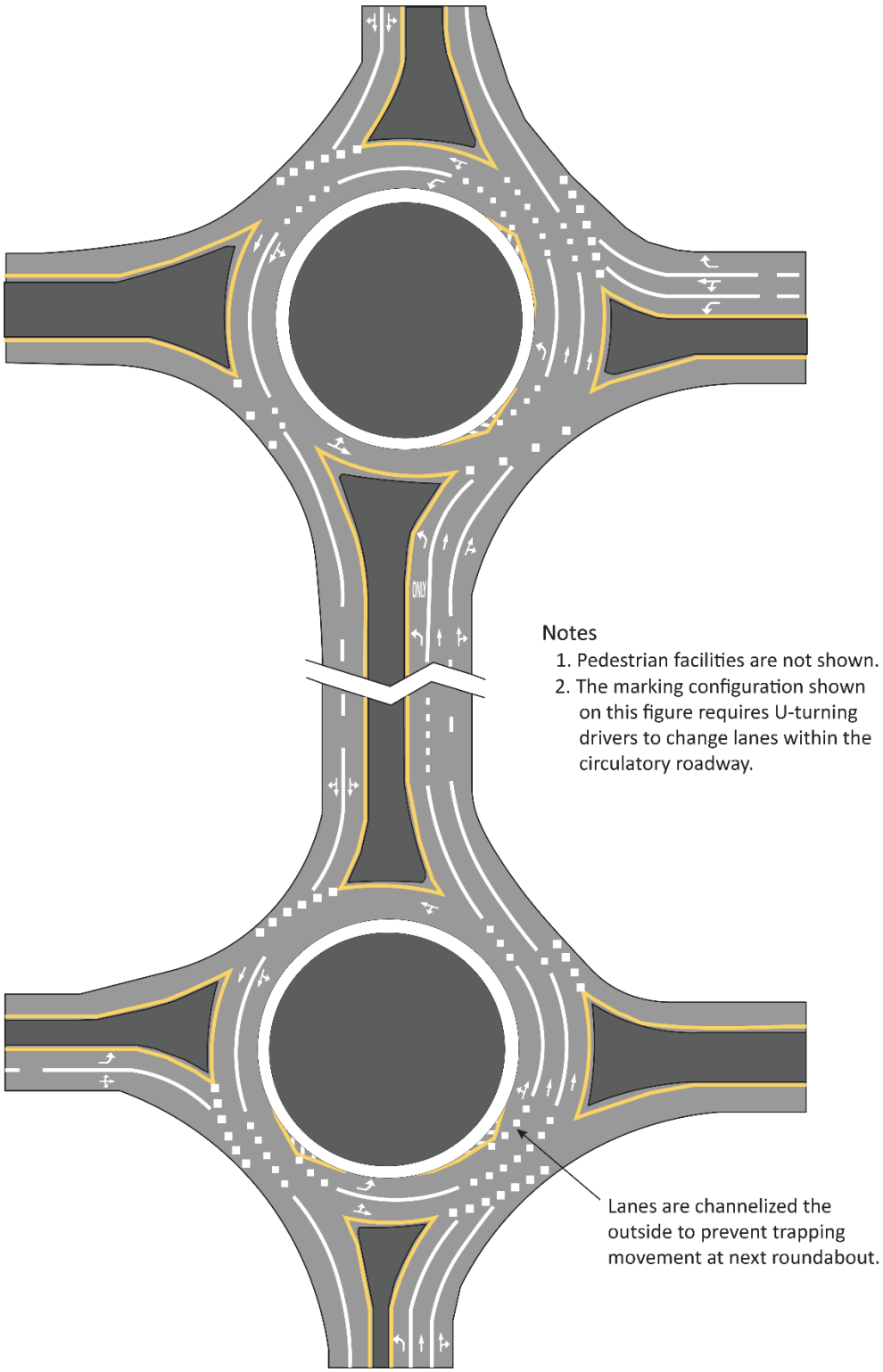


Figure 4-76 Example of Markings for a Three-Lane Roundabout with Two-Lane Exits: Example of Markings for Two Linked Roundabouts

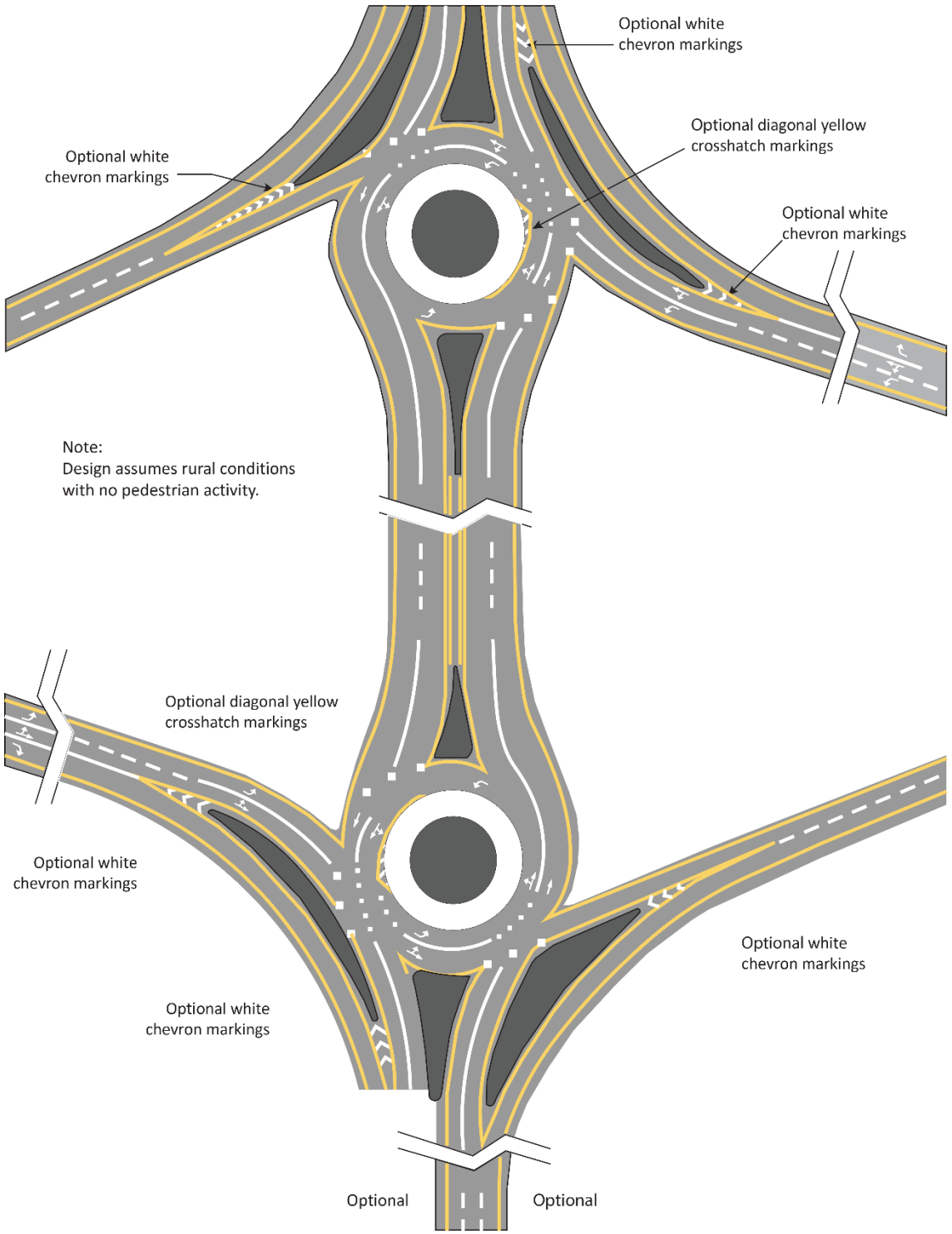


Figure 4-77 Example of Markings for a Diamond Interchange with Two Circular-Shaped Roundabout Ramp Terminals

4.6. Special Zones and Preferential Lane Markings

4.6.1. Speed Measurement Markings (L20-1)

A speed measurement marking (L20-1) is a transverse marking placed on the roadway to assist the enforcement of speed regulations.

- Speed measurement markings, if used, **shall** be white, and **shall** not be greater than 610 mm in width.
- Speed measurement markings may extend 610 mm on either side of the center line or 610 mm on either side of edge line markings at 0.5 km intervals over a 1.5 km length of roadway. When paved *should*ers of sufficient width are available, the speed measurement markings may be placed entirely on these shoulders Advisory signs may be used in conjunction with these markings.

4.6.2. Speed Reduction Markings (L21-1)

Speed reduction markings (L21-1) are transverse markings that are placed on the roadway within a lane (along both edges of the lane) in a pattern of progressively reduced spacing to give drivers the impression that their speed is increasing. These markings might be placed in advance of an unexpectedly severe horizontal or vertical curve or other roadway feature where drivers need to decelerate prior to reaching the feature and where the desired reduction in speeds has not been achieved by the installation of warning signs and/or other traffic control devices (see Figure 4-78).

- If used, speed reduction markings **shall** be a series of white transverse lines on both sides of the lane that are perpendicular to the center line, edge line, or lane line. The longitudinal spacing between the markings **shall** be progressively reduced from the upstream to the downstream end of the marked portion of the lane.
- Speed reduction markings **shall** not be used in lanes that do not have a longitudinal line (center line, edge line, or lane line) on both sides of the lane.
- If used, speed reduction markings *Should* be reserved for unexpected curves and *Should* not be used on long tangent sections of roadway or in areas frequented mainly by local or familiar drivers, (e.g., school zones). If used, speed reduction markings *Should* supplement the appropriate warning signs and other traffic control devices and *Should* not substitute for these devices.
- Speed reduction markings *Should* not be greater than 300 mm in width and *Should* not extend more than 460 mm into the lane.

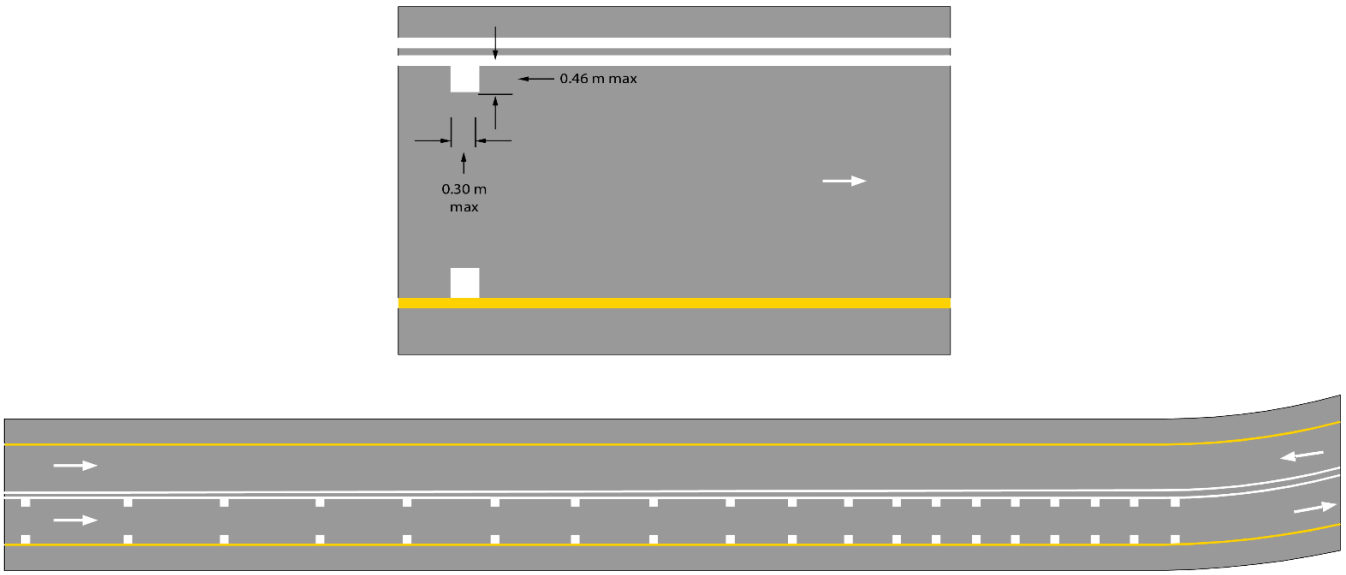


Figure 4-78 Example of the Application of Speed Reduction Markings (L21-1)

4.6.3. Speed Hump Markings (L22-1)

- If speed hump markings (L22-1) are used, they **shall** be a series of white markings placed on a speed hump to identify its location.
- If markings are used for a speed hump that does not also function as a crosswalk or speed table, the markings **shall** comply with Option A, B, or C as shown in Figure 4-79.
- If markings are used for a speed hump that also functions as a crosswalk or speed table, the markings **shall** comply with Option A or B as shown in Figure 4-80.

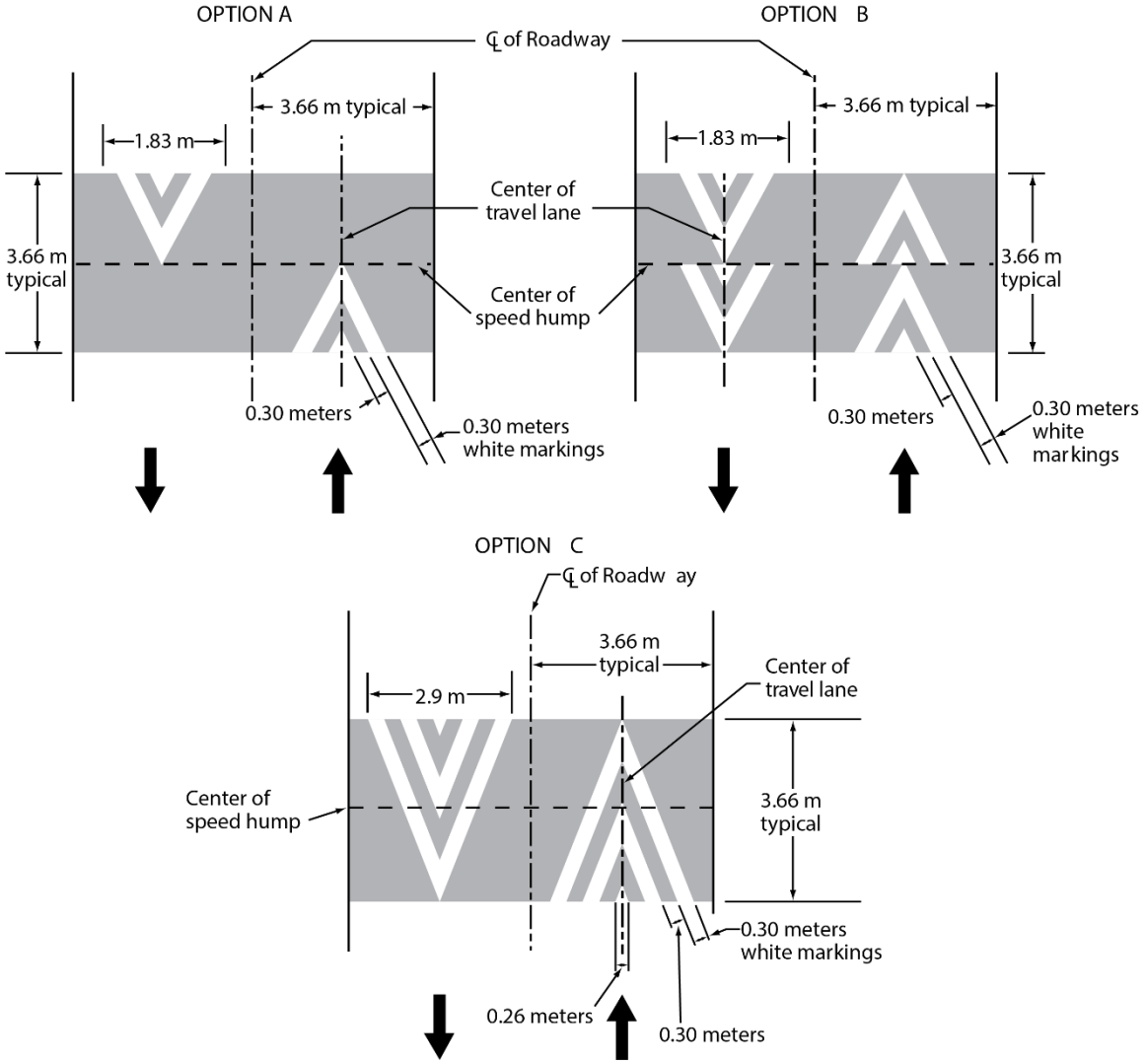
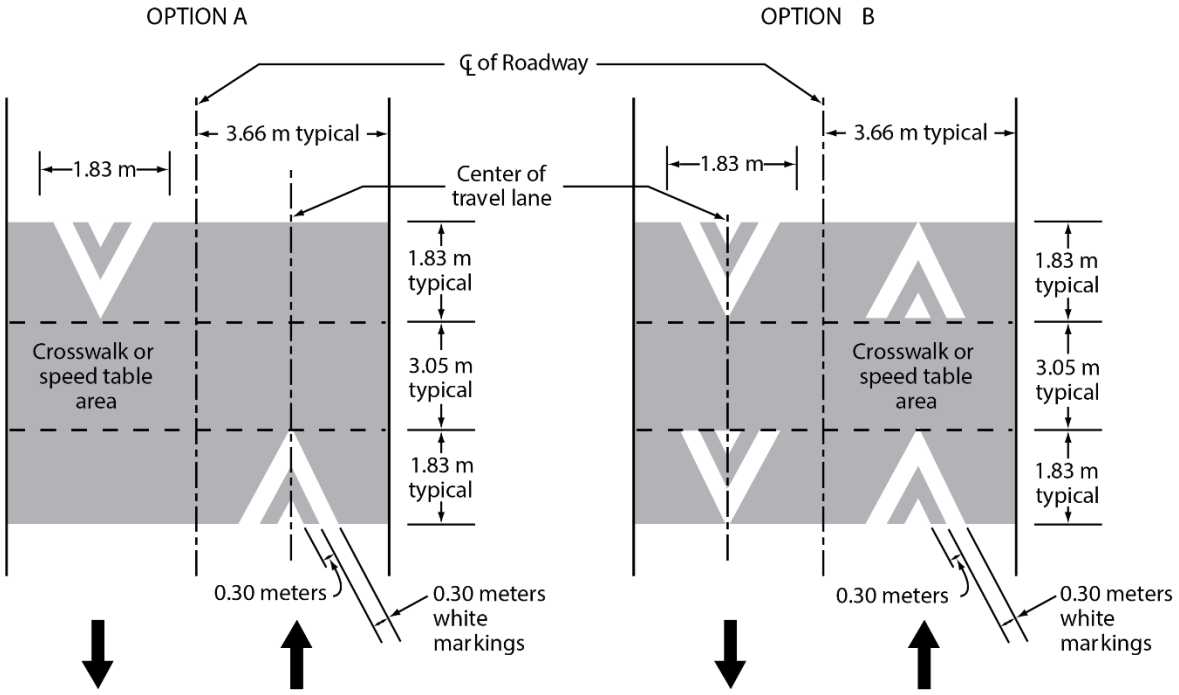


Figure 4-79 Pavement Markings for Speed Humps without Crosswalks (Options A and B at the top, C at the bottom) (L22-1)



Note: Optional crosswalk lines are not shown in this figure

Figure 4-80 Pavement Markings for Speed Tables or Speed Humps with Crosswalks (L22-1) (Options A and B)

4.6.4. Advance Speed Hump Markings (L23-1)

Advance speed hump markings (L23-1) (see Figure 4-81) may be used in advance of speed humps or other engineered vertical roadway deflections such as dips where added visibility is desired or where such deflection is not expected.

Advance pavement wording such as bump or hump may be used on the approach to a speed hump either alone or in conjunction with advance speed hump markings. Appropriate advance warning signs may be used in compliance with Section Standard Warning Signs.

- If advance speed hump markings are used, they **shall** be a series of eight white 305 mm transverse lines that become longer and are spaced closer together as the vehicle approaches the speed hump or other deflection. If advance markings are used, they **shall** comply with the detailed design shown in Figure 4-81.
- If used, advance speed hump markings *Should* be installed in each approach lane.

Further information regarding speed humps details can be found in SHC 603 (Road Safety).

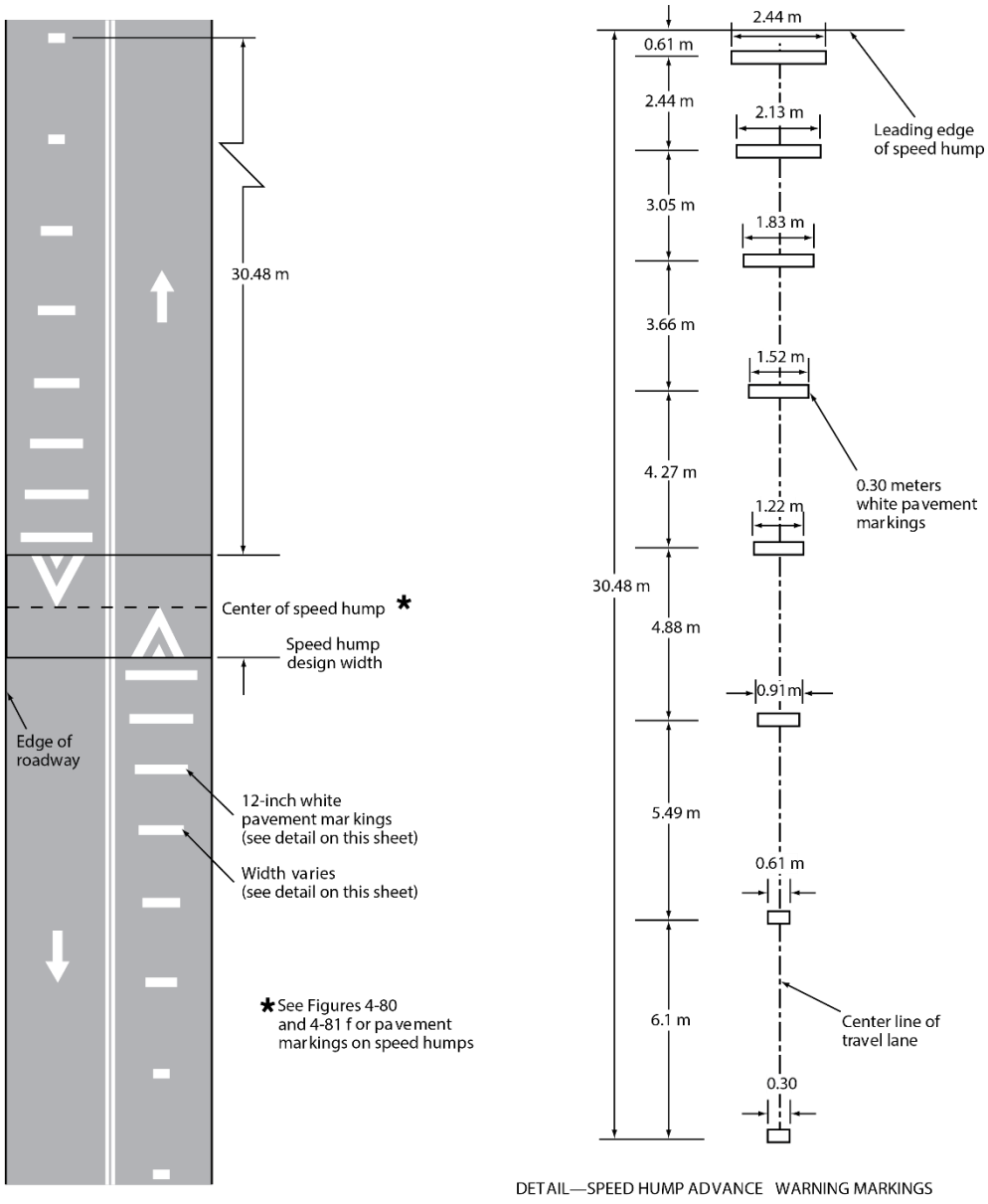


Figure 4-81 Advance Warning Markings for Speed Humps (L23-1)

4.6.5. Bus Lanes and Facilities

Bus lanes and bus facilities are those that are always reserved for the use of buses or part-time. For instance, the bus lane may only need to be in operation during the peak hours to facilitate movements and to encourage sustainable travel.

4.6.5.1. With-flow bus lanes (L24-1, L25-1, L26-1, L27-1, L28-1)

With-flow bus lanes are lanes in which buses travel in the same direction as traffic in the adjacent lane. Where roadways are wide enough, the bus lane *Should* be 4.25 m wide, with a minimum preferred width of 4 m.

Bus lanes may be full-time or part-time (with the times displayed on accompanying signs). Both are marked similarly; however, the separation line between the bus lane and rest of the roadway varies, as detailed below.

- A solid, full-time separation bus lane is indicated by marking (L24-1), an unbroken white line 150 mm wide (Figure 4-82). Marking (L24-1) denotes the bus lane is permanent and cannot be crossed at any time (except in emergencies).

Figure 4-82 Solid Full-Time Separation Bus Line (L24-1)

- An intermittent part-time bus lane is indicated by the marking (L25-1, see Figure 4-83), a broken white line 150 mm wide with 3 m line and 9 m gap if it is a traffic lane at other times or is indicated by the marking (L26-1 see Figure 4-84), a 9 m line and 3 m gap if at other times it is a parking or special lane.

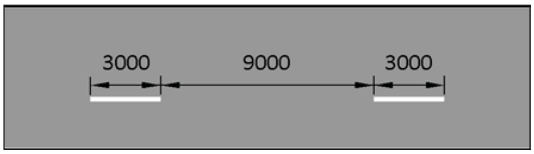


Figure 4-83 Intermittent part-time line (3 m line 9 m Gap) (L25-1)

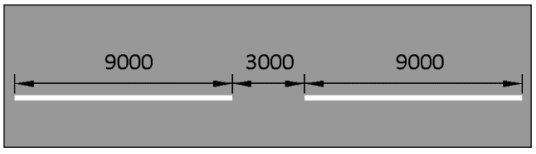


Figure 4-84 Intermittent Part-Time Line (9 m line 3 m Gap) (L26-1)

- These intermittent lines **shall** only be crossed when the bus lane is not in force, as detailed by accompanying signs.
- The continuity line marking (L27-1, see Figure 4-85), which consists of 1 m line and 3 m gap with a width of 150 mm, **shall** mark the start of the bus lane. Marking (L27-1) **shall** extend a distance of 35 m.

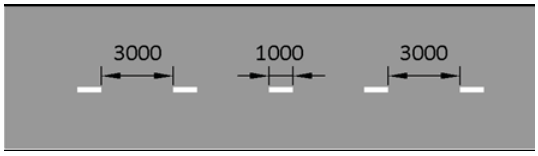


Figure 4-85 Start of Bus Lane Line (L27-1)

- Marking (L27-1) is the same for both full-time and part-time bus lanes. To provide advanced guidance, marking L13-8 deflection arrows *Should* be placed 15 m and 30 m upstream of the start of the taper.
- For posted speeds up to 80 km/h, marking L13-8 deflection arrows *Should* be 6 m long and for posted speeds of 100 km/h and 120 km/h marking L13-8 deflection arrows *Should* be 9 m long.
- Continuity marking (L27-1) may be used on the approaches to an intersection where the lane may be entered by traffic that is normally prohibited, but that needs to make an allowed movement.
- For full-time bus lanes, the bus symbol marking (L28-1, see Figure 4-86) **shall** be marked on the roadway. Roadway messages are optional on part-time bus lanes and *Should* not be used if they could mislead road users when the bus lane is not in operation.
- The bus symbol *Should* be used at the start of the bus lane, after every intersection, and every 200 m. Figure 4-87 and Figure 4-88 show the standard layout of full-time and part-time bus lanes accordingly. Figure 4-89 provides details of a short bus priority lane used in conjunction with a dedicated bus only early start signal phase.

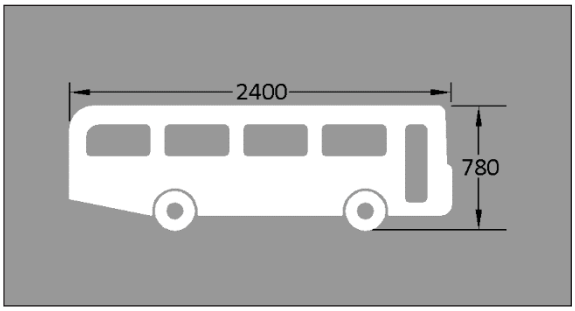


Figure 4-86 Bus Symbol Marking (L28-1)

- Full-time bus lanes may be colored red to provide greater clarity and to discourage encroachment by other vehicles. the colored surface treatment *Should* not be applied to part-time bus lanes, as this could lead to motorist confusion.

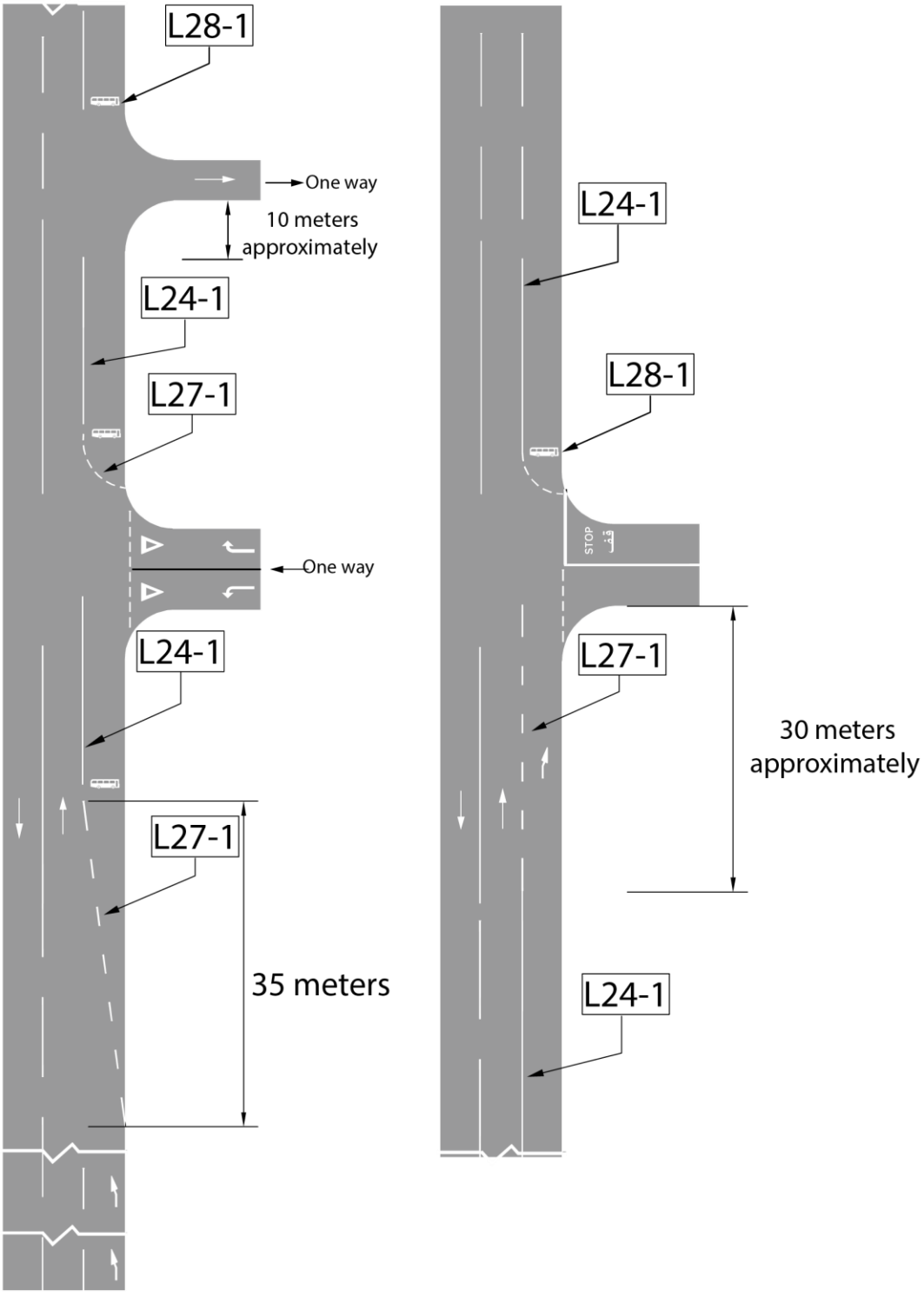


Figure 4-87 Standard Layout of Full-Time Bus Lane

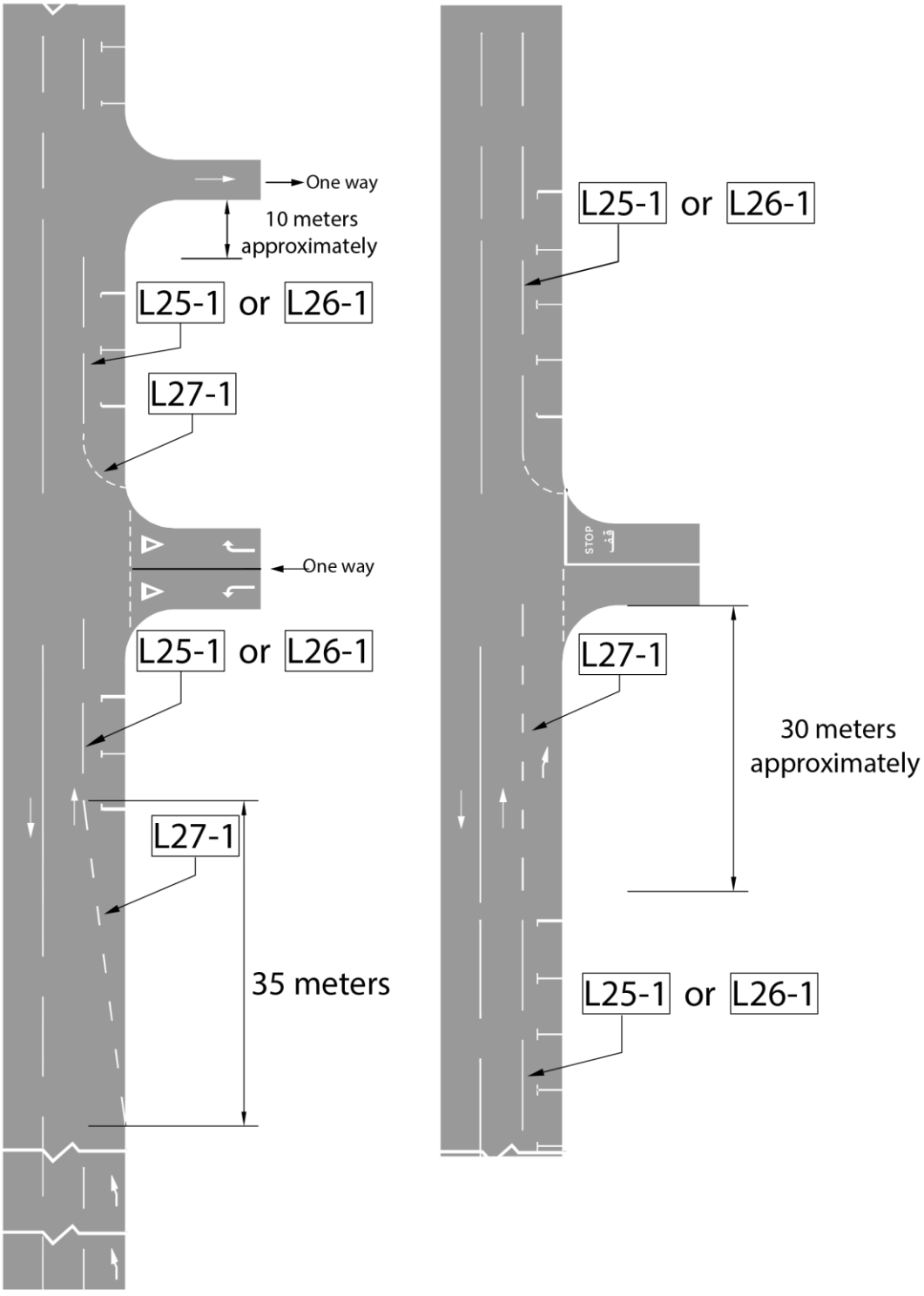


Figure 4-88 Standard Layout of Part-Time Bus Lane

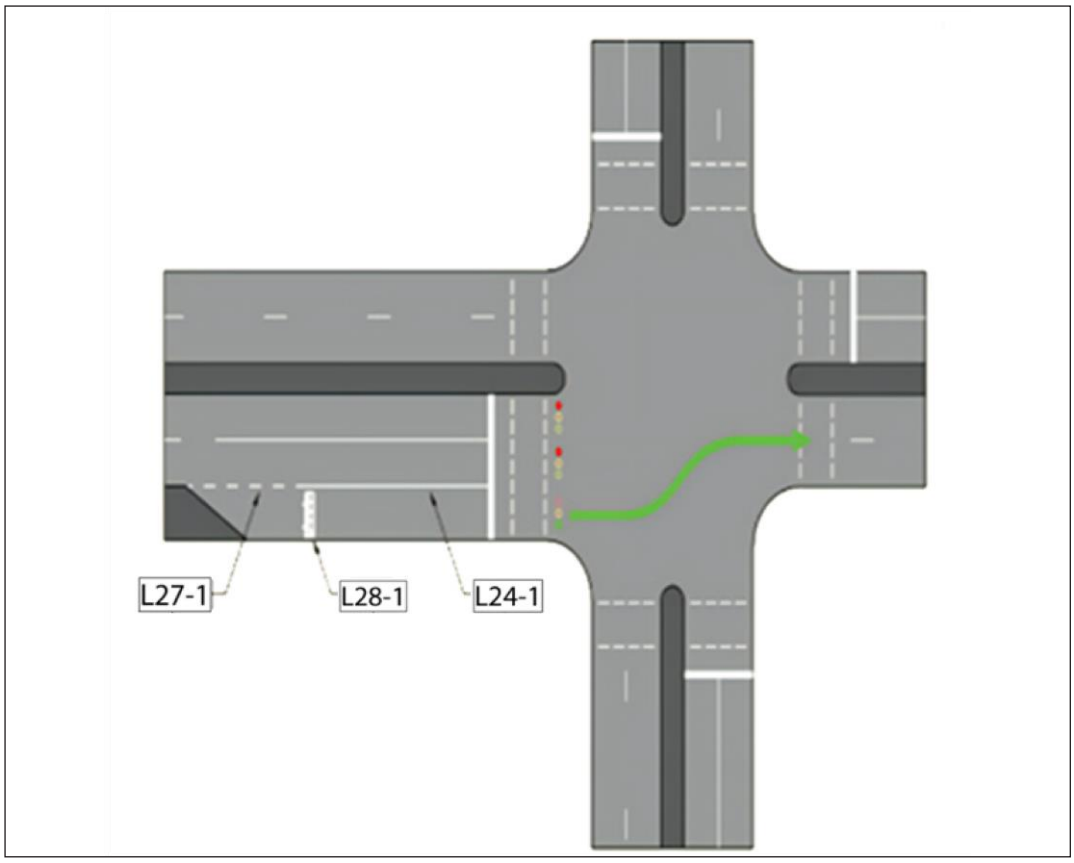


Figure 4-89 Bus Lane on Approach to Signalized Intersection with Bus Only Phase

4.6.5.2. Bus only roadways

Where roadways are reserved for the use of buses only, the entry *Should* be marked with marking (L28-1) which **shall** be accompanied by Figure 3-115.

4.6.5.3. Bus stop markings (L29-series, L30-series and L31-1)

The bus stop marking (L29-1) **shall** be used within all types of bus stops. Marking (L29-1, see Figure 4-90) **shall** be used for bus stop lane widths of 3.0 m or more. Marking (L29-2, see Figure 4-91) **shall** be used for reduced bus stop lane widths of 2.5 to 3.0 m.

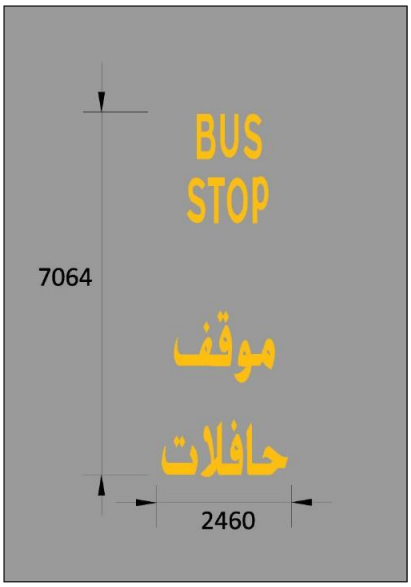


Figure 4-90 Bus Stop Symbol (Bus Stop Lane Width ≥ 3.0 m) (L29-1)

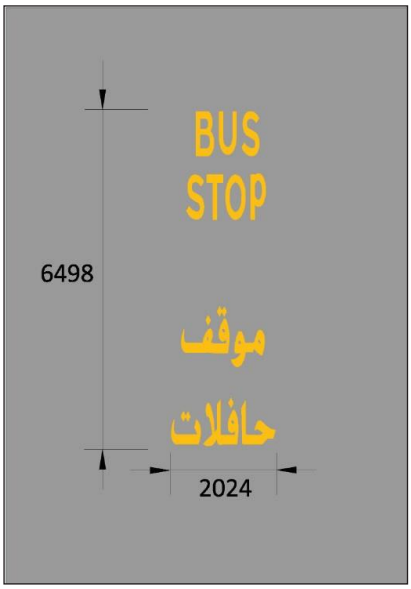


Figure 4-91 Bus Stop Symbol ((Bus Stop Lane Width Between 2.5 and 3.0 m) (L29-2)

- The bus stop markings (L29-1) and (L29-2), and the combination markings (L29-1)/(L29-2) **shall** be used to delineate the limits of a bus stop in which other vehicles are prohibited to stop and *Should* be accompanied by Bus Stop Sign (R32-1), as shown in Figure 3-111.
- Marking (L30-1, see Figure 4-92) **shall** be used where the bus stop is entirely within the travel lane. This marking **shall** be accompanied by marking (L29-1) and the lane width **shall** be 3.0 m or greater. When the bus stop is located entirely within the travel lane, the width of the edge line **shall** be 100 mm.
- Marking (L31-1, see Figure 4-94) **shall** be used for a bus lay-by where the bus stop occupies the entire length of a lay-by. Marking (L31-1) **shall** be accompanied by

marking (L29-1) and the lane width **shall** be 3.0 m or greater. When the bus stop occupies the entire length of a lay-by, the width of the edge line **shall** be:

- 100 mm when the posted speed is ≤ 60 km/h,
- 150 mm when the posted speed is 80 km/h, and
- 200 mm when the posted speed is ≥100 km/h.

- A combination of markings (L30-1) and (L19-1) **shall** be used for a bus stop that occupies part of an area otherwise dedicated to on-street parallel parking (see Figure 4-93). If the lane width of the bus stop is less than 3.0 m and greater than or equal to 2.5 m, reduced width lane marking (L29-2) **shall** be used and marking (L29-1) **shall** be used for lane widths 3.0 m and greater. When the bus stop occupies part of an area otherwise dedicated to on-street parallel parking, the width of the edge line **shall** be 100 mm. The edge line (L5-1) along the length of the bus stop, including the entry and exit lengths of marking (L19-1) and the bus standing area denoted by marking (L30-1), **shall** be colored yellow, while the broken edge line marking along lengths upstream and downstream of the bus stop **shall** be white.

Figure 4-92 Bus Stop Solely Within Roadway (L30-1)

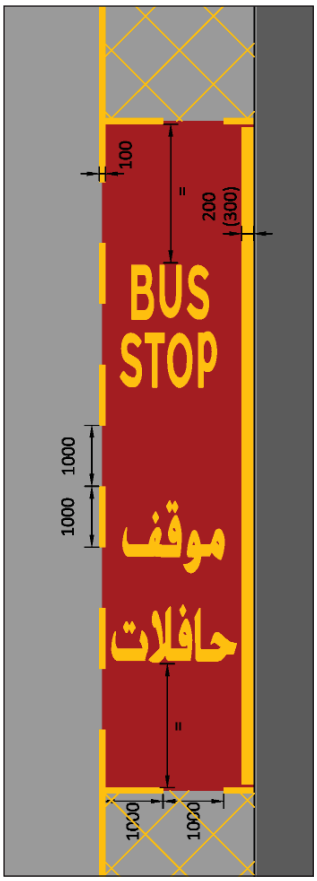


Figure 4-93 Combination of Markings for Bus Stop Solely Within Roadway (L30-1) and (L19-1)

Figure 4-94 Bus Stop in Lay-By (L31-1)

- The solid yellow line on the curb side of all bus stop markings indicates that stopped vehicles are prohibited. The solid yellow line *Should* be 200 mm wide where the posted speed is 80 km/h or less, and 300 mm wide where the posted speed is 100 km/h or greater.
- The roadway surface within areas defined by bus stop markings (L30-1) and (L31-1) **shall** be colored red in accordance with Section 4.8, and both the bus stop marking (L29-1) or (L29-2) and all lines delineating the stopping area of (L30-1) and (L31-1) **shall** be colored white. Only one size of marking **shall** be used for a bus stop located entirely within the travel lane.
- Where the bus stop serves frequent stops or multiple routes or vehicles with different entrance positions, the length of the bay may be increased in increments of 2 m. Marking (L29-1) or (L29-2) **shall** be repeated to equal the maximum number of buses that the bus standing area is planned to accommodate at a single given time. If the bus standing area length can accommodate two buses at a time, marking (L29-1) or (L29-2) **shall** be displayed two times within the bus standing area. The spacing between each marking and between the marking and the end of the bay **shall** be equal.

4.6.6. Bus Rapid Transit (BRT) at Grade Crossing

A bus rapid transit (BRT) facility which may utilize either an exclusive travel lane or a separate guideway (often called a busway). For purposes of design, installation, operation, and maintenance of traffic control devices at grade crossings, it is recognized that the crossing of the road by busway is situated on a right of way available for the joint use of road traffic as well as rail, busway traffic. The combination of devices selected or installed at a specific grade crossing is referred to as a "traffic control system."

BRT applications can be found in SHC 601 (Traffic Engineering).

4.6.7. High Occupancy Vehicle (HOV) Lanes

High occupancy vehicle (HOV) lanes are reserved for the exclusive use of vehicles with a driver and one or more passengers, including carpools, vanpools, and buses. HOV lanes may be full-time or part-time. The normal minimum occupancy level is driver plus one or more passengers. HOV lanes are marked in the same manner as bus lanes with regard to using longitudinal lines, a continuity line, and deflection arrows. Figure 4-95 provides an example of a typical HOV lane layout.

HOV lanes can take many forms depending on the level of usage and the design of the facility.

They can be Non-Barrier Separated or Barrier-Separated Facilities from the adjacent general-purpose lanes, or they can be directly adjacent to (contiguous with) the general-purpose lanes.

Longitudinal marking for Non-Barrier Separated Managed Lanes for HOV **shall** be used to delineate lanes as follows:

- Separation between managed lane and general-purpose lanes: No passing lines (L3-1) of between 150 and 200 mm width depending on available roadway width (see Figure 4-95). Prohibitory solid line (L4-1) 200 mm wide line may be used if there is not sufficient roadway width to provide two lines.
- Intermediate transition between managed lane and general-purpose lanes (800 to 1,000 m length): Broken white line (L2-1) 80 mm or 100 mm wide with 3 m line, 9 m gap. (See Figure 4-96).
- White continuity line (L4-1) at the beginning of the managed lane, 100 mm or preferably 200 mm wide, 1 m line, 3 m gap: Used in conjunction with white lane lines delineating the start of a managed lane to direct other traffic away from the lane.
- Application of retroreflective raised pavement markings **shall** be in accordance with guidelines set out in this Volume.

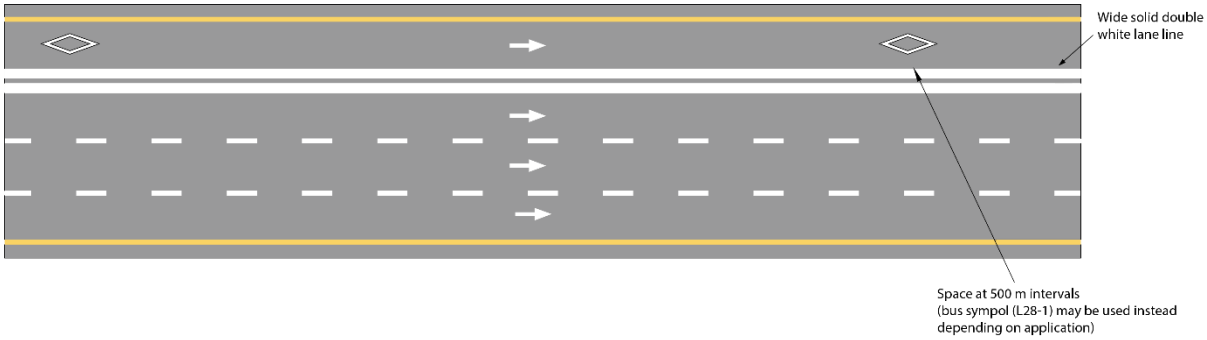


Figure 4-95 Separation Between High Occupancy (Managed) Lanes and General-Purpose Lanes

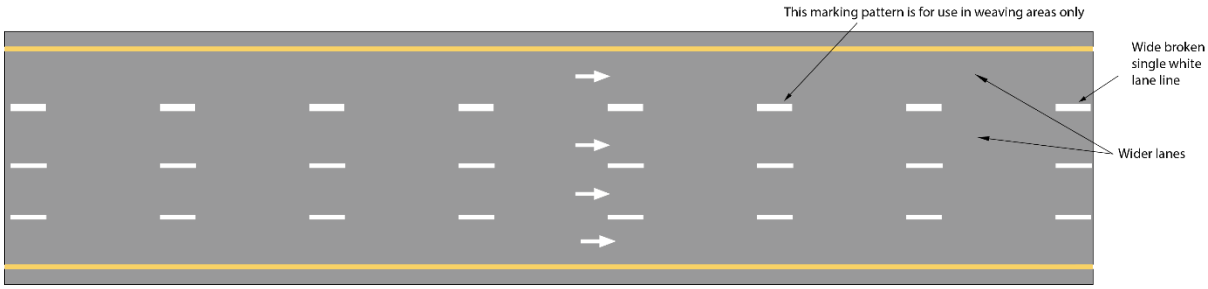


Figure 4-96 Intermediate Transition Between High Occupancy (Managed) Lane and General Purpose Lanes

For barrier-separated facilities, a combination of conventional longitudinal lines (unbroken for lane edges (L5-1), broken for lane line (L2-1)) and chevrons to protect barriers and wide buffers at slip ramp locations and elsewhere are to be provided as shown in Figure 4-97.

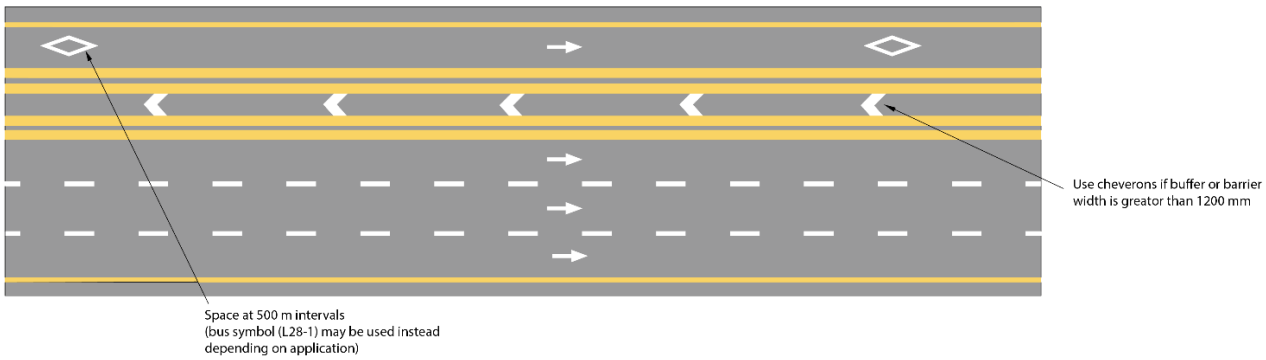


Figure 4-97 Longitudinal Markings for Barrier-Separated High Occupancy (Managed) Lanes

HOV symbol **shall** be marked on the road pavement in HOV lanes. Markings **shall** be white and elongated in the direction of traffic movement to improve their legibility. They **shall** be placed at 500 m intervals or closer depending on geometrics and visibility of the facility. Allowable symbol marking shown in Figure 4-98.

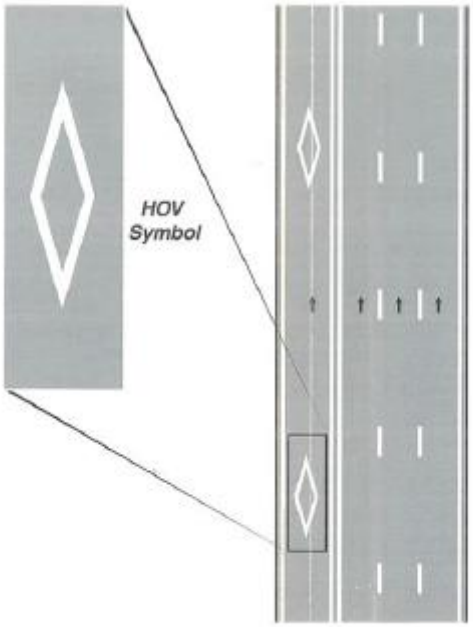


Figure 4-98 HOV Symbol Marking

4.6.8. Toll Lanes (L32-Series)

This section details the pavement markings used for toll roadways and plazas. Within this section, three specific toll roadway functions are designated: Electronic Toll Collection (ETC), High Occupancy Vehicle Toll (HOVT), and Open Road Tolling (ORT). Toll lanes may operate full-time (24 hours per day on all days), for extended periods of the day, part-time (restricted usage during specific hours on specified days), or on a variable basis (such as a strategy for a managed lane).

- Longitudinal pavement markings (Figure 4-97), as well as word and symbol pavement markings, associated with a toll lane **shall** end where the toll lane ends.
- Word and symbol pavement markings **shall** be white and **shall** be positioned in the center of the preferential lane.
- Where a toll lane exists adjacent to a general-purpose lane, the toll lane **shall** be marked with one or more of the following symbol or word markings (L32-1) and (L32-2) and (L32-3) for the preferential lane use specified as in Figure 4-99, Figure 4-100 and Figure 4-101 accordingly.

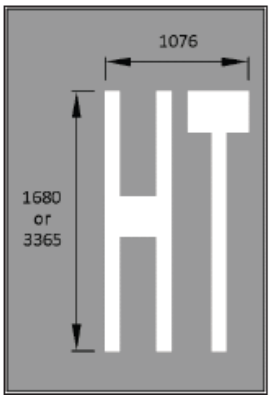


Figure 4-99 HT – High Occupancy Vehicle Toll Lane Marking (L32-1)

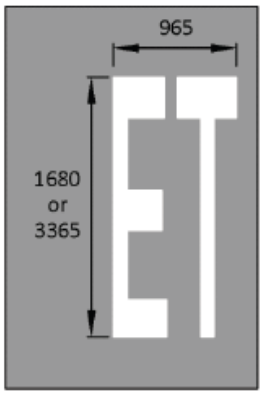


Figure 4-100 ET – Electronic Toll Collection Lane Marking (L32-2)

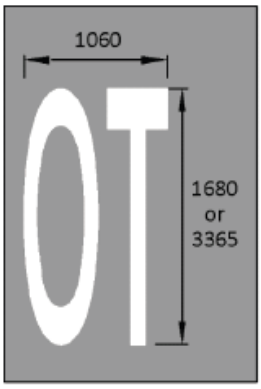


Figure 4-101 OT – Open Road Tolling Marking (L32-3)

- The length of the letters *Should* be not less than 1.68 m in urban areas, but on high-speed roadways and freeways, the letter length *Should* be 3.365 m.
- Word marking spacing of as little as 25 m may be used for city roadways, while a marking spacing of up to 300 m may be used for freeways. Word markings *Should* be placed at strategic locations such as major decision points, direct off-ramp departures, and at access openings to and from adjacent general-purpose lanes. If two or more lane specific uses or user-groups are permitted

in a single lane, the word marking for each preferential lane use **shall** be installed.

Toll lanes can take many forms depending on the level of usage and the design of the facility.

They can be non-barrier separated or barrier separated from the adjacent general-purpose lanes, or they can be directly adjacent to (contiguous with) the general-purpose lanes.

4.6.9. Toll Plazas Lanes

At toll plazas, pavement markings *Should* identify the proper lane(s) to use for each type of toll procedures, channelize movements into the proper lane(s), and delineate obstructions in the roadway.

When a lane on the approach to a toll plaza is restricted for use by vehicles with registered Electronic Toll (ET) collection accounts, the ET word marking and the longitudinal pavement markings **shall** be used. When one or more ORT lanes bypass a mainline toll plaza on a separate alignment, the appropriate word markings and longitudinal markings **shall** be used on the approach to the point where the ORT lanes diverge from the lanes destined for the mainline toll plaza.

Preferential lane-use symbol or word markings may be omitted at toll plazas where physical conditions preclude use of the markings.

If an ORT lane that is immediately adjacent to a mainline toll plaza is not separated from adjacent cash payment toll plaza lanes by a curb or barrier, then longitudinal pavement markings that prohibit lane changing *Should* be used to separate the ORT lane from the adjacent cash payment lane.

4.7. Delineators (L33-1)

Road delineators are light-retroreflective devices mounted in series at the side of the roadway to indicate roadway alignment. Delineators are effective aids for night driving and considered as guidance devices rather than warning devices. Delineators may be used on long, continuous sections of highway or through short stretches where there are changes in horizontal alignment, particularly where the alignment might be confusing or at pavement width transitions.

4.7.1. Design and Applications

- Delineators (L33-1) **shall** consist of reflector units capable of clearly reflecting light under normal atmospheric conditions from a distance of 300 m when illuminated by the upper beam of standard automobile lights.
- Double delineators consist of two reflector units, one mounted above the other. Elongated reflective units of appropriate size may be used in place of the two reflectors.
- Single delineators **shall** be provided on the right side of freeway/expressway roadways and on at least one side of interchange ramps. These delineators may be provided on other classes.
- The color of delineators **shall**, in all cases, conform to the yellow color of edge lines.

- Delineation is intended to be a guide to the vehicle operator as to the alignment of the highway. Whatever is needed to provide that guidance in a clear and simple way *Should* be installed.
- Single delineators may be provided on the left side of roadways and *should* be provided on the outside of curves on interchange ramps.
- Where median crossovers are provided for official or emergency use on divided highways and these crossovers are to be marked, a double yellow delineator *Should* be placed on the left side of the through roadway on the far side of the crossover for each roadway.
- The delineators *should* be used adjacent to the lane affected for the full length of the convergence and *should* be so placed and spaced to show the width reduction.
- On a highway with continuous delineation on either or both sides, delineators *Should* be carried through the transition and a closer spacing may be warranted.
- Red delineators may be used on the reverse side of any delineator whenever it would be viewed by a motorist traveling in the wrong direction on that particular ramp or roadway.
- Delineators of the appropriate color may be used to indicate the narrowing of a pavement.
- Delineation is optional on sections of roadway between interchanges where fixed source lighting is in operation.
- Delineation is not necessary for the traffic moving in the direction of a wider pavement or on the side of the roadway where the alignment is not affected by the convergence.

4.7.2. Delineator Placement and Spacing

- Delineators, if used, **shall** be mounted on suitable supports so the top of the reflecting head is about 1.20 m above the near roadway edge.
- Delineators **shall** be placed not less than 1.0 m or more than 2.0 m outside the outer edge of the *should*er, or if appropriate, in the line of the guardrail. Delineators may be mounted on the guardrail at a height less than 1.2 m.
- Delineators *Should* be placed at a constant distance from the edge of the roadway. However, where a guardrail or other obstruction intrudes into the space between the pavement edge and the extension of the line of delineators, the delineators *Should* be in line with or inside the innermost edge of the obstruction. Typical delineator installations are shown in Figure 4-102.
- Normally, delineators *Should* be spaced 60 m to 160 m. When normal uniform spacing is interrupted by driveways, crossroads, or similar interruptions delineators falling within such areas may be moved in either direction, a distance not exceeding one quarter of the normal spacing.
- Double or vertically elongated delineators *Should* be installed at 30 m intervals along acceleration and deceleration lanes.
- Spacing *Should* be adjusted on approaches and throughout horizontal curves so several delineators are always visible to the driver. Table 4-14 shows suggested maximum spacing for delineators at curves.

Table 4-14 Suggested Maximum Spacing for Highway Delineators on Curve

Radius of Curve (R) (meters)	Radius on Curve (S) (meters)
15	6
30	7.5
45	9
60	10.5
75	12
90	13.5
120	16.5
150	19.5
180	21
210	22.5
240	24
270	25.5
300	27
Spacing for radii not shown may be interpolated from the table. The minimum spacing **shall** be 6 m. The spacing of the first delineator on a tangent adjacent to a curve **shall** be 2 S, the second 3 S, and the third 6 S, but not to exceed 100 m.	

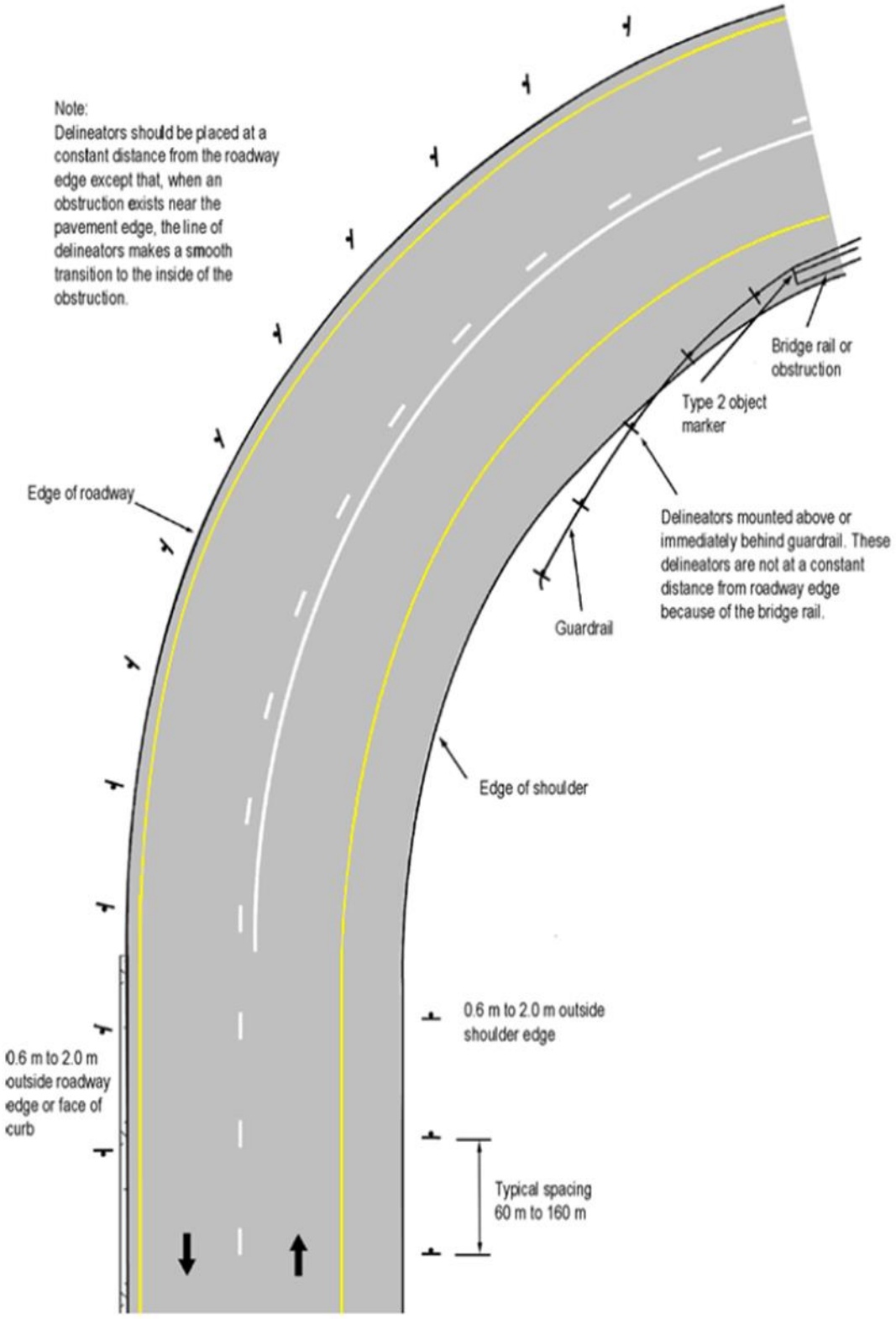


Figure 4-102 Typical Delineator Applications

4.8. Colored Pavements

Colored pavements consist of differently colored road paving materials, such as colored asphalt or concrete, or paint or other marking materials applied to the surface of a road or island to simulate a colored pavement.

- If colored pavement is used within the traveled way, on flush or raised islands, or on *should*ers to regulate, warn, or guide traffic or if retroreflective colored pavement is used, the colored pavement is considered to be a traffic control device and **shall** be limited to the following colors and applications:
    - Yellow pavement color **shall** be used only for flush or raised median islands separating traffic flows in opposite directions or for left-hand *should*ers of roadways of divided highways or one-way streets or ramps.
    - White pavement color **shall** be used for flush or raised channelizing islands where traffic passes on both sides in the same direction or for right-hand *should*ers.
- Colored pavements **shall** not be used as a traffic control device unless the device is applicable at all times. Colored pavements used as traffic control devices *Should* be used only where they contrast significantly with adjoining paved areas.
- Colored pavement located between crosswalk lines *Should* not use colors or patterns that degrade the contrast of white crosswalk lines, or that might be mistaken by road users as a traffic control application.
- If non-retroreflective colored pavement, including bricks and other types of patterned surfaces, is used as a purely aesthetic treatment and is not intended to communicate a regulatory, warning, or guidance message to road users, the colored pavement is not considered to be a traffic control device, even if it is located between the lines of a crosswalk.

4.9. Channelizing Devices for Pavement Markings

Traffic cones (L34-1) and tubular markers (L35-1) are sometimes used outside of construction and maintenance areas for general traffic control purposes (see Figure 4-103). Such uses include adding emphasis to channelizing lines or islands (see Section 4.3.4 for more details).

- These devices **shall** be a minimum of 450 mm in height and made of materials to withstand impact without damage to the devices or vehicles.
- Large size devices *should* be used wherever more conspicuous guidance is needed.
- The color of cones and tube markers used outside construction and maintenance areas **shall** be the same as the pavement marking these markers are supplementing or substituting.
- Channelizing devices *should* be kept clean and bright to maximize target value.
- For nighttime use, the markers **shall** be reflectorized.

More details are provided in Section 7.3 “Temporary Channelization and Devices”.

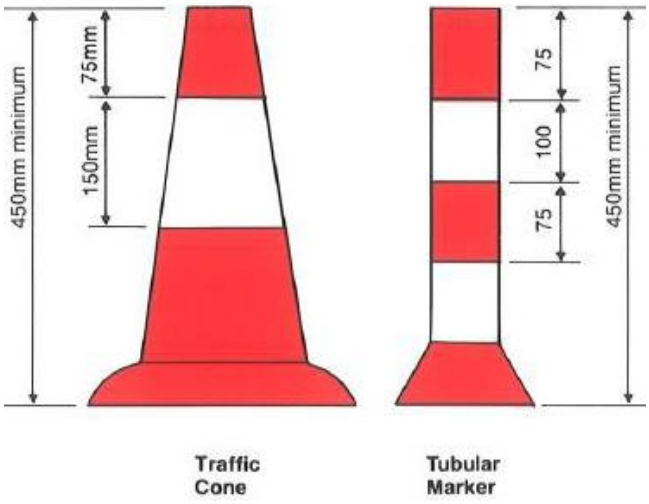


Figure 4-103 Channelizing Devices (L34-1 and L35-1)

4.10. Rumble Strip Markings (L36-Series)

4.10.1. Longitudinal Rumble Strip Markings

Longitudinal rumble strips (L36-1) consist of a series of rough-textured or slightly raised or depressed road surfaces intended to alert inattentive drivers through vibration and sound that their vehicle has left the travel lane. Shoulder rumble strips are typically installed along the shoulder near the travel lane. On divided highways, rumble strips are sometimes installed on the median side (left-hand side) shoulder (L36-1a) as well as on the outside (right-hand side) shoulder (L36-1b). On two-way roadways, rumble strips are sometimes installed along the center line (L36-1c).

Figure 4-104 through Figure 4-106 illustrates markings used with or near longitudinal rumble strips.

- An edge line or center line may be located over a longitudinal rumble strip to create a rumble stripe.
- An edge line **shall** not be used in addition to a rumble stripe that is located along a shoulder.

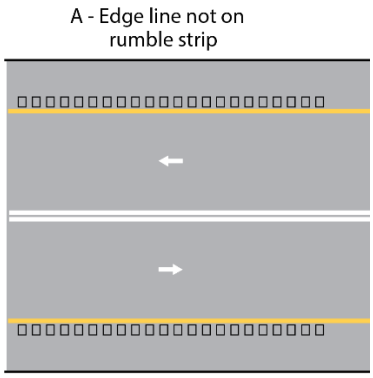


Figure 4-104 Edge Line not on Rumble Strips (L36-1a)

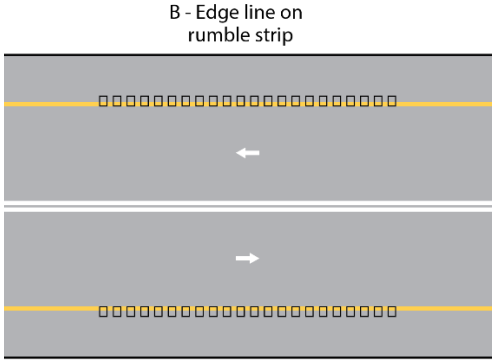


Figure 4-105 Edge Line on Rumble Strips (L36-1b)

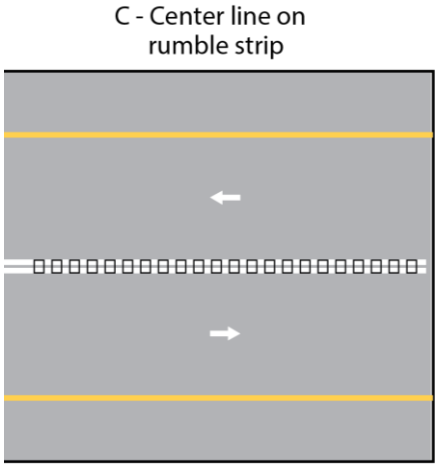


Figure 4-106 Center Line on Rumble Strips (L36-1c)

4.10.2. Transverse Rumble Strip Markings (L37-1)

Transverse rumble strips (L37-1, see Figure 4-107) may be used to warn drivers of the need to stop (e.g., at intersections, toll plazas), slow down, or change lanes; to warn drivers of a change

in roadway alignment, that they are leaving the travelled way; or of upcoming construction zones; or to warn drivers of wildlife crossings or other potentially unexpected conditions. Transverse rumble strips consist of intermittent, narrow, transverse areas of rough-textured or slightly raised surface that extend across the travel lanes and that, through noise and vibration, alert road users to specific features.

- Transverse rumble strips **shall** be used in conjunction with other standard traffic control devices and never as a stand-alone solution.
- Transverse rumble strips **shall** be formed of or topped with yellow thermoplastic material (for purposes of conspicuousness and to distinguish them from STOP line markings) built up at least 5 mm, but no more than 15 mm, above the roadway surface.
- The recommended basic rumble strip configuration consists of five transverse yellow markings 300 mm wide spaced such that, at prevailing traffic speeds, all five markings will be traversed during an approximately 1-second period.
- Transverse rumble strips used in a travel lane *Should* not be placed in locations where they might be confused with other transverse markings such as STOP lines or pedestrian crossing locations.
- Transverse rumble strips *Should* not be placed on sharp horizontal or vertical curves.
- Transverse rumble strips **shall** not be placed through pedestrian crossings or on bicycle routes.
- Transverse rumble strips *Should* be placed perpendicular to the direction of vehicular traffic and *should* not adversely affect overall roadway skid resistance under wet or dry conditions.
- The configuration and number of sets of five markings required for a specific site *Should* be dictated by the approach speed and the speed reduction required. Figure 4-108 illustrates a sequence of sets of marking spaced according to these principles.

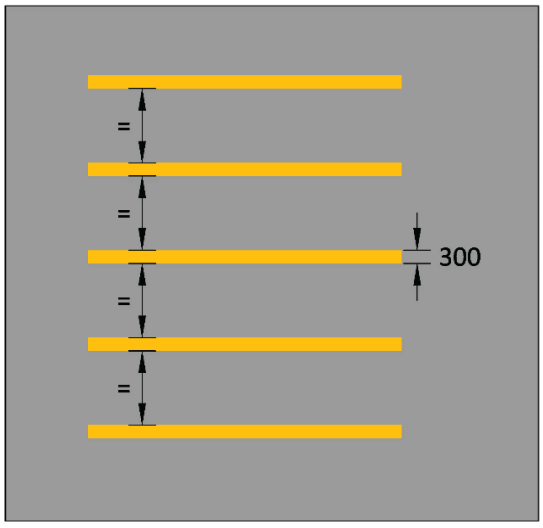


Figure 4-107 Transverse Rumble Strips (L37-1)

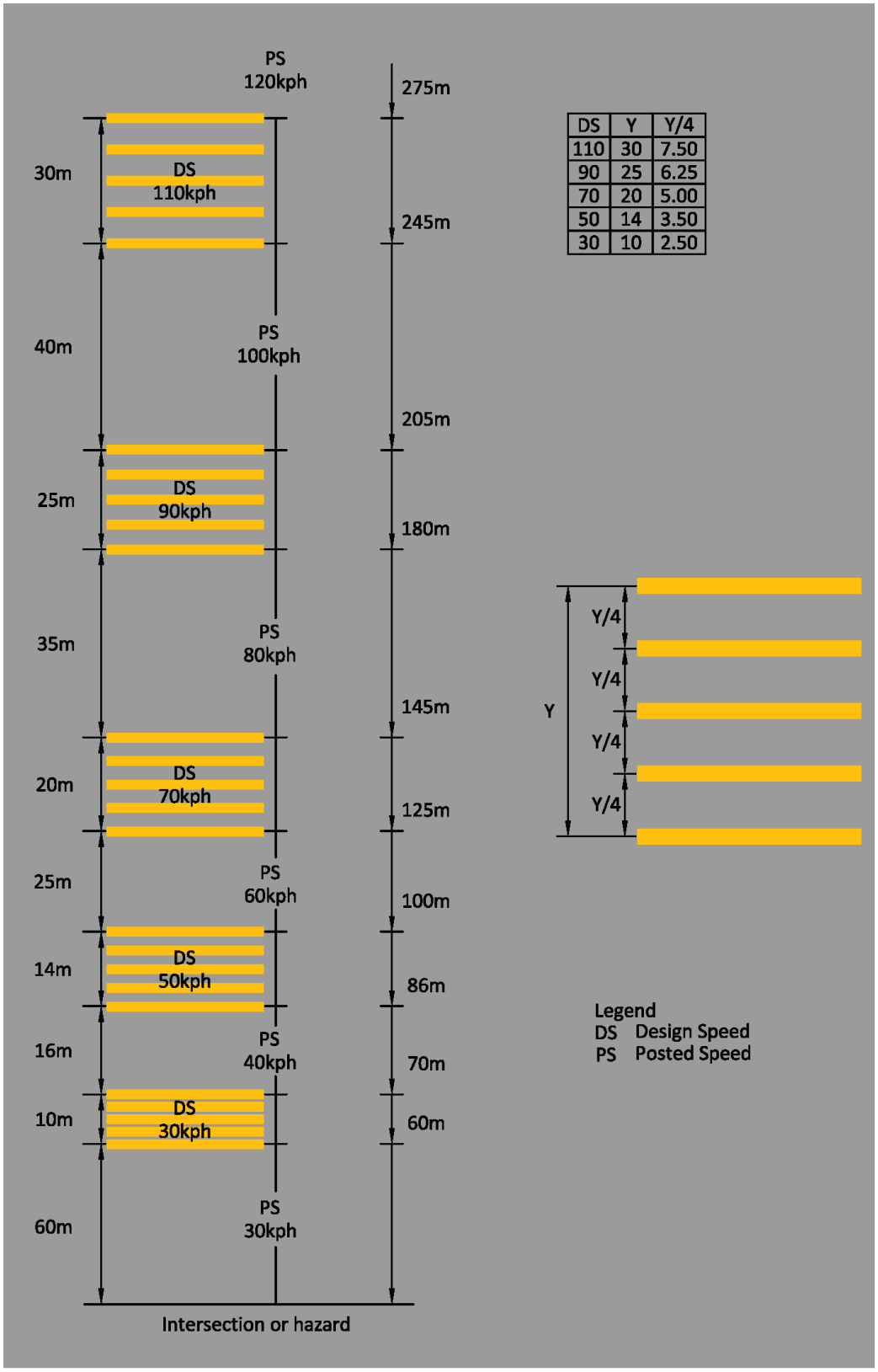


Figure 4-108 Sequence of Transverse Rumble Strips

5. Signals

5.1. General Guidelines

5.1.1. Introduction

A traffic control signal **shall** control traffic only at the intersection or midblock location at which it is placed. The terms, traffic signal and signal, are sometimes used redundantly for purposes of simplification to mean traffic control signal. The following standard types of traffic signal are covered in this Part:

- Traffic control signals (stop-and-go) including pedestrian signal indications.
- Beacons (flashers), but not barricade warning lights.

Traffic control signals **shall** not be installed unless one or more of the signal warrants in this Manual is met. These warrants **shall** be applied whether a pretimed or a traffic-actuated signal is being considered. If a decision is made to install a traffic control signal, future traffic needs *Should* be considered in its design and installation. Traffic studies of existing signalized intersections **shall** be undertaken at reasonable intervals. If a study indicates the warrant for existing traffic control signals are no longer met, the operation of these signals **shall** be discontinued.

5.1.2. Pretimed and Traffic-Actuated Signal Types

- Traffic control signals at a specific intersection may be either pretimed or traffic-actuated.
    - **Pretimed Signal**: is a type of traffic control signal in which the cycle, phasing, intervals, and indications are predetermined and do not vary. They are repeated until changed manually or by a control mechanism, such as a clock or master controller.
    - **Traffic-Actuated Signal**: is a type of traffic control signal in which the length of most intervals and the cycle, and in some the types of the sequence of phasing, are varied by the demands of traffic.
    - Both types of control may be included in a system composed of traffic signal controllers at several intersections whose operation is coordinated for efficient traffic flow. More guidance regarding "Traffic Signals Phasing and Timing" is provided in SHC 601 (Traffic Engineering).
- The critical features of the position, visibility, and permissible sequence of signal indications are the same for all types of traffic control signals.

5.1.3. Portable Traffic Control Signals

- Portable traffic control signal **shall** be used only when a signal is needed for a short time emergency situation or for a work zone. It **shall** be used only when an engineering study shows a signal is required. A portable traffic control signal **shall** not be used if a flagman or police officer can economically and safely direct traffic.
- Portable traffic control signal **shall** not be used at a school crossing. When used, a portable traffic control signal **shall** meet all of the physical, display, and operational

requirements in this Manual. Signal Ahead signs **shall** always be used on the approaches to a portable traffic control signal.

5.2. Signal Use Warrants

The need for traffic signals may be determined from the warrants set out below. The main objective of these warrants is to separate locations where traffic signals are likely to be effective or ineffective. Therefore, the satisfaction of criterion or warrant by itself **shall** not require the installation of a traffic control signal. An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location **shall** be performed to determine whether installation of a traffic control signal is justified at a particular location.

The investigation of the need for a traffic control signal **shall** include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, along with the applicable factors stated in the following traffic signal warrants.

5.2.1. Warrant 1 "Minimum Vehicular Volume"

- The "Minimum Vehicular Volume" signal warrant **shall** be applied according to 2 Conditions, as shown in Table 5-1:
    - Condition A, applicable at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.
    - Condition B, applicable at locations where Condition A is not satisfied and where the traffic volume on a "Major Street" is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the "Major Street".

Table 5-1 Warrant 1, Eight Hour Vehicle Volume

Condition A: Minimum Vehicular Volume *"Large Volume of Intersecting Traffic"*									
Number of Lanes for Moving Traffic (On Each Approach)		**Total Vehicles/ Hour (veh/h) on "Major Street" (Both Approaches)**				**Vehicles/ Hour (veh/h) on "Minor Street" Approach (One Direction Only)**			
Major Street	**Minor Street**	**100%** *[1]*	**80%** *[2]*	**70%** *[3]*	**56%** *[4]*	**100%** *[1]*	**80%** *[2]*	**70%** *[3]*	**56%** *[4]*
(1-Lane)	(1-Lane)	500	400	350	280	150	120	105	84
(1-Lane)	(2-Lanes)	500	480	350	280	200	160	140	112
(1-Lane)	> (2-Lanes)	500	480	350	280	200	160	140	112
(2-Lanes)	(1-Lane)	600	480	420	336	150	120	105	84
(2-Lanes)	(2-Lanes)	600	480	420	336	200	160	140	112
(2-Lanes)	> (2-Lanes)	600	480	420	336	200	160	140	112
> (2-Lanes)	(1-Lane)	600	480	420	336	150	120	105	84
> (2-Lanes)	(2-Lanes)	600	480	420	336	200	160	140	112
> (2-Lanes)	> (2-Lanes)	600	480	420	336	200	160	140	112
Condition B: Interruption of Continuous Traffic *"Excessive Delay or Conflict in Traffic"*									
Number of Lanes for Moving Traffic (On Each Approach)		**Total Vehicles/ Hour (veh/h) on "Major Street" (Both Approaches)**				**Vehicles/ Hour (veh/h) on "Minor Street" Approach (One Direction Only)**			
Major Street	**Minor Street**	**100%** *[1]*	**80%** *[2]*	**70%** *[3]*	**56%** *[4]*	**100%** *[1]*	**80%** *[2]*	**70%** *[3]*	**56%** *[4]*
(1-Lane)	(1-Lane)	750	600	525	420	75	60	53	42
(1-Lane)	(2-Lanes)	750	600	525	420	100	80	70	56
(1-Lane)	> (2-Lanes)	750	600	525	420	100	80	70	56
(2-Lanes)	(1-Lane)	900	720	630	504	75	60	53	42
(2-Lanes)	(2-Lanes)	900	720	630	504	100	80	70	56
(2-Lanes)	> (2-Lanes)	900	720	630	504	100	80	70	56

> (2-Lanes)	(1-Lane)	900	720	630	504	75	60	53	42
> (2-Lanes)	(2-Lanes)	900	720	630	504	100	80	70	56
> (2-Lanes)	> (2-Lanes)	900	720	630	504	100	80	70	56

Notes:	
[1]	Basic minimum hourly volume.
[2]	Used for combination of Conditions A and B after adequate trial of other remedial measures.
[3]	May be used when the ""Major Street"" speed exceeds 70 km/h or in an isolated community with a population of less than 10,000.
[4]	*May be used for combination of Conditions A and B after adequate trial of other remedial measures when the "Major Street" speed exceeds 70 km/h or in an isolated community with a population of less than 10,000.*

- Warrant 1 **shall** be treated as a single warrant. For instance, if Condition A is satisfied, then the criteria for Warrant 1 are satisfied and Condition B and the combination of Conditions A and B are not needed; similarly, if Condition B is satisfied, then the criteria for Warrant 1 are satisfied and the combination of Conditions A and B is not needed.
- The need for a traffic control signal **shall** be considered if an engineering study finds that one of the following cases exist for each of any "8 Hours of an Average Day":
    - The vehicles per hour given in both of "100 %" columns (Column [1]), for Condition A in Table 5-1, exist on the "Major Street" and the higher-volume "Minor Street" approaches, respectively; or
    - The vehicles per hour given in both of "100 %" columns (Column [1]), for Condition B in Table 5-1, exist on the ""Major Street"" and the higher-volume "Major Street" approaches, respectively, to the intersection.
- The need for a traffic control signal **shall** be considered if an engineering study finds that both of the following conditions exist for each of any "8 Hours of an Average Day":
    - The vehicles per hour given in both "80 %" columns (Column [2]), for Condition A in Table 5-1 exist on the ""Major Street"" and the higher-volume "Major Street" approaches, respectively; and
    - The vehicles per hour given in both "80 %" columns (Column [2]), for Condition B in Table 5-1 exist on the ""Major Street"" and the higher-volume "Major Street" approaches, respectively, to the intersection.
- In applying each condition, the ""Major Street"" and "Major Street" volumes **shall** be for the same 8 hours. On the "Minor Street", the higher volume **shall** not be required to be on the same approach during each of these 8 hours.
- These ""Major Street"" and "Major Street" volumes **shall** be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A **shall** not be required to be the same 8 hours satisfied in Condition B. On the "Minor Street", the higher volume **shall** not be required to be on the same approach during each of the 8 hours.
- The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied, and Condition B is not satisfied and *Should* be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

- If the posted or statutory speed limit or the 85th-percentile speed on the "Major Street" exceeds 70 km/h or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the "70 %" columns (Column [3]) in Table 5-1 may be used in place of the "100 %" columns (Column [1]).

5.2.2. Warrant 2 "Four-Hour Vehicular Volume"

- The "Four-Hour Vehicular Volume" signal warrant conditions **shall** be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.
- The need for a traffic control signal **shall** be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the "Major Street" (total of both approaches) and the corresponding vehicles per hour on the higher volume "Major Street" approach (one direction only) all fall above the applicable curve in Figure 5-1 for the existing combination of approach lanes. On the "Minor Street", the higher volume **shall** not be required to be on the same approach during each of these 4 hours.
- If the posted or statutory speed limit or the 85th-percentile speed on the "Major Street" exceeds 70 km/h or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 5-2 may be used in place of Figure 5-1.

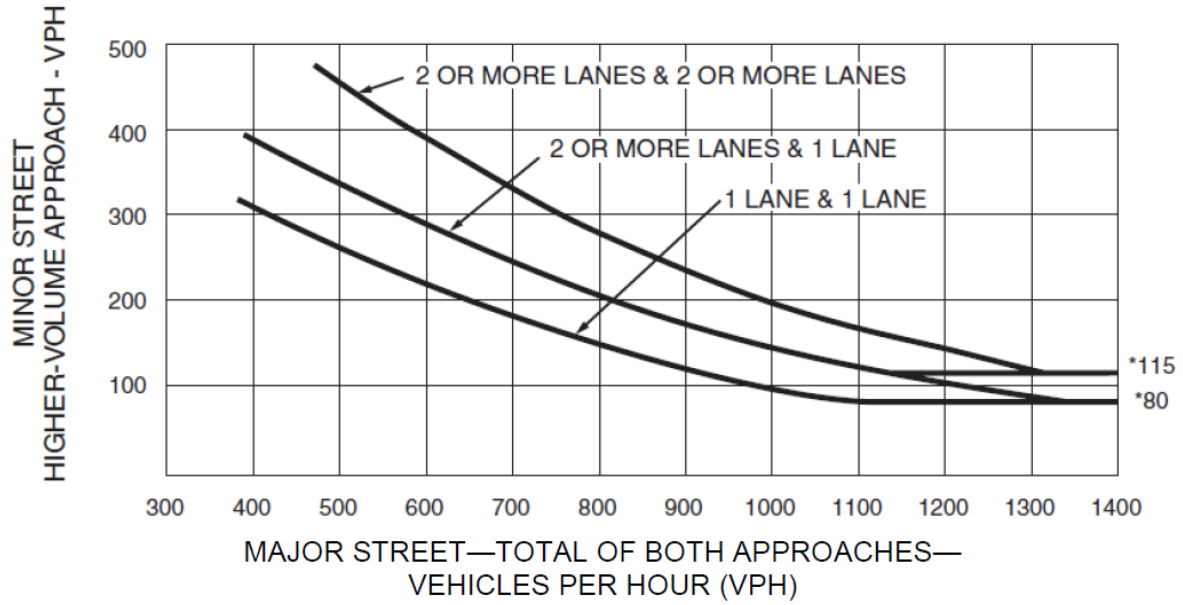


Figure 5-1 Warrant 2, Four-Hour Vehicular Volume

Notes on Figure 5-1:

- *115 vehicles per hour* applies *as the lower threshold volume for a "Minor Street" approach with two or more lanes.*

- *80 vehicles per hour applies as the* lower *threshold volume for a "Minor Street" approach with one lane.*

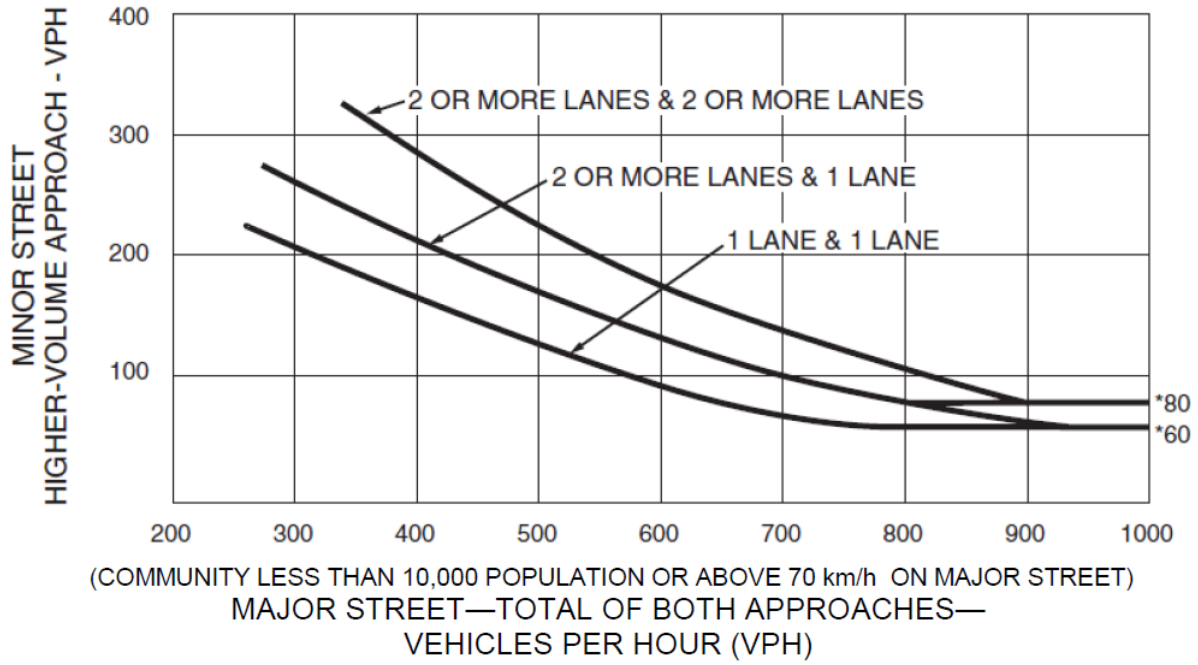


Figure 5-2 Warrant 2, Four-Hour Vehicular Volume (70-Percent Factor)

Notes on Figure 5-2*:*

- *80 vehicles per hour* applies *as the lower threshold volume for a "Major Street" approach with two or more lanes.*
- *60 vehicles per hour applies* as *the lower threshold volume for a "Major Street" approach with one lane.*

5.2.3. Warrant 3 "Peak Hour"

- The "Peak Hour" signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day the "Major Street" traffic suffers undue delay when entering or crossing the "Major Street".
- Warrant 3 **shall** be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.
- The need for a traffic control signal **shall** be considered if an engineering study finds that the criteria in either of the following two categories are met:
    - If all three of the following cases exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:
        - The total stopped time delay experienced by the traffic on one "Major Street" approach (one direction only) controlled by a STOP sign equals or exceeds "4 vehicle-hours" for a one-lane approach; or "5 vehicle-hours" for a two-lane approach, and

- The volume on the same "Major Street" approach (one direction only) equals or exceeds "100 vehicles per hour" for one moving lane of traffic or "150 vehicles per hour" for two moving lanes, and
- The total entering volume serviced during the hour equals or exceeds "650 vehicles per hour" for intersections with three approaches or "800 vehicles per hour" for intersections with four or more approaches.

- The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume "Major Street" approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 5-3 for the existing combination of approach lanes (Figure 5-4 shall be used for either major streets for speeds exceed 70 km/h or for communities with less than 10,000 inhabitants).

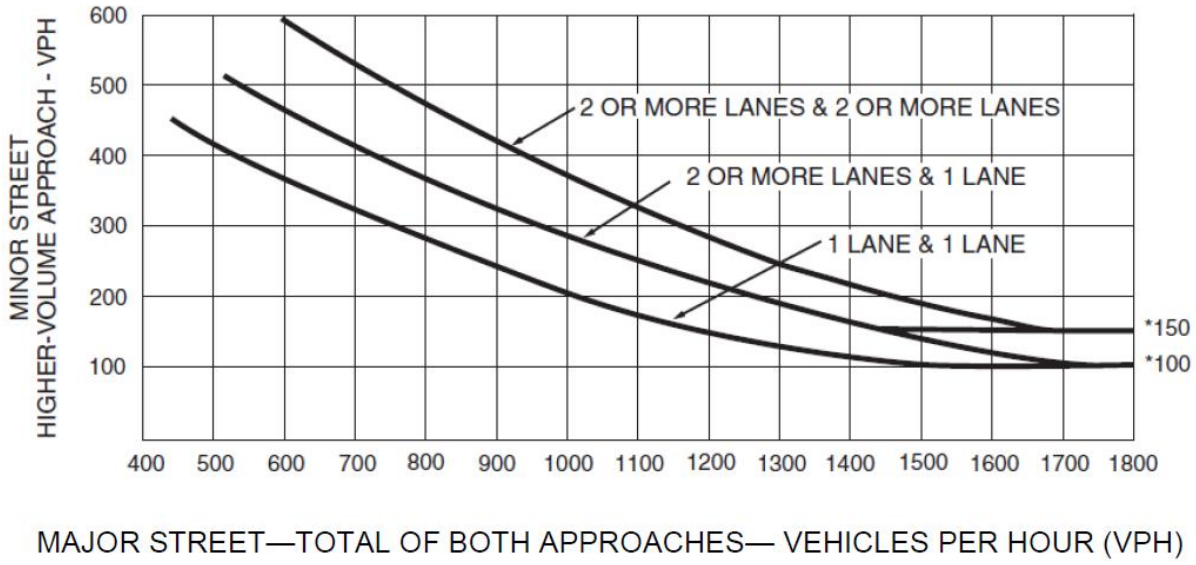


Figure 5-3 Warrant 3, Peak Hour

Note on Figure 5-3*:*

- *150 vehicles per hour* applies *as the lower threshold volume for a minor-street approach with two or more lanes and 100 vehicles per hour applies as the lower threshold volume for a minor-street approach with one lane.*

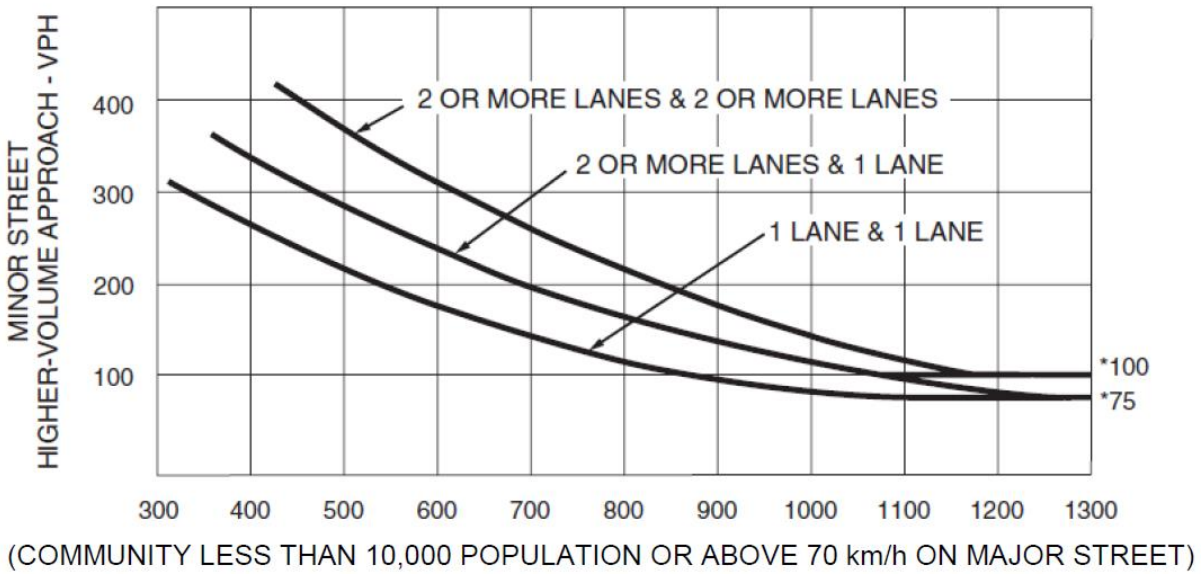


Figure 5-4 Warrant 3, Peak Hour (70-Percent Factor)

Note on Figure 5-4*:*

- *100 vehicles per hour* applies *as the lower threshold volume for a minor-street approach with two or more lanes and 75 vehicles per hour applies as the lower threshold volume for a minor-street approach with one lane.*

5.2.4. Warrant 4 "Pedestrian Volume"

- The "Pedestrian Volume" signal warrant is intended for application where the traffic volume on a "Major Street" is so heavy that pedestrians experience excessive delay in crossing the major street.
- The need for a traffic control signal at an intersection or midblock crossing **shall** be considered if an engineering study finds that one of the following conditions is met:
    - For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the "Major Street" (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the curve in Figure 5-5 and Figure 5-6.
    - For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on the "Major Street" (total of both approaches) and the corresponding pedestrians per hour crossing the "Major Street" (total of all crossings) falls above the curve in Figure 5-7.
- If the posted or statutory speed limit or the 85th-percentile speed on the "Major Street" exceeds 55 km/h, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 5-6 be used in place of Figure 5-5 to evaluate Condition (a) above, and Figure 5-8 may be used in place of Figure 5-7 evaluate Condition (b) above.
- Warrant 4 **shall** not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross is less

than 90 meters unless the proposed traffic control signal will not restrict the progressive movement of traffic.

- If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal **shall** be equipped with pedestrian signal heads.

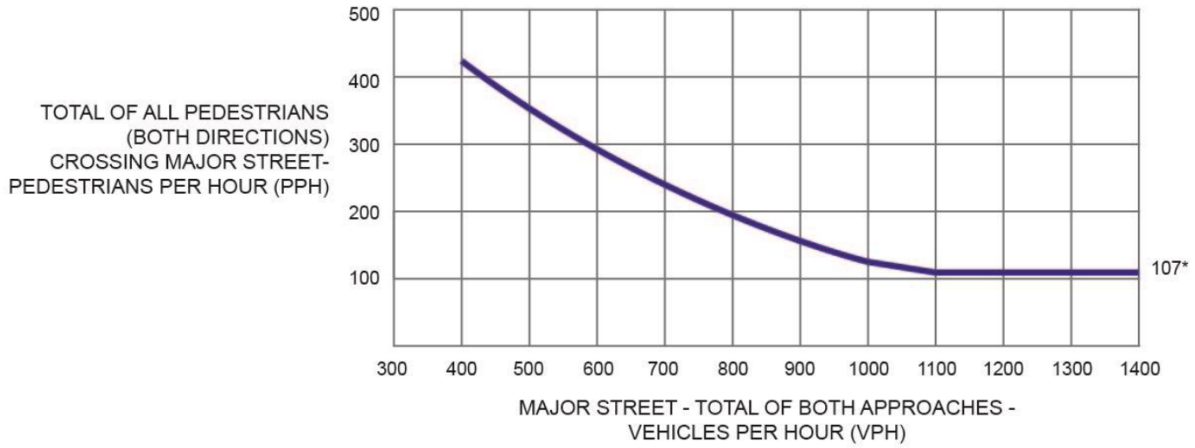


Figure 5-5 Warrant 4, Pedestrian Four-Hour Volume

Note on Figure 5-5*:*

- *107 pedestrians per hour applies as the lower threshold volume.*

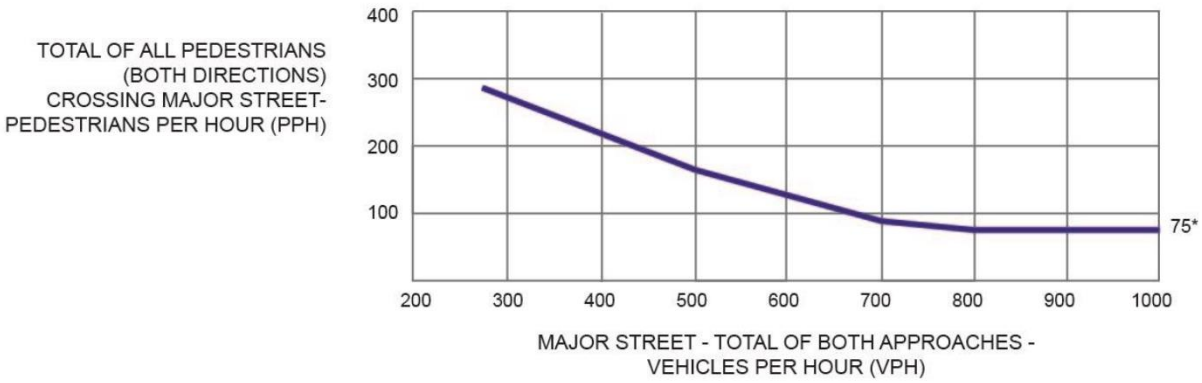


Figure 5-6 Warrant 4, Pedestrian Four-Hour Volume (70-Percent Factor)

Note on Figure 5-6*:*

- *75 pedestrians per hour* applies *as the lower threshold volume.*

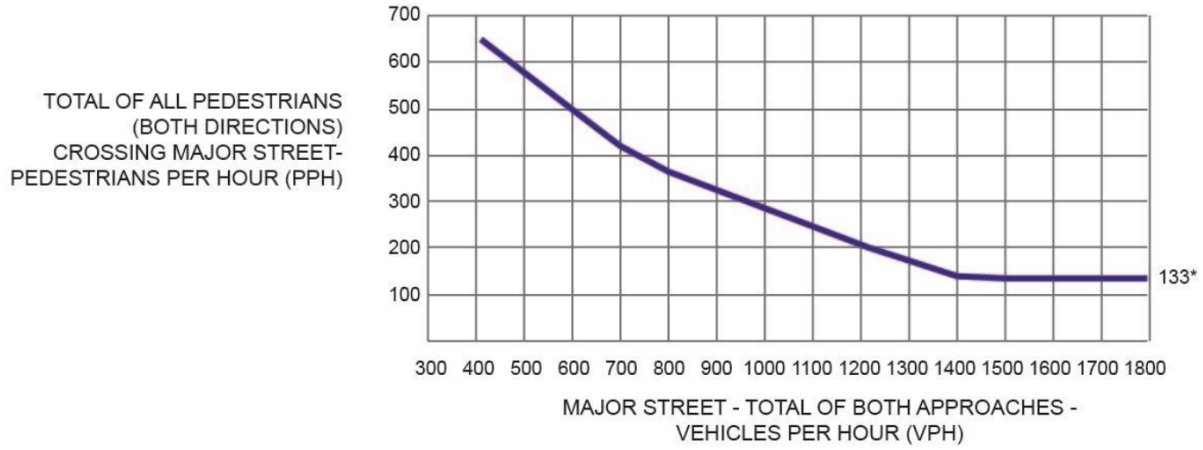


Figure 5-7 Warrant 4, Pedestrian Peak Hour

Note on Figure 5-7*:*

- *133 pedestrians per hour applies as the lower threshold volume.*

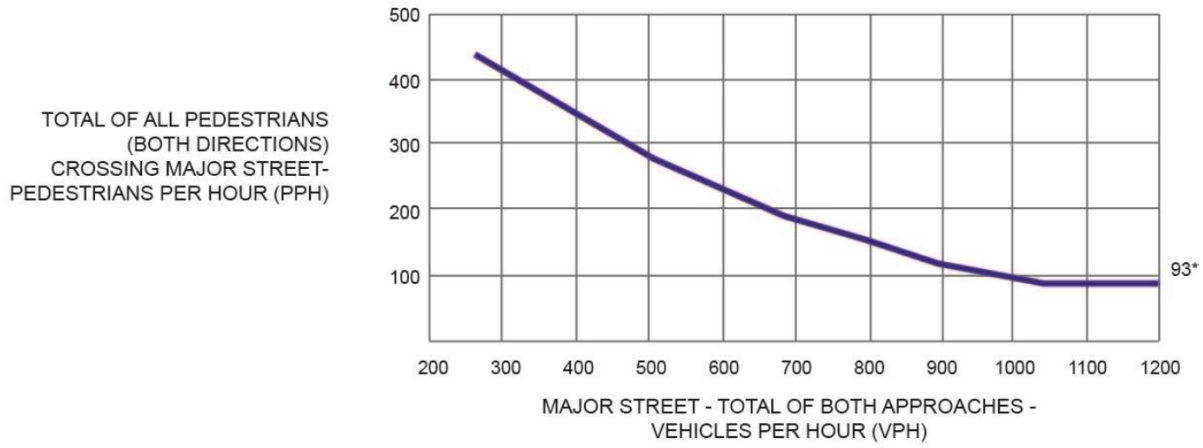


Figure 5-8 Warrant 4, Pedestrian Peak Hour (70-Percent Factor)

Note on Figure 5-8*:*

- *93 pedestrians per hour applies as the lower threshold volume.*

General Notes for Warrant 4:

- The criterion *for the pedestrian volume crossing the major street may be reduced as much as "50 %" if the 15th-percentile crossing speed of pedestrians is less than 1.2 m/s.*
- *A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street.*
- *If this warrant* is met and a traffic control signal is justified by an engineering study, then:

- If it is installed at an intersection or major driveway location, the traffic control signal *should* also control the "Major Street" or driveway traffic, *should* be traffic-actuated, and *should* include pedestrian detection.
- If it is installed at a non-intersection crossing, the traffic control signal *Should* be installed at least 30 m from side streets or driveways that are controlled by Stop or Yield signs and *should* be pedestrian actuated.
- If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces *Should* be over the travelled way for each approach, parking and other sight obstructions *Should* be prohibited for at least 30 m in advance of and at least 6 m beyond the crosswalk or site accommodations *Should* be made through curb extensions or other techniques to provide adequate sight distance, and the installation *Should* include suitable standard signs and pavement markings.
- If the traffic control signal installed within a signal system, the traffic control signal *Should* be coordinated with adjacent intersections and **shall** be connected to the central control system, if applicable.
- The criterion for the pedestrian volume crossing the "Major Street" may be reduced as much as "50 %" if the15th-percentile crossing speed of pedestrians is less than 1.2 m/s.

5.2.5. Warrant 5 "School Crossing"

- This "School Crossing" signal *warrant* **shall** be applied when the number of adequate gaps, for children wish to cross a street are needed between vehicles for the children to cross safely, is less than the number of minutes in the time period of the day during which children wish to cross. Generally, this period *Should* not be less than 15 minutes (min). However, adequate gaps may not occur frequently enough.
- When *traffic* control signals are installed where this criterion, but no other criterion is satisfied, the following actions are also required:
  - Pedestrian signal indications **shall** be designated for school children. Pedestrian signal indications may be provided for other crosswalks.
  - A school crossing signal at an intersection **shall** be fully traffic actuated. Signals in a progressive signal system may have pretimed control or, if traffic-actuated, **shall** be coordinated with the system.
  - At school crossings between intersections, the signal **shall** be pedestrian actuated. If within a progressive signal system, it **shall** be coordinated with that system. At such signalized locations, parking **shall** be prohibited for at least 30m in advance of the crosswalk and 10 m beyond the crosswalk.
  - A school crossing signal **shall** not be installed within 150 m of another traffic control signal and **shall** be located at least 30 m and preferably further from the nearest intersection.

5.2.6. Warrant 6 "Progressive Movement"

- The "Progressive Movement" signal *warrant* may be applied if traffic control signals are far apart, the vehicles within a group disperse and the signals do not regulate the speed of traffic. Thus, it may be desirable to install a traffic control signal at an intersection

between signals which are quite far apart. This will help to preserve the efficient grouping of vehicles and regulate vehicle speed. Progressive signal systems control the speed of traffic. A vehicle which is driven at a high rate of speed between signals would arrive at the second signal before the green indication is shown. When the indications of a traffic control signal change from red to green, the vehicles proceeding ahead on the green signal form a group. These vehicles usually stay in the group for 500 m or more. The movement of traffic groups through a progressive signal system is more efficient than random movement of individual vehicles through the system.

- The "Progressive Movement" *signal* warrant may be applied when all three conditions exist:
    - The adjacent signals are more than 800 m apart.
    - A traffic engineering study shows that vehicles do not remain in groups.
    - Vehicle speeds are considerably above safe speed.
- A traffic control signal **shall** normally not be installed if this criterion is satisfied when the resulting distance from that *traffic* signal to any adjacent signal would be less than 300 m.

5.2.7. Warrant 7 "Crash Experience"

- The "Cash Experience" signal warrant *may* be applied to reduce the number of certain types of crashes occurring at an intersection, although the signal will cause more delays to drivers. It may also cause an increase in other types of crashes. Crash studies have shown the installation of a traffic control signal will significantly reduce the number of right-angle collisions at an intersection. Right angle collisions are usually severe. A traffic control signal often will increase the number of rear-end collisions that are as a rule usually much less severe. Another type of crash which may be reduced by a traffic control signal is one involving pedestrians and vehicles.
- Warrant 7 may be *applied* when all the following conditions are met:
    - Adequate trial of alternatives with satisfactory observance and enforcement, such as improved signing, pavement markings and parking restrictions, has failed to reduce the crash frequency.
    - Five or more reported crashes of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash.
    - For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the "80 %" columns (Columns [2] of Condition A in Table 5-1 (see Section 5.2), or the vehicles per hour (vph) in both of the "80 %" columns (Columns [2]) of Condition B in Table 5-1 exists on the "Major Street" and the higher volume "Minor Street" approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than "80 %" of the requirements specified in Warrant 4, "Pedestrian Volume". These major streets and minor street volumes **shall** be for the same 8 hours. On the minor street, the higher volume **shall** not be required to be on the same approach during each of the 8 hours (h).

- If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the "56 %" columns (Column [4]) in Table 5-1 may be used in place of the "80 %" columns (Column [2]).

5.2.8. Warrant 8 "Roadway Network"

- Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.
- The need for a traffic control signal **shall** be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following conditions:
    - The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and/or a Sunday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday.
    - The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Friday or Saturday).
- A major route as used in this signal warrant **shall** have one or more of the following characteristics:
    - It is part of the street or highway system that serves as the principal roadway network for through traffic flow; or
    - It includes rural or suburban highways outside, entering, or traversing a city; or
    - It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.

5.2.9. Warrant 9 "Intersection near a Grade Crossing"

- This warrant may not be relevant in KSA at the current time since all heavy rail crossings in the future might be grade separated. Nevertheless, this warrant still applies to light rail at-grade crossings.
- The "Intersection Near a Grade Crossing" signal warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a Stop or Yield sign is the principal reason to consider installing a traffic control signal.
- If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, the grade crossing *Should* have automatic gates.
- The need for a traffic control signal **shall** be considered if an engineering study finds that both of the following conditions are met:
    - A grade crossing exists on an approach controlled by a Stop or Yield sign and the centre of the track nearest to the intersection is within 40 m of the stop line or yield line on the approach.

- During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in Figure 5-9 or Figure 5-10 for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance.

- If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, then:
  - The traffic control signal **shall** have actuation on the minor street; and
  - The grade crossing **shall** have flashing-light signals.
- This signal warrant *Should* be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing. Among the alternatives that *Should* be considered or tried are:
  - Providing additional pavement that would enable vehicles to clear the track or that would provide space for an evasive manoeuvre, or
  - Reassigning the stop controls at the intersection to make the approach across the track a non-stopping approach.
- The following considerations apply when plotting the traffic volume data on Figure 5-9 or Figure 5-10**.**
  - Figure 5-9 *Should* be used if there is only one lane approaching the intersection at the track crossing location and in Figure 5-10 *Should* be used if there are two or more lanes approaching the intersection at the track crossing location.
  - After determining the actual distance D, the curve for the distance D that is nearest to the actual distance D *Should* be used. For example, if the actual distance D is 29 m, the plotted point *Should* be compared to the curve for D = 27.50 m.

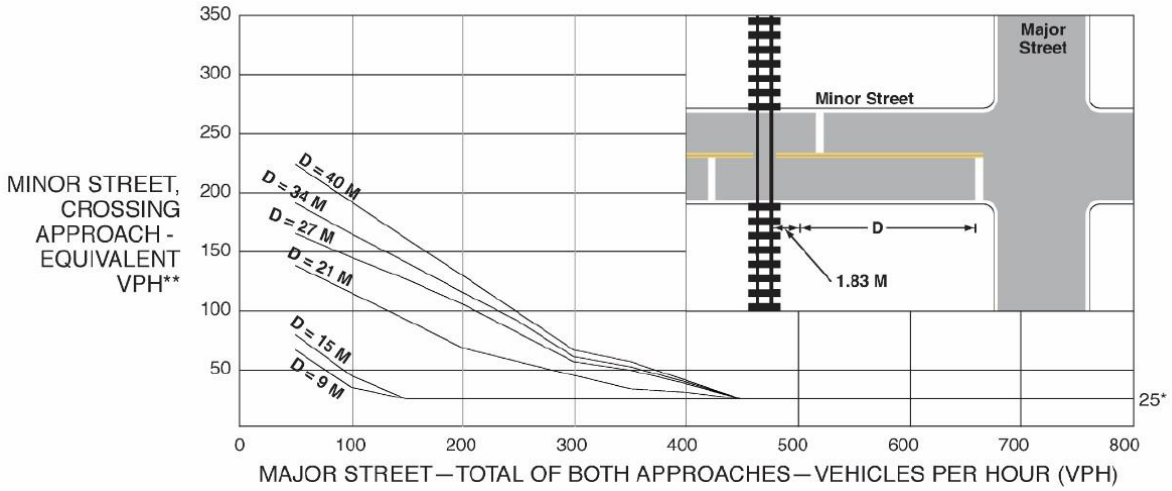


Figure 5-9 Warrant 9, Intersection Near a Grade Crossing (One Approach Lane at the Track Crossing)

Notes on Figure 5-9*:*

- *25 vehicles per hour* applies as the lower threshold volume.
- Vehicles per Hour (VPH) after *applying the adjustment factors in Tables 5-2, 5-3, and/or 5-4, if appropriate.*

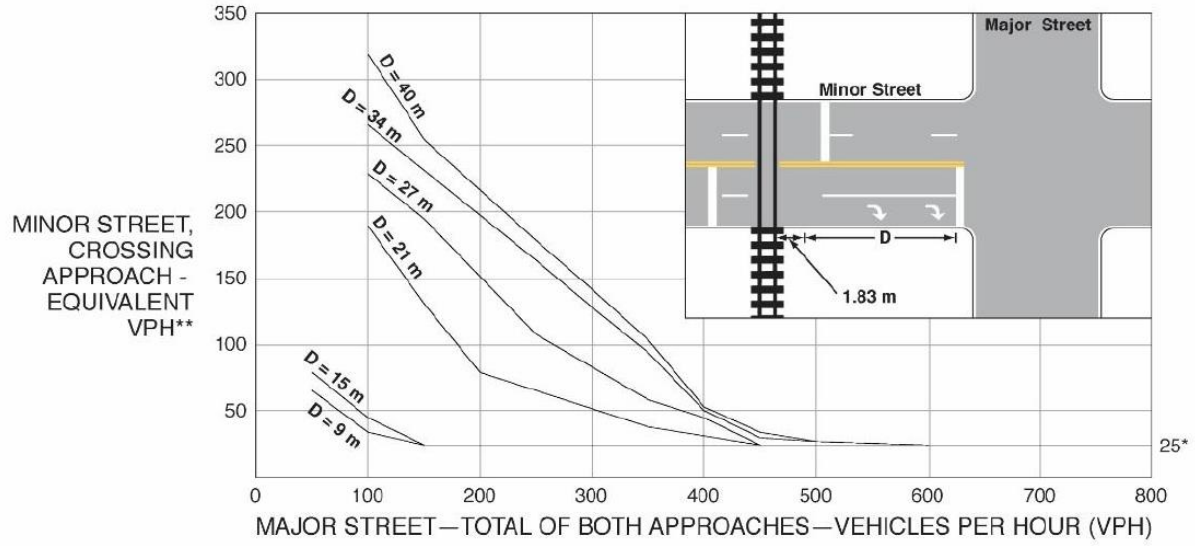


Figure 5-10 Warrant 9, Intersection near a Grade Crossing (Two or More Approach Lanes at the Track Crossing)

Notes on Figure 5-10*:*

- *25 vehicles per hour* applies as the lower threshold volume.
- Vehicles per Hour (VPH) after applying the adjustment factors in Tables 5-2, 5-3, and/or 5-4, if appropriate.

General Notes for Warrant 9:

- If the rail traffic arrival times are unknown, the highest traffic volume hour of the day *Should* be used. The minor-street approach volume may be multiplied by up to three adjustment factors as provided.
    - Because the curves are based on an average of four occurrences of rail traffic per day, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 5-2 for the appropriate number of occurrences of rail traffic per day.
    - Because the curves are based on typical vehicle occupancy, if at least "2 %" of the vehicles crossing the track are buses carrying at least 20 people, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 5-3 for the appropriate percentage of high-occupancy buses.
    - Because the curves are based on tractor-trailer trucks comprising "10 %" of the vehicles crossing the track, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 5-4 for the appropriate distance and percentage of tractor-trailer trucks.

Table 5-2 Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 5-3 Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

Percent of High-Occupancy Buses* on Minor-Street Approach	Adjustment Factor
0 %	1.00
2 %	1.09
4 %	1.19
6 % or more	1.32
Note: ** A high-occupancy bus is defined as a bus occupied by at least 20 people.*	

Table 5-4 Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

Percent of Tractor Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 21 meters	D of 21 meters or more
0 to 2.5 %	0.50	0.50
2.6 to 7.5 %	0.75	0.75

7.6 to 12.5 %	1.00	1.00
12.6 to 17.5 %	2.30	1.15
17.6 to 22.5 %	2.70	1.35
22.6 to 27.5 %	3.28	1.64
More than 27.5 %	4.18	2.09

5.2.10. Warrant 10 "Bicycle Crossing"

- Although the "Bicycle Signals" warrants are not universally adapted, safety for cyclists is cited as an important consideration for the installation of any type of traffic signal, specifically where *motorist* cross-traffic speed and/or volume is high enough to hinder cyclists crossing of an intersection. Maintaining the flow of bicycle traffic is another reason for the installation of a signal, particularly when the right of way of the cyclists needs to be emphasized.
- A "Bicycle Signal" *Should* be considered for use when the following volume and collision or volume and geometric warrants have been met. Suggested standards are noted below.
    - Volume:

      W = B x V; applies when W > 50,000 and B > 50.

        - W is the volume warrant.
        - B is the number of bicycles at the peak hour entering the intersection.
        - V is the number of vehicles at the peak hour entering the intersection.
        - B and V **shall** use the same peak hour.
    - Collision:
        - When 2 or more bicycle/vehicle collisions of types susceptible to correction by a bicycle signal have occurred over a 12-month period and the responsible public works official determines that a bicycle signal will reduce the number of collisions.
    - Geometric: Geometric factors to control the separation of conflicting movements between cyclists and motorists such as:
        - Where a separate bicycle / multi use path intersects a roadway.
        - When there is a bicycle-only approach to an intersection.
        - When there is a need to provide a leading interval for cyclists to increase their visibility and safety.

5.3. Selection of Traffic Control Signal

5.3.1. Pretimed, Traffic-Actuated, or Adaptive Control

- Pretimed traffic control signals are generally the most appropriate type for the following conditions:
    - A repeated, predictable traffic volume pattern.

- An intersection in the built-up area of a city or village.

- Unless an intersection is or will be in a coordinated signal system, traffic-actuated signals may be used in place of pretimed signals. Traffic-actuated signals are appropriate for the following conditions:
  - When the volume of traffic is low, changes frequently through the day, or is greater first on one approach and then on others.
  - When the side street vehicles arc numerous only during a few hours per day, and those are the only hours when considerable delay is experienced on the side street.
  - When only the pedestrian or crash criterion is used.
  - When the signal will be at an isolated location, that is 2 km from the nearest signalized intersection.
- Adaptive traffic control, that is, the adjustment of timings to reflect oncoming traffic conditions, may be considered if there is sufficient traffic detection available upstream of the intersection and if traffic volumes frequently adjust at different times of the day due to surges of demand and special events.

5.3.2. Pedestrian Actuation of Traffic Control Signals

- Pedestrian detectors (usually pushbutton switches at the ends of crosswalks) **shall** be installed with a traffic-actuated traffic control signal when pedestrians would have to wait for an unreasonable length of time for a vehicle actuation to give them an opportunity to cross.
- Pedestrian detectors **shall** be installed with a traffic-actuated traffic control signal if pedestrians would not have sufficient time to cross the intersection during a green signal indication for vehicles.

5.4. Traffic Control Signal Indications

5.4.1. Meaning of Vehicular Traffic Control Signal Indications

- Green traffic signal indications **shall** have the following meanings:
  - Traffic, except pedestrians, facing a green disk indication may proceed straight through an intersection or turn right or left. However, signs, pavement markings, or roadway design may prohibit or prevent one or more of those movements. Drivers **shall** yield the right of-way to vehicles and pedestrians already lawfully within the intersection or adjacent crosswalk.
  - Traffic, except pedestrians, facing a green arrow indication, shown alone or in combination with another indication, may cautiously enter the intersection only to make the movement specified by the arrow or by the other indication. Drivers **shall** yield the right-of-way to vehicles and pedestrians already lawfully within the intersection or adjacent crosswalk.
  - Pedestrians facing a green disk indication may proceed across the roadway within the crosswalk, unless prohibited from doing so by a pedestrian signal.
- Amber traffic signal indications **shall** have the following meanings:

- Traffic, except pedestrians, facing a steady amber disk or amber arrow indication is warned that the movement which had been allowed by the corresponding green indication is being terminated.
- A steady amber disk or amber arrow indication tells pedestrians that there is no longer sufficient time to cross the roadway before a red indication is shown.
- A flashing amber disk indication is a warning to drivers to proceed through an intersection or past the flashing traffic signal with caution. This indication may also be used to call the attention of drivers and pedestrians to warning or regulatory signs except for the stop, yield sign and no entry signs.

- Red traffic signal indications **shall** have the following meanings:
  - Traffic, except pedestrians, facing a steady red disk or red arrow indication **shall** stop at the marked stop line before entering the intersection. Traffic **shall** remain standing until an indication to proceed is shown, except as otherwise provided for. If a marked stop line does not exist, the stop **shall** be made before entering the crosswalk. If a marked crosswalk does not exist, the stop **shall** be made before entering the intersection.
  - Pedestrians facing a steady red disk indication alone **shall** not enter the roadway unless permitted to do so by a pedestrian indication.
  - Drivers of vehicles approaching a flashing red disk indication **shall** stop at the marked stop line. The right to proceed **shall** be governed by rules applicable after making a stop at a Stop sign. If a marked stop line does not exist, the stop **shall** be made before entering the crosswalk. If a marked crosswalk does not exist, the stop **shall** be made before entering the intersection.

5.4.2. Use of Non-Flashing Indications

- A Red Disk indication is used as follows:
  - It **shall** be shown when it is intended to prohibit traffic, except pedestrians directed by a pedestrian signal, from entering an intersection or other controlled area. A pedestrian crossing between intersections is an example of such a controlled area.
  - It **shall** not be shown with a right or left green arrow indication, which is the only other illuminated indication in that face (except as provided in Section 5.3.2 4a). It **shall** not be shown with the right or left amber arrow change indication, which follows a green arrow indication shown alone.
  - it **shall** be shown with a right or left green arrow indication when traffic is allowed to turn but is not allowed to proceed straight ahead. It **shall** also be displayed with the amber arrow indication, which follows the green arrow indication in this case.
- An amber disk indication is used as follows:
  - It **shall** be shown when it is necessary to inform approaching traffic the right-of-way is about to change, except when an amber arrow indication is required.
  - It **shall** be used rather than the amber arrow indication following a green arrow indication shown alone, when the indications are visible only to traffic which these signals control.
- A green disk indication is used as follows:

- It **shall** be shown only when traffic facing the signal is permitted to proceed in any direction which is lawful and practicable. However, this restriction may be modified by signs prohibiting specific movements, usually at stated times.
- It **shall** not be shown at the same time to two traffic movements whose paths would cross or otherwise conflict.

5.4.3. Use of Arrow Indications

- Amber arrow and green arrow indications **shall** normally be used in the following locations:
  - At an intersection with a one-way street.
    - Where some movements are prohibited or are physically impossible.
    - Where there is a separate, sheltered Jane intended only for a specific traffic movement.
    - Where some of the vehicular movements on an approach do not begin or end at the same time as other vehicular movements. This rule applies only when signal indications for turning vehicles are visible to other traffic on that approach. A red arrow indication may also be used.
    - An amber arrow indication **shall** be used only to show a change in the right-of-way granted by a green arrow indication. This is required when the indications are visible to all traffic on the approach. When green arrow and green disk indications terminate at the same time, only an amber disk indication **shall** be shown.
  - An amber arrow indication **shall** not be displayed when any conflicting movement has a green or yellow indication.
  - A green arrow indication **shall** be displayed only when the path of the vehicles proceeding in the direction of the arrow:
    - Does not conflict with the path of other vehicles moving lawfully in response to other green or yellow signal indications; and
    - Does not cross a crosswalk to which pedestrian Walk indications are being shown at the same time.
  - Typical Arrow Indication format (see Figure 5-11).

5.4.4. Prohibited Combinations of Traffic Signal Indications

- The following combinations of traffic signal indications **shall** not be shown simultaneously on any one signal face:
  - Green disk with amber disk.
  - Straight-through green arrow with red disk.
  - Red disk with amber disk.
  - Green disk with red disk.
- The above combinations **shall** not be simultaneously displayed on different signal faces on any one approach, unless the following are true:
  - One of the signal faces controls only traffic in a lane intended only for turning vehicles and is identified as a left or right turn signal, or
  - One of the signal faces controls only the traffic in a lane intended only for turning vehicles, and:

        - The indications on that signal face are only a red disk (or a red arrow), amber arrow and green arrow, and
        - At least the red disk indication is visible only to traffic it controls.
    - Or, as an alternative to the above two cases, the signal indications are screened, covered, louvered, positioned, or designed so the combination of indications is not confusing to approaching drivers.
- None of these traffic signal indications **shall** be used:
    - A straight-through amber arrow.
    - More than two arrow indications illuminated at the same time.
    - The combination of an amber disk indication and an amber arrow indication normally **shall** not be shown. Where possible, only the amber disk **shall** be shown except in those unusual situations where elimination of the amber arrow causes traffic signal controller design and operating problems.
    - 200 mm red disk indication in the same signal face with 300 mm amber disk or green disk indications.

5.4.5. Indications That May Follow Other Indications

- Each color, type, and combination of steady (non-flashing) traffic control signal indication in any one signal face may only be followed by the showing of an approved steady "following" display. The approved "following" displays are listed in Table 5-5 for normal operation. Additional "following" displays allowed when the signal is preempted by an emergency vehicle or a train are shown in Table 5-6. No other "following" displays may be used.
- Traffic control signals at intersections near railroad crossings are normally connected electrically to the warning signals for the crossing. The approach of a train preempts the traffic control signal from its normal operation. Equipment is also available to permit emergency vehicles (fire, police, and ambulance) to preempt the operation of traffic control signals.
- Any change in the operation of the traffic control signal to clear the tracks or the intersection must take place promptly. To accomplish this, signal indications may be followed by indications which would not normally succeed them. However, these succeeding indications **shall** not result in conflict between vehicles moving legally in accordance with any green or yellow indication.

5.4.6. Use of Flashing Indications

- The following requirements apply when a traffic control signal is put on flashing operation by a time clock or other automatic mechanism:
    - The signal indications **shall** be either flashing red disks on all approaches, or flashing amber disks on the “major street” approaches and flashing red disks on the “minor street” approaches.
    - Flashing yellow indications **shall** never be shown to all approaches.
    - Amber arrow indications **shall** never be flashed. If a traffic control signal with a signal face having an amber arrow indication must be flashed, the face **shall** also have an amber disk indication. Only the amber disk indication **shall** be

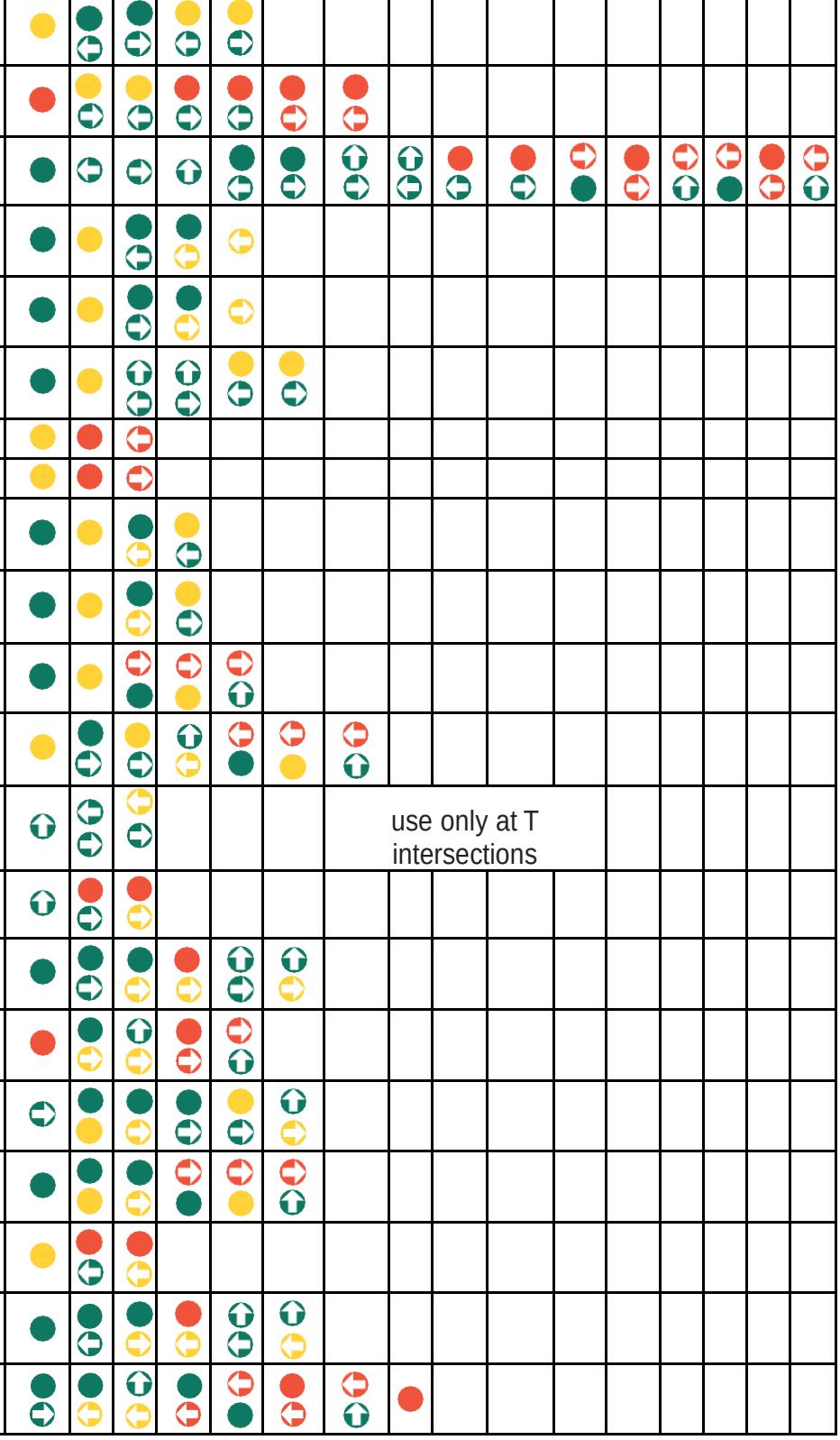
flashed in that signal face when the traffic control signal is put on flashing operation.

- A green disk, green arrow, or flashing amber disk indication **shall** normally be followed by a steady amber disk indication. That indication **shall** then be followed by a steady or flashing red disk indication.
- However, when a traffic control signal is being changed to flashing operation, a green disk or green arrow indication may be followed by a flashing amber disk indication.
- All signal faces on an approach **shall** flash the same color of circular indication. However, the red disk or red arrow indication in a left turn signal face may be flashed rather than the amber disk. This is allowed when the red indication is screened, louvered, positioned or designed so through traffic will not be confused by the flashing indication from the left turn signal face. The flashing yellow signal indications for through traffic may be visible to drivers in the left turn lane.

- When flashing operation is commenced by the "emergency flash" manual switch in the traffic signal controller cabinet, the indications **shall** immediately change to one of the following preselected flashing conditions:
  - Red on all signal faces; or
  - Red on the “Minor Street” and yellow on the “Major Street”.

Figure 5-11 Typical Arrow Indications

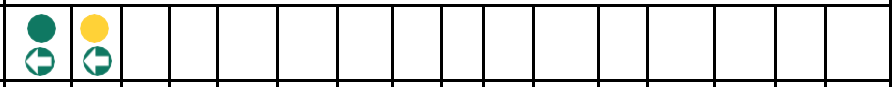
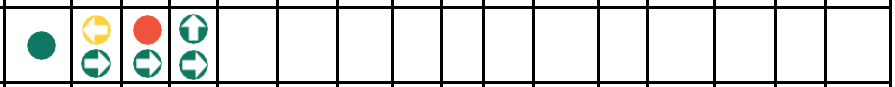
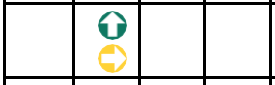
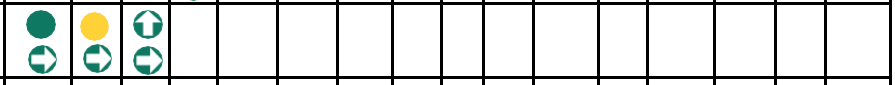
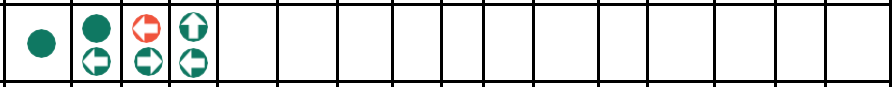
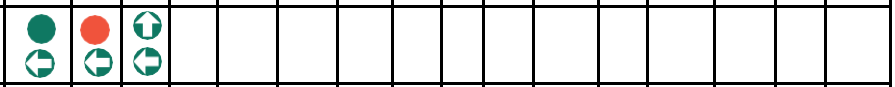
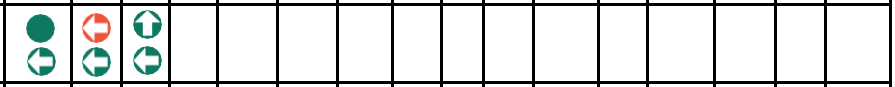
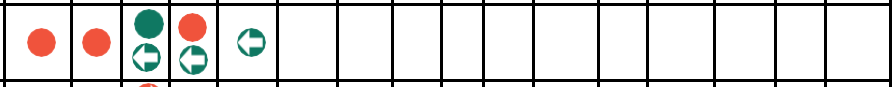
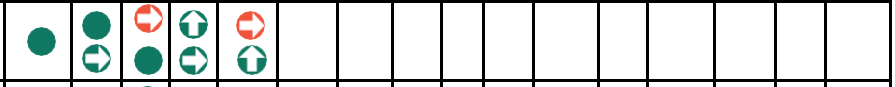
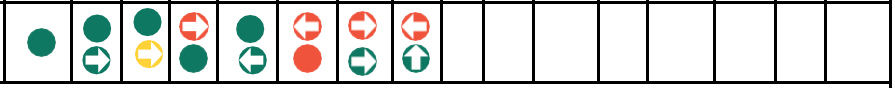
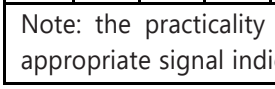
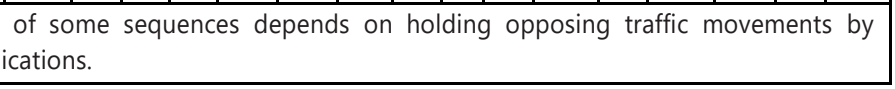
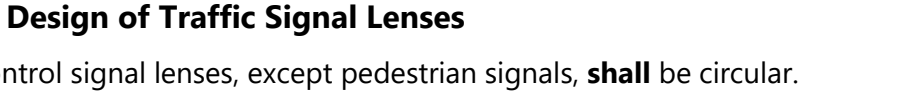
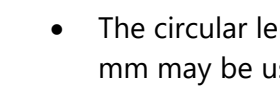
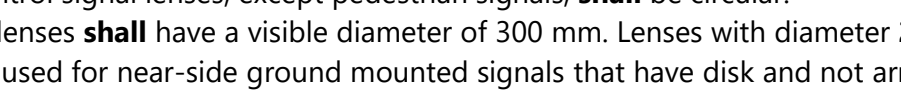
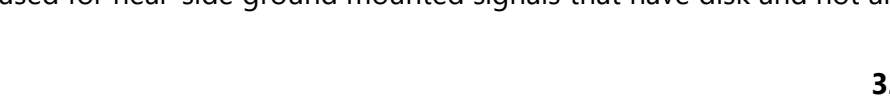
Table 5-5 Permissible Sequential Traffic Control Signal Indications

Existing Indication Or Indications	Permissible Following Indication In the Same Signal Face
	

use only at T intersections

Existing Indication Or Indications	Permissible Following Indication In the Same Signal Face															

Table 5-6 Additional Permissible Sequential Traffic Control Signal Indications During Signal Preemption Phase

Existing Indication or Indications	Permissible Following Indication In the Same Signal Face
	None
	None
	None
	
	
	
	
	
	
	
	
	
	
	
	
	
Note: the practicality of some sequences depends on holding opposing traffic movements by appropriate signal indications.	

5.5. Vehicular Traffic Control Signal Indications

5.5.1. Size and Design of Traffic Signal Lenses

- All traffic control signal lenses, except pedestrian signals, **shall** be circular.
- The circular lenses **shall** have a visible diameter of 300 mm. Lenses with diameter 200 mm may be used for near-side ground mounted signals that have disk and not arrow

displays. Lenses with 100 mm diameter **shall** be used as an auxiliary signal to provide a clear view for the drivers to the traffic signal at the intersection.

- The lenses **shall** be red, amber, or green in color.
- The 300 mm lenses may utilize Light-Emitting Diode (LED) displays instead of incandescent bulbs, for the purposes of reduced energy usage and improved visibility, provided drivers can see the lights at an adequate viewing angle.
- Arrow indications **shall** be pointed vertically upward to show a straight through movement.
- Arrow indications **shall** be pointed horizontally to indicate a turn at approximately a right angle (i.e. 90 degrees).
- When the angle of the turn is substantially different from a right angle, the arrow **shall** be pointed at an angle which will approximately equal that of the turn.
- Each arrow lens **shall** show only one arrow direction. The arrow indication **shall** be the only illuminated part of the lens which is visible.
- In no case **shall** letters, numbers, or symbols be displayed as part of a vehicular traffic control signal indication.
- More guidance regarding "Traffic Signals Design" is provided in SHC 306 (Highway Facilities and Utilities Design – Public Utilities, Highway and Street Lighting, Control and Monitoring Devices) and SHC 601 (Traffic Engineering).
- More details regarding installation and technical specifications of traffic control signal equipment, is provided in SHC 403 (Construction of Highway Facilities).

5.5.2. Number and Arrangement of Indications in Signal Face

- The indications in each traffic control signal face **shall** be arranged in either a vertical or a horizontal straight line.
- The only permissible exception is that in a vertical arrangement, indications of the same color may occasionally be located horizontally adjacent to each other. This is only permissible where space is not available for a normal vertical arrangement.
- Not more than two identical indications or three different indications of the same color may be grouped together in this manner.
- No more than 5 total indications **shall** be shown per signal head.
- The relative positions of indications within a signal face **shall** be as follows:
    - In a vertical signal face from top to bottom:
        - Red disk.
        - Left turn red arrow.
        - Right turn red arrow.
        - Amber disk. Green disk.
        - Straight through green arrow. Left turn amber arrow.
        - Left turn green arrow. Right turn amber arrow.
        - Right turn green arrow.
    - In a horizontal signal face from left to right:
        - Red disk.
        - Left turn red arrow. Right turn red arrow. Amber disk.
        - Left turn amber arrow. Left turn green arrow. Green disk.
        - Straight through green arrow.
        - Right turn amber arrow.

        - Right turn green arrow.
- The red disk indication **shall** always be at the top of a vertical signal arrangement and at the left side of a horizontal arrangement.
- When used, an amber disk indication **shall** always be located between the red indications and all other indications.
- Each signal face **shall** have at least three indications but not more than five, with the following exceptions:
    - A single Green Arrow indication **shall** be used alone to permit a continuous movement.
    - Pedestrian signal faces, which have two indications.
- One or more indications in a signal face may be repeated for safety or increased effectiveness. For instance, two red indications may be placed in adjacent vertical or horizontal locations in a signal face with three other indications.
- Either horizontally or vertically arranged signal faces, or both arrangements, may be used on the same intersection approach.
- Some of the most commonly used permissible arrangements of indications in traffic signal faces are shown in Figure 5-12.

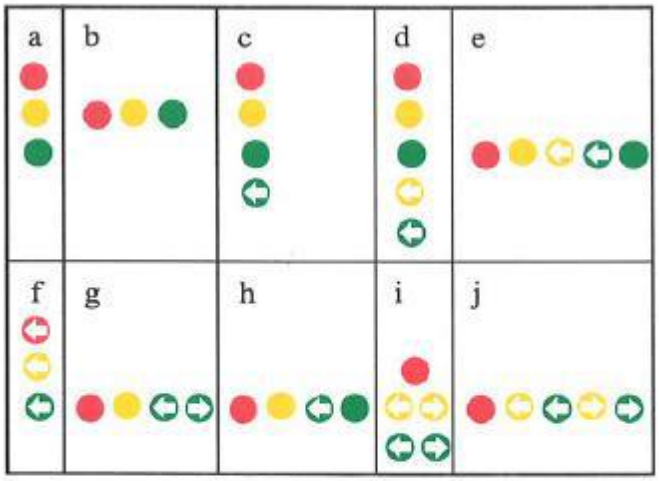


Figure 5-12 Typical Permissible Traffic Signal Indication Arrangements

Note on Figure 5-12: The arrow indications in this illustration could not be shown correctly because of printing difficulties. Refer to Figure 5-11 for correct arrow format.

5.5.3. Illumination of Traffic Control Signal Lenses

- Each traffic signal lens **shall** be illuminated separately.
- An unobstructed, illuminated vehicular traffic control signal indication **shall** be sufficiently bright to be clearly visible for a distance of at least 400 m under normal atmospheric conditions.
- Traffic control signal lenses with a diameter of 300 mm which have 1,750 lumen lamps may have to be flashed at night. If so, a dimming device **shall** be used to proportionally reduce the light output of the indication.

- The output **shall** decrease in proportion to the decrease in ambient light to a minimum of not less than "30 %" or more than "50 %" of the light output at full rated voltage when the ambient light has decreased to its lowest level.
- Except in urban areas with bright surroundings and on high-speed rural highways, all indications of a traffic control signal may be dimmed at night to the maximum amount indicated above, after an engineering study.

5.5.4. Visibility and Shielding of Signal Faces

- Every signal head and its supports **shall** be designed so each signal face may be aimed independently of any other signal face.
- Every signal face **shall** be aimed so its indications will have maximum visibility to the traffic it is intended to control.
- Each signal face *Should* normally be aimed at a point approximately 1 m above the approach roadway, substantially in advance of the stop line.
- The distance from the stop line to this point *Should* be approximately the distance traveled by a vehicle while the driver reacts to the signal indication and stops. This distance is shown in Table 5-7.
- An upgrade on the approach to a signal will reduce the required vehicle stopping distance, while a downgrade will increase that distance.
- When the approach grade is about "5 %" or more, it would be desirable to adjust the minimum visibility distances shown in Table 5-7 to compensate for the required decrease or increase in stopping distance.

Table 5-7 Required Advance Visibility of Traffic Control Signal Indications

85th Percentile Speed (km/h)	Minimum Visibility Distance (m)
30	50
40	65
50	85
60	110
70	135
80	165
90	195
100	230
110	265
120	295

- It is important that signal indications not be visible to drivers who are not controlled by those indications. For this reason, visors **shall** be used around all signal lenses. Visors also reduce "sun phantom" which gives an unlighted lens the false appearance of being lighted when it is facing a low sun.
- The control of the visibility and effectiveness of signal indications can be improved by shielding, long visors, and louvers, and by special optical design. Where streets intersect at a small angle, these devices **shall** be used to limit the visibility of the signal indications as much as practicable to the drivers the signals control. Visors exceeding 300 mm in length **shall** only be used on signal heads which are rigidly supported so that they do not swing.
- Street, commercial, and advertising lighting behind and in line with traffic signal indications may seriously interfere with signal visibility and effectiveness. Backplates **shall** be used on all signal heads placed over the roadway. Backplates **shall** also be used on all other signal heads located where background colors and lights would interfere substantially with the effectiveness of the traffic signal indications**.** The front surface of backplates, the inside surfaces of visors, and the entire surface of louvers and fins **shall** have a flat black finish. A backplate (a strip of thin material extending outward approximately 125 mm parallel to the signal face on all sides of the signal housing) may have a white or silver border.

5.5.5. Number of Signal Faces

The requirements for the number of signal heads are as follows:

- For every signal group, there **shall** be a minimum of two traffic signal heads. This typically means there is one primary signal head and one secondary signal head.
- For each through lane, there **shall** be a minimum of one traffic signal head.
- For through traffic, the nearside signal head **shall** be located on the right-hand side of the traffic flow. For left-turn traffic, the nearside signal head **shall** be located on the left-hand side of the traffic flow. However, no signal heads *Should* be located in separator medians between through lanes and left-turn lanes.

5.5.6. Location of Signal Faces

A minimum of one primary signal head **shall** be provided for each lane group. Primary signals are designed to enhance the visibility of traffic signals and their location *should* be consistent at all intersections to assist drivers. They **shall** be located at a minimum of 1.0 m from the stop line (2.5 m from the stop line if pedestrians are present) and 1.75 m from the nose of the median (main median separators only; refer to Figure 5-15 and Table 5-8 for the standard four phase traffic signal (for a divided street or highway without pedestrian signal), and Figure 5-16 and Table 5-9 for the standard signal operation plan (for raised median left-turn bays, without pedestrian signal).

A low-level signal head (referred to as Auxiliary signal) when used, **shall** be installed on each of the primary signal poles. The function of an auxiliary signal head is to supplement the primary signal heads which displays the same signal indications, and it is used to improve operation by allowing the drivers at the stop line to have a clear view of the traffic signals.

Figure 5-13 and Figure 5-14 show where primary signals **shall** be located with regard to approaching traffic at a single-lane approach and at a multi-lane approach, respectively.

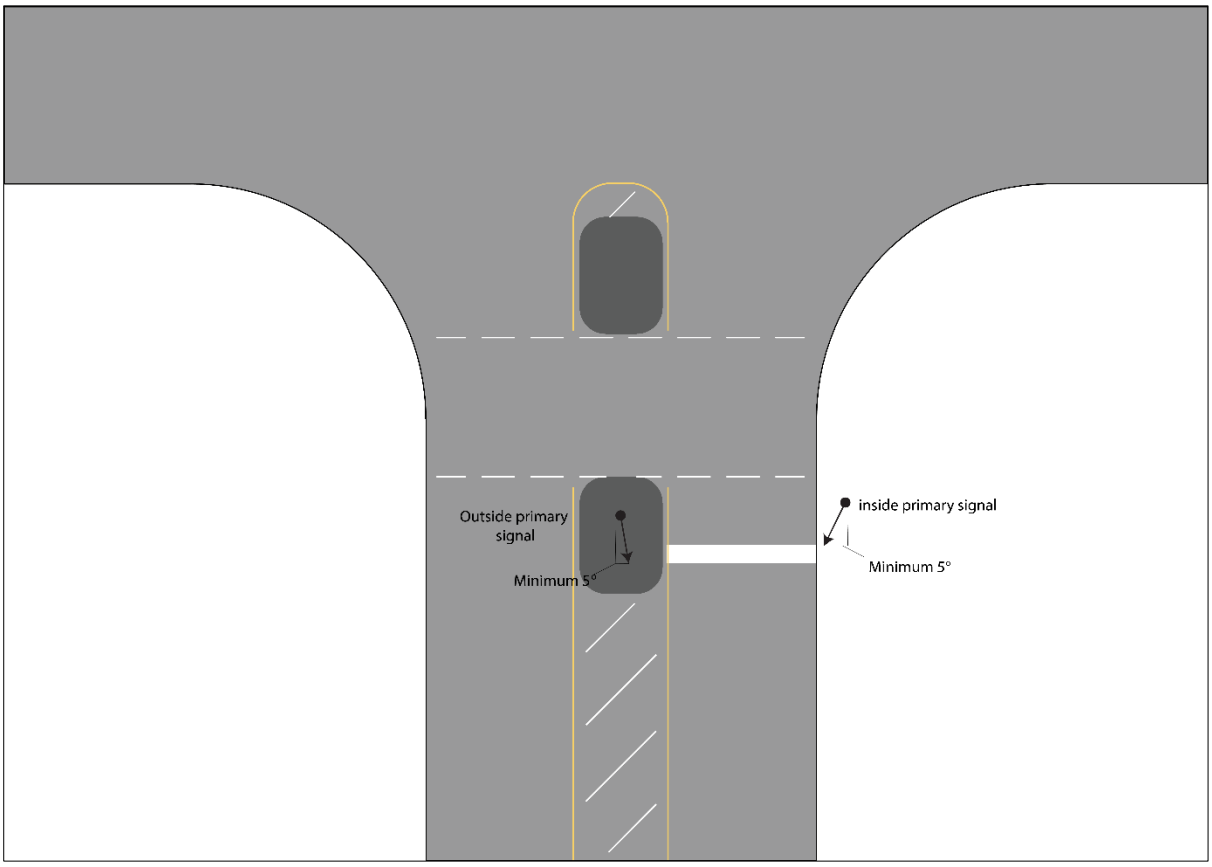


Figure 5-13 Location of Primary Signals at Single-Lane Approach

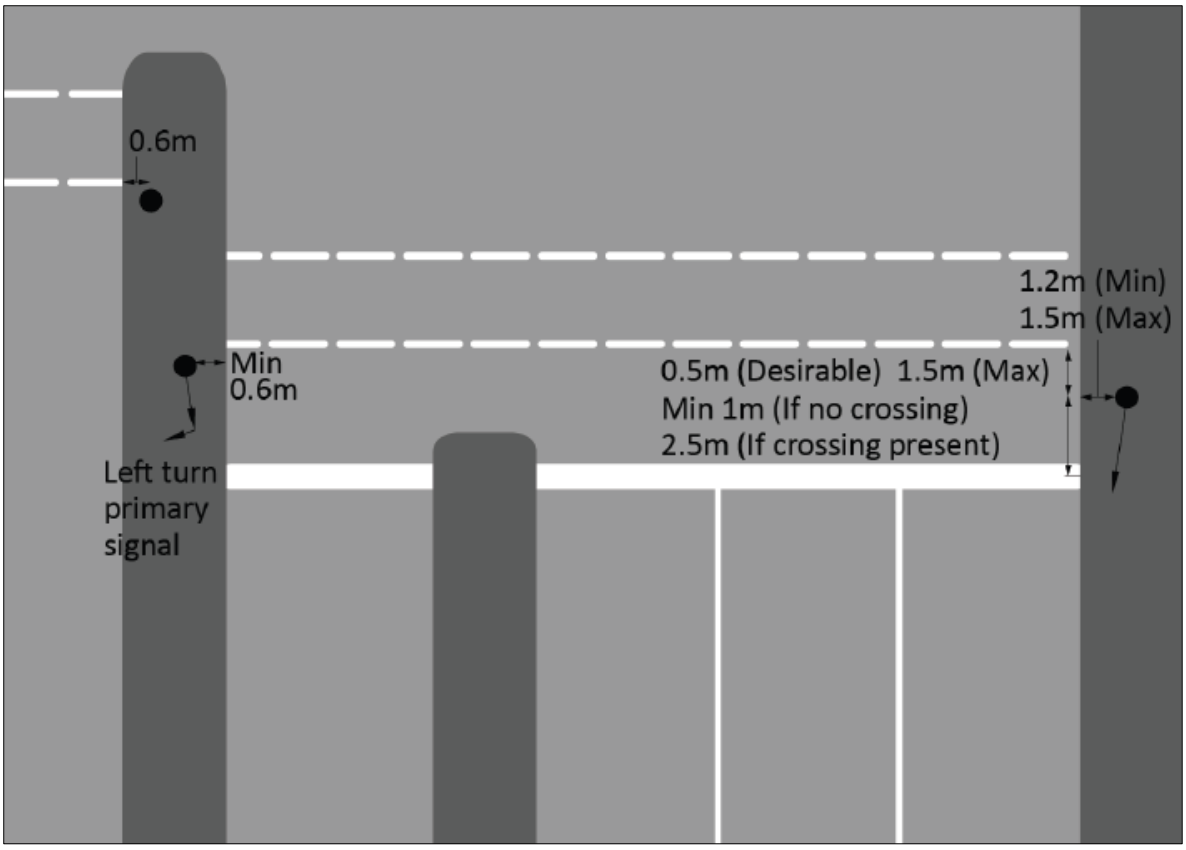


Figure 5-14 Location of Primary Signals at Multi-Lane Approach

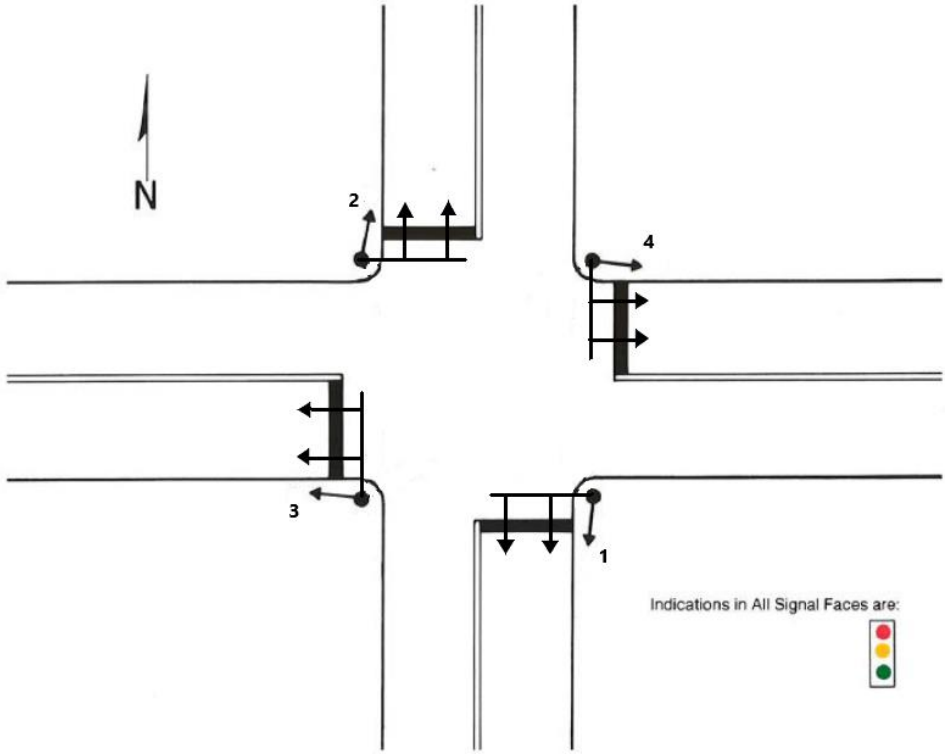


Figure 5-15 Signal Face Location and Indications - Divided Street or Highway - Without Pedestrian Signals

Table 5-8 Standard Four Phase Traffic Signal – without Pedestrian Signal

Phases	Intervals	Signals				Movements
		1	2	3	4	
A	1					
	2					
	3					
B	1					
	2					
	3					
C	1					
	2					
	3					
D	1					
	2					
	3					

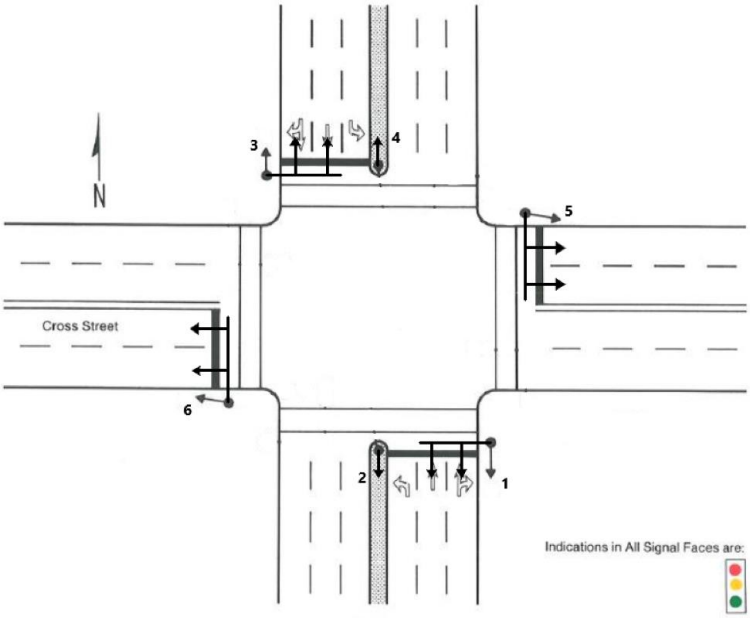
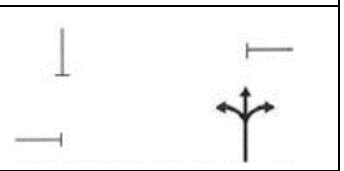
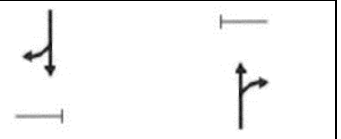
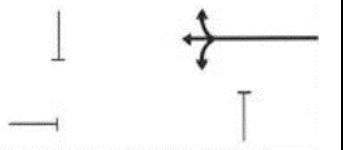
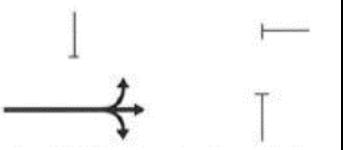
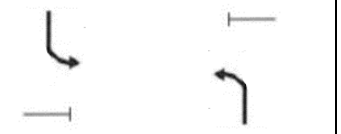


Figure 5-16 Signal Face Location and Indications - Raised Median Left- Turn Bays - without Pedestrian Signals

Table 5-9 Standard Signal Operating Plan – without Pedestrian Signal

Phases	Intervals	Approach						Movements
		1	2	3	4	5	6	
A	1	🟢	🟢	🔴	🔴	🔴	🔴	
	2	🟡	🟡	🔴	🔴	🔴	🔴	
	3	🔴	🔴	🔴	🔴	🔴	🔴	
B	1	🟢	🔴	🟢	🔴	🔴	🔴	
	2	🟡	🔴	🟡	🔴	🔴	🔴	
	3	🔴	🔴	🔴	🔴	🔴	🔴	
C	1	🔴	🔴	🟢	🟢	🔴	🔴	
	2	🔴	🔴	🟡	🟡	🔴	🔴	
	3	🔴	🔴	🔴	🔴	🔴	🔴	
D	1	🔴	🔴	🔴	🔴	🟢	🔴	
	2	🔴	🔴	🔴	🔴	🟡	🔴	
	3	🔴	🔴	🔴	🔴	🔴	🔴	
E	1	🔴	🔴	🔴	🔴	🔴	🟢	
	2	🔴	🔴	🔴	🔴	🔴	🟡	
	3	🔴	🔴	🔴	🔴	🔴	🔴	
F	1	🔴	🟢	🔴	🟢	🔴	🔴	
	2	🔴	🟡	🔴	🟡	🔴	🔴	
	3	🔴	🔴	🔴	🔴	🔴	🔴	

5.5.7. Height of Signal Faces

- Signals *Should* be as low as possible and yet give adequate vertical clearance over the roadway. Signal faces **shall** be directly in the driver's line of sight. All the indications in a horizontal signal face **shall** have the same minimum roadway clearance. Unless there are vertical clearance problems, all signal arrays *should* be vertical. The vertical array **shall** be used for signals not over the roadway.
- The bottom of the housing of a signal face not mounted over a roadway **shall** be not less than 2.5 m or more than 4.5 m above the sidewalk. A height of 2.5 to 3 m is generally best. If no sidewalk exists, the measurement **shall** be above the grade of the pavement at the center of the highway.
- The bottom of the housing of a signal face placed on a median island on the near side of an intersection approach **shall** not be less than 1.25 m and not more than 2.5 m above the top of the median island.

- The bottom of the housing of a low-level repeater signals **shall** be placed with the mast arm, or with the ground mounted pole with a minimum of 1.2 m and a maximum of 2 m above the ground.
- The distance between a low-level repeater signal head and the ground mounted signal head **shall** not be less than 0.5 m when they are placed on the same pole.
- The bottom of the housing of a signal face supported over a roadway **shall** not be less than 5.5 m or more than 6.5 m above the pavement below the signal.
- Typical mast arm, bracket mountings of signals, and the low level auxiliary signals are shown in Figure 5-17, Figure 5-18, Figure 5-19 and Figure 5-20.

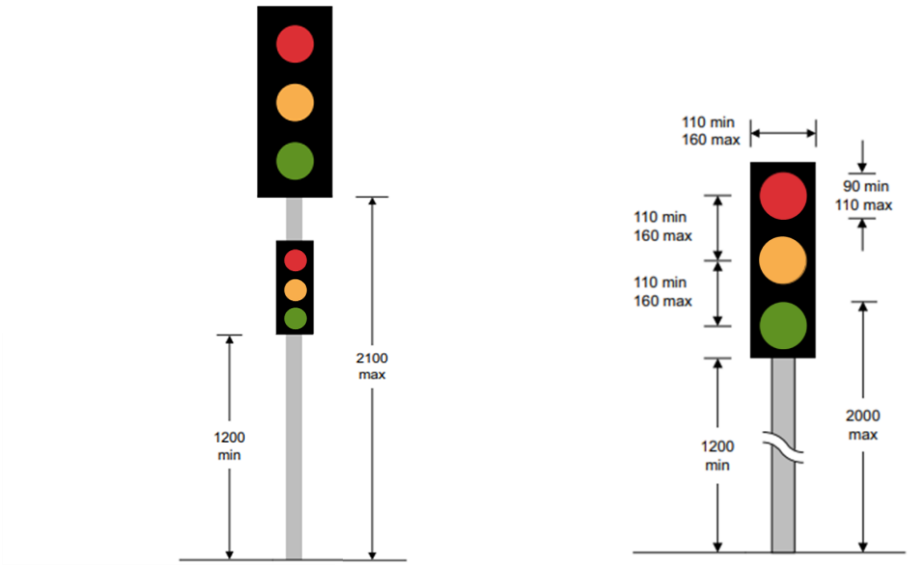


Figure 5-17 Auxiliary Signal Head Height and Measurements

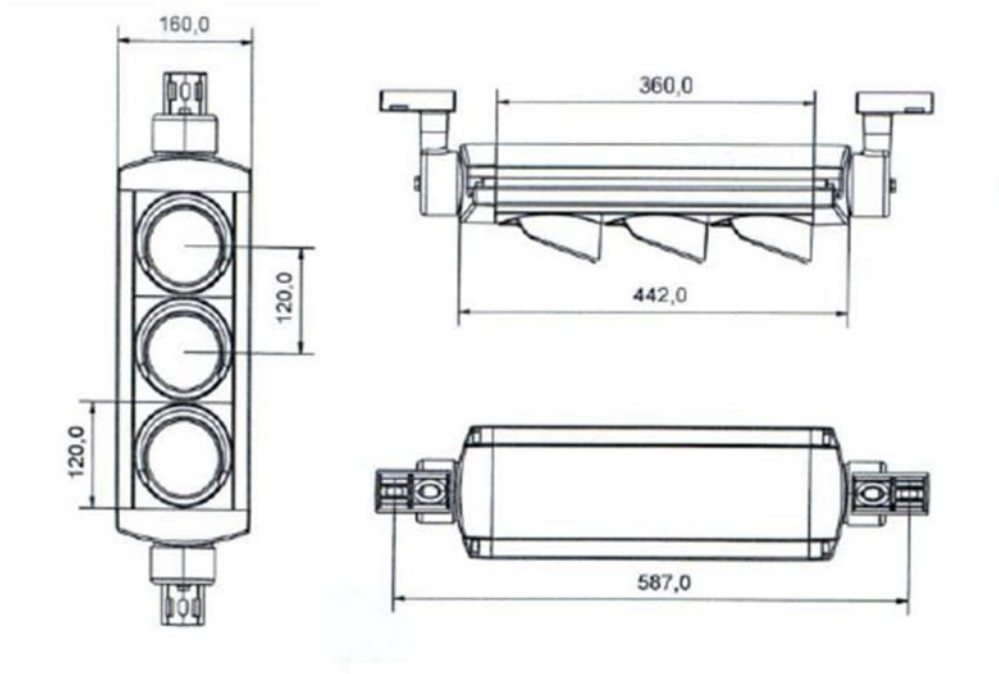


Figure 5-18 Auxiliary Signal Head Measurements

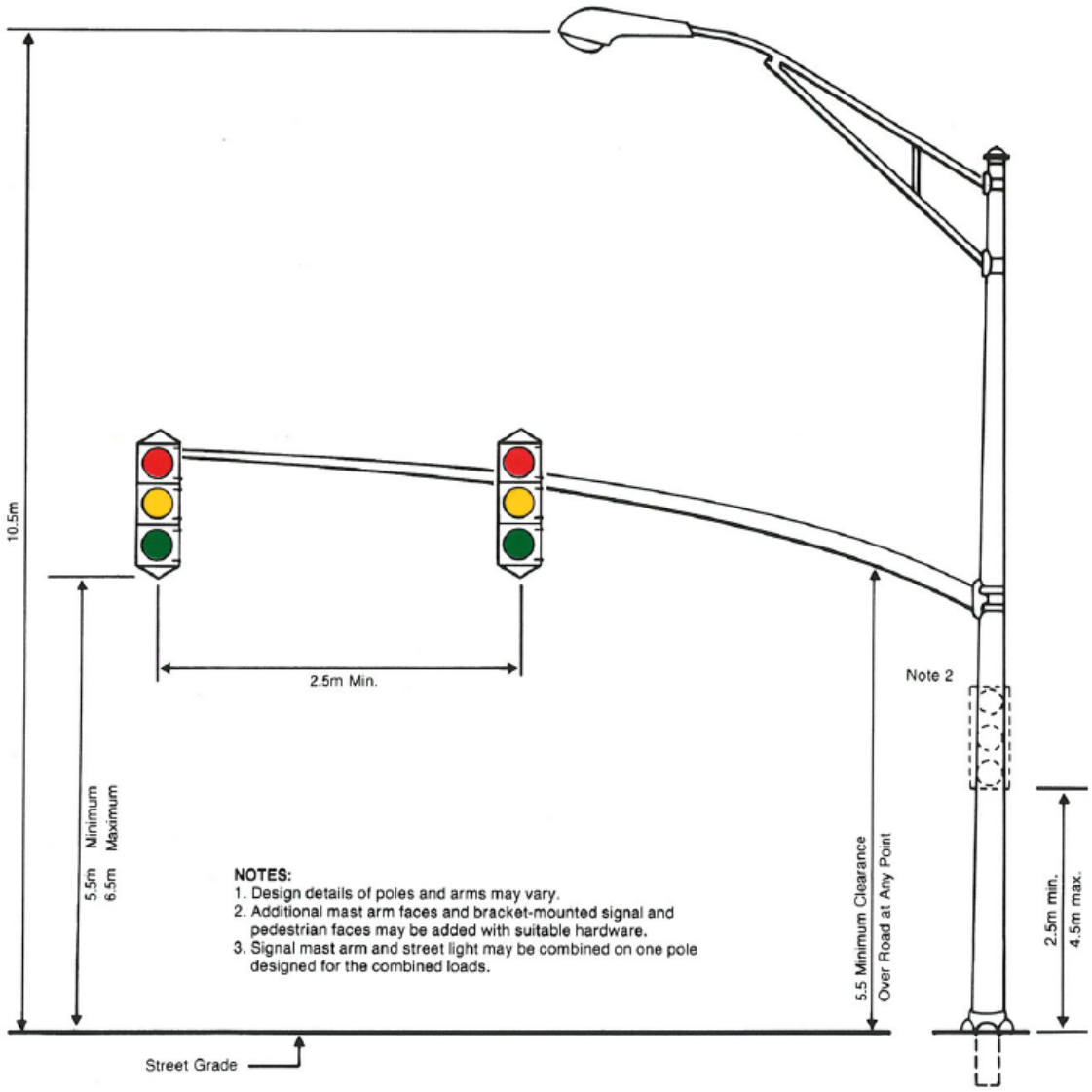
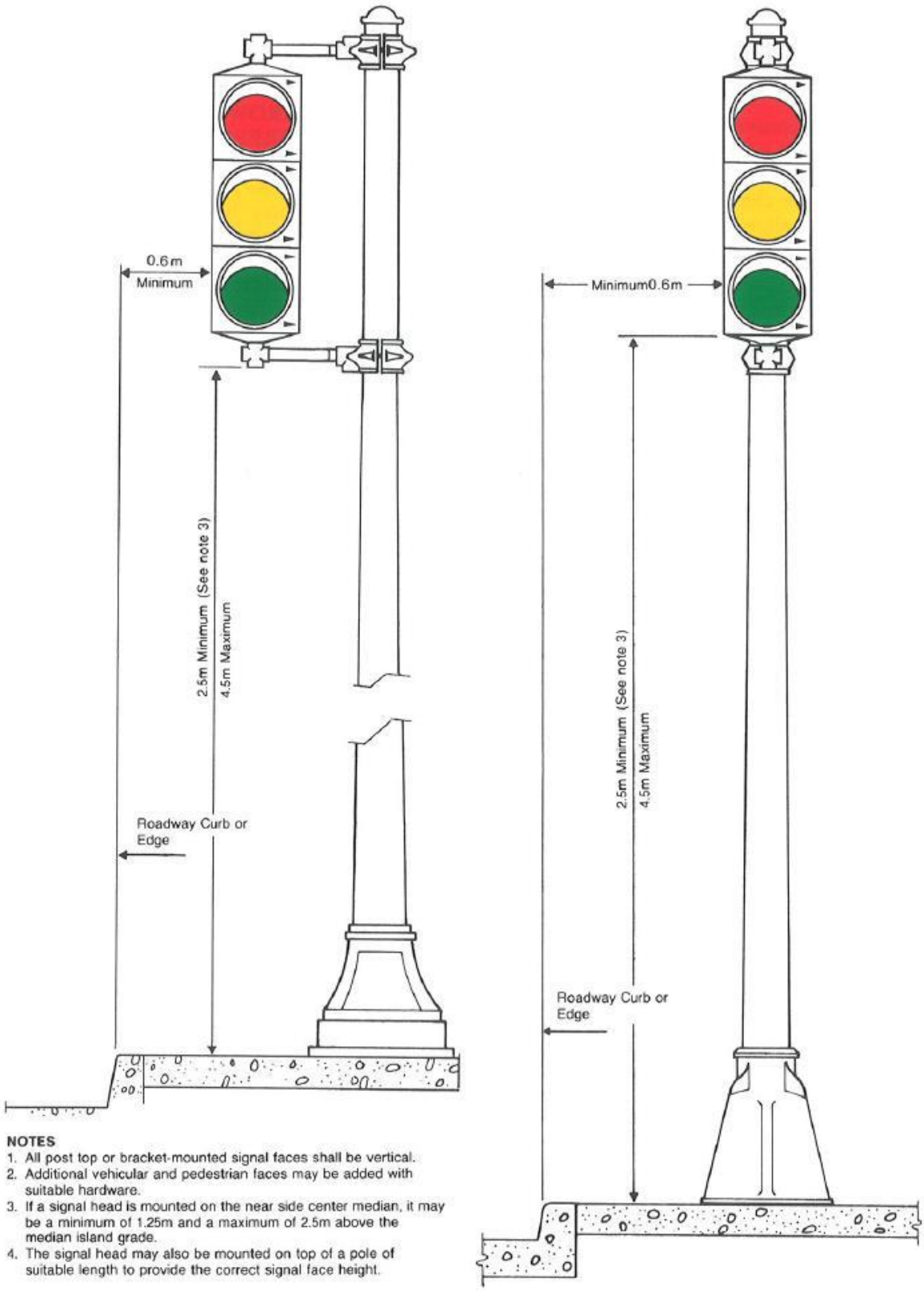


Figure 5-19 Typical Mast Arm Mounting of Signal Heads



NOTES

1. All post top or bracket-mounted signal faces shall be vertical.
2. Additional vehicular and pedestrian faces may be added with suitable hardware.
3. If a signal head is mounted on the near side center median, it may be a minimum of 1.25m and a maximum of 2.5m above the median island grade.
4. The signal head may also be mounted on top of a pole of suitable length to provide the correct signal face height.

Figure 5-20 Typical Pedestal and Short Bracket Signal Head Mountings

5.5.8. Signal Supports and Controller Cabinets for Safety

- In the interest of safety, signal support **shall** be placed as far as practicable from the edge of the traveled way without adversely affecting the visibility of the signal. Proper visibility of traffic signal faces is the primary consideration in the location of traffic signal supports. Signals **shall** not obstruct pedestrian crosswalks.
- Supports for post-mounted signal heads and signal heads at the side of a street **shall** be placed not less than 0.6m back from the face of a curb. If there is no curb the supports and signal heads **shall** be placed not. less than 0.6 m back from the edge of the shoulder.
- Supports for post-mounted signal heads **shall** be designed to readily break off, bend, or slip when hit by a vehicle, to minimize injury to the vehicle's occupants or damage to the vehicle. Where the speed of vehicles is less than 60 km/h and there is a vertical curb 25 cm or more in height, a "breakaway" support is not required. No part of the concrete base of a breakaway signal support **shall** extend more than 10 cm above the ground level at any point.
- Vehicles **shall** be protected from the base of a non-breakaway (rigid) signal pole such as is used to support a signal over the roadway. Guardrail or a suitable device to deflect or stop vehicles without serious injury to the occupants **shall** be provided. However, this protection is not required if the support is located where it is unlikely to be hit by an out-of-control vehicle, or where the speed of vehicles is normally less than 60 km/h.
- Each controller cabinet **shall** have a main door equipped with a keyed tumbler lock of the type in current use in KSA. An auxiliary door **shall** be mounted on the main door. This door **shall** be equipped with a lock operable by a different key. The door **shall** give access to the manual flash, main power and controller power switches, and the manual control cord or phase change switches.
- Overhead (mast arm) indications **shall** be used on intersection approaches where:
    - More than 15 % of the traffic is approaching at speeds more than 80 km/h.
    - On any approach where there are 3 more approach lanes.
    - Where physical conditions prevent drivers from having a continuous view of at least two signal indications.

5.6. Pedestrian Control Features

5.6.1. Meaning of Pedestrian Signal Head Indications

- Pedestrian signal heads **shall** provide special types of traffic signal indications exclusively intended for controlling pedestrian traffic. These signal indications **shall** consist of illuminated or animated symbols of a steady or animated walking person, a flashing standing person or a flashing upraised hand symbolizing the pedestrian change interval; and a steady standing person or a steady upraised hand see Figure 5-21 and Figure 5-22. Engineering judgment *Should* be used to determine the need for separate pedestrian signal heads and accessible pedestrian signals.

Figure 5-21 Pedestrian Signal Indication – Steady standing person (Top) and Steady Walking Person (Bottom)

Figure 5-22 Animated Pedestrian Signal Indication – Steady Upraised Hand (Top) and Animated, Non-Flashing Walking Person (Bottom)

- Pedestrian signal heads **shall** display three distinctive indications, exclusive of the Green and flashing Red countdown displays for the walk and don't walk displays, respectively. These indications symbolize steady walk, flashing don't walk and steady don't walk. The meaning of these displays **shall** be as follows:
    - A steady (or animated) green walking person signal indications is the initial pedestrian interval, and it means that a pedestrian facing the signal indication is permitted to start to cross the roadway in the direction of the signal indication. The pedestrian **shall** yield the right-of-way to vehicles lawfully within the intersection at the time that the green walking person signal indication is first shown.
    - A flashing red upraised hand signal indication is the pedestrian clearance interval and it means that a pedestrian **shall** not start to cross the roadway in the direction of the signal indication; however, any pedestrian who has already started to cross on a steady walking person signal indication **shall** proceed to the far side of the travelled way of the street or highway, unless otherwise

directed by a traffic control device to proceed only to the median of a divided highway or only to some other island or pedestrian refuge area.
    - A steady red upraised hand signal indication means that pedestrians **shall** not enter the roadway in the direction of the signal indication.

5.6.2. Application of Pedestrian Signal Heads

- Pedestrian signal heads **shall** be used in conjunction with vehicular traffic control signals under any of the following conditions:
    - If a traffic control signal is justified by an engineering study and meets either "Pedestrian Volume" Warrant 4 (see Section 5.2.4) or "School Crossing" Warrant 5 (see Section 5.2.5).
    - If an exclusive signal phase is provided or made available for pedestrian movements in one or more directions, with all conflicting vehicular movements being stopped.
    - When vehicular signal indications are not sufficiently visible to pedestrians, particularly on one-way streets or at "T" intersections.
    - If crash data demonstrates presence of significant number of pedestrian conflicts, or at an existing school crossing at any signalized location.
    - The light source of a flashing upraised hand signal indication **shall** be flashed continuously at a rate of not less than 50 or more than 60 times per minute. the displayed period of each flash **shall** be a minimum of 1/2 and a maximum of 2/3 of the total flash cycle.
- Conflicting pedestrian signal displays/indications **shall** not be used at opposite sides of crosswalk at intersections. For instance, a pedestrian signal indication consisting of upraised hand signal indication **shall** not be displayed opposite to a steady walking person signal indication.
- Pedestrian signal heads *should* be considered for use under any of the following conditions:
    - If it is necessary to assist pedestrians in deciding when to begin crossing the roadway in the chosen direction or if engineering judgment determines that pedestrian signal heads are justified to minimize vehicle-pedestrian conflicts.
    - If pedestrians are permitted to cross a portion of a street, such as to or from a median of sufficient width for pedestrians to wait, during a particular interval but are not permitted to cross the remainder of the street during any part of the same interval.
    - Pedestrian signal heads may be used under other conditions based on engineering judgment.

5.6.3. Size, Design, and Illumination of Pedestrian Signal Indications

- Pedestrian indications **shall** be adequately bright and legible to be effective under all normal atmospheric conditions. These indications **shall** attract attention and be readable by pedestrians (day and night) at all distances from 3 m to the full width of the area to be crossed.
- Lenses for pedestrian indications may be either rectangular or circular. The signal indications **shall** be internally illuminated.

- When illuminated, the walking man symbol **shall** be green on a black background.
- When illuminated, the standing man symbol **shall** be red on a black background.
- When not illuminated, pedestrian indications **shall** not be readily distinguishable by pedestrians from the far end of the crosswalk.
- Symbols at least 150 mm high **shall** be used if the distance from the near curb to the pedestrian signal indication is 35 m meters or less. Where that distance is more than 35 m, the symbols **shall** be at least 225 mm in height.
- When pedestrians are required to cross the street on two or more stages, optically programmed Walk - Don't walk pedestrian signal indications **shall** be utilized. These indications **shall** be installed so that the pedestrian will view only the indication which applies to him.

5.6.4. Location and Height of Pedestrian Signal Heads

- Pedestrian signals **shall** be mounted with the bottom of the housing not less than 2 m no more than 3 m above the sidewalk level.
- For each direction on each crosswalk, pedestrian indications **shall** be in the normal line of vision of pedestrians. The preferred location of the pedestrian signal face is at the end of each crosswalk. The indications **shall** be positioned and adjusted for maximum visibility at the far end of the crosswalk. The pedestrian indication **shall** be located within 3 m of the extension of the crosswalk lines.
- Pedestrian signal heads may be mounted separately or on the same support as the vehicular signal heads. Vehicular and pedestrian signal heads on the same support **shall** be separated by a space of not less than 150 mm when both signal heads face in the same direction.
- More guidance regarding "Traffic Signals Design" is provided in SHC 306 (Highway Facilities and Utilities Design – Public Utilities, Highway and Street Lighting, Control and Monitoring Devices) and SHC 601 (Traffic Engineering).
- More details regarding installation and technical specifications of traffic control signal equipment, is provided in SHC 403 (Construction of Highway Facilities).

5.6.5. Pedestrian Intervals and Signal Phases

- Pedestrian signal indications **shall** not be displayed when the vehicular traffic control signal is reverted to operating in the flashing mode due to fault or malfunction.
- More guidance regarding "Traffic Signals Phasing and Timing" is provided in SHC 601 (Traffic Engineering).

5.6.6. Countdown Pedestrian Signals

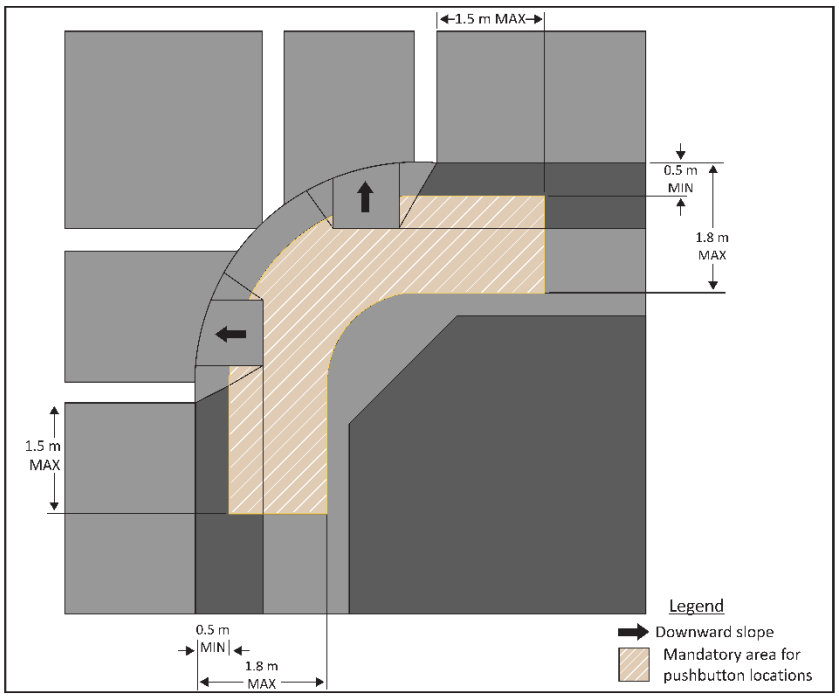
- All pedestrian signal heads used at crosswalks where the pedestrian change interval is more than 7 seconds **shall** include a pedestrian change interval countdown display in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval, Pedestrian signal heads used at crosswalks where the pedestrian change interval is 7 seconds or less may include a pedestrian change interval countdown display.

- Where countdown pedestrian signals are used, the countdown **shall** always be displayed simultaneously with the flashing upraised hand (symbolizing don't walk) signal indication displayed for that crosswalk.
- The display of the number of remaining seconds **shall** begin only at the beginning of the pedestrian change interval (flashing upraised hand). after the countdown displays zero, the display **shall** remain dark until the beginning of the next countdown.
- The countdown pedestrian signal **shall** display the number of seconds remaining until the termination of the pedestrian change interval (flashing upraised hand). Countdown displays **shall** not be used during the walk interval or during the red clearance interval of a concurrent vehicular phase.
- For crosswalks where the pedestrian enters the crosswalk more than 30.5 m from the countdown pedestrian signal display, the numbers *Should* be at least 22.86 cm in height.
- Because some technology includes the countdown pedestrian signal logic in a separate timing device that is independent of the timing in the traffic signal controller, care *Should* be exercised by the engineer when timing changes are made to pedestrian change intervals.
- If the pedestrian change interval is interrupted or shortened as a part of a transition into a preemption sequence, the countdown pedestrian signal display *Should* be discontinued and go dark immediately upon activation of the preemption transition.

5.6.7. Pedestrian Detectors

- Traffic signal signs explaining the purpose and use of pedestrian pushbuttons **shall** be mounted immediately above or incorporated into the pushbutton detector units.
- The positioning of pedestrian pushbuttons and the legends on the pedestrian pushbutton signs **shall** clearly indicate which crosswalk signal is actuated by each pedestrian pushbutton.
- If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and the signals are pedestrian actuated, an additional pedestrian detector **shall** be provided in the median.
- The following criteria *Should* be met when installing a pedestrian pushbutton:
    - Unobstructed and adjacent to a level all-weather surface to provide access from a wheelchair.
    - Where there is an all-weather surface, a wheelchair accessible route *Should* be provided from the pushbutton to the ramp.
    - Between the edge of the crosswalk line (extended) farthest from the center of the intersection and the side of a curb ramp (if present), but not greater than 0.5 m from said crosswalk line.
    - Between 0.5 and 1.8 m from the edge of the curb, shoulder, or pavement.
    - With the face of the pushbutton parallel to the crosswalk to be used.
    - At a mounting height of approximately 1 m, but no more than 1.5 m, above the sidewalk.
    - Where two pedestrian pushbuttons are provided on the same corner of a signalized intersection, the pushbuttons *Should* be separated by a distance of at least 3 m.

Figure 5-23 shows a pedestrian pushbutton location area that meets the above criteria.



Notes :

1. Where there are constraints that make it impractical to place the pedestrian pushbutton between 0.5 and 1.8 meters from the edge of the curb, shoulder, or pavement, it should not be further than 3 meters from the edge of curb, shoulder, or pavement.
2. Two pedestrian pushbuttons on a corner should be seperated by 3 meters.
3. This figure is not drawn to scale

Figure 5-23 Pushbutton Location Area

5.7. Accessible Pedestrian Signals and Detectors

5.7.1. Application

- Accessible pedestrian signals and detectors **shall** provide information in non-visual formats (such as audible tones, speech messages, and/or vibrating surfaces). The primary technique that pedestrians who have visual disabilities use to cross streets at signalized locations is to initiate their crossing when they hear the traffic in front of them stop and the traffic alongside them begin to move, which often corresponds to the onset of the green interval. The existing environment is often not sufficient to provide the information that pedestrians who have visual disabilities need to cross a roadway at a signalized location.
- If a particular signalized location presents difficulties for pedestrians who have visual disabilities to cross the roadway, an engineering study *Should* be conducted that considers the needs of pedestrians in general, as well as the information needs of pedestrians with visual disabilities. The engineering study *Should* consider the following factors:
    - Potential demand for accessible pedestrian signals.
    - A request for accessible pedestrian signals.

  - Traffic volumes during times when pedestrians might be present, including periods of low traffic volumes or high turn-on-red volumes.
  - The complexity of traffic signal phasing (such as split phases, protected turn phases, leading pedestrian intervals, and exclusive pedestrian phases).
  - The complexity of intersection geometry.
- Accessible pedestrian signal detectors may be pushbuttons or passive detection devices, at locations with pretimed traffic control signals or non-actuated approaches, pedestrian pushbuttons may be used to activate the accessible pedestrian signals.
- When used, accessible pedestrian signals **shall** be used in combination with pedestrian signal timing. The information provided by an accessible pedestrian signal **shall** clearly indicate which pedestrian crossing is served by each device.
- Under stop-and-go operation, accessible pedestrian signals **shall** not be limited in operation by the time of day or day of week.
- At accessible pedestrian signal locations where pedestrian pushbuttons are used, each pushbutton **shall** activate both the walk interval and the accessible pedestrian signals.
- Accessible pedestrian signals *Should* be integrated into the pedestrian detector (pushbutton), so the audible tones and/or messages come from the pushbutton housing. They have a pushbutton locator tone and tactile arrow and can include audible beaconing and other special features. The name of the street to be crossed may also be provided in accessible format, such as Braille or raised print. Tactile maps of crosswalks may also be provided.

5.7.2. Location and Arrangements

- Accessible pedestrian signals **shall** be located as close as possible to pedestrians waiting to cross the street to provide the clearest and least ambiguous indication for pedestrian crossing. Pushbuttons for accessible pedestrian signals *Should* be located in accordance with the provisions of Section 5.6.7 and *Should* be located as close as possible to the crosswalk line furthest from the center of the intersection and as close as possible to the curb ramp.
- If two accessible pedestrian pushbuttons are placed less than 3 m apart or on the same pole, each accessible pedestrian pushbutton **shall** be provided with the following features:
  - A pushbutton locator tone,
  - A tactile arrow,
  - A speech walk message for the walking person (symbolizing walk) indication, and
  - A speech pushbutton information message.
- If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and accessible pedestrian detectors are used, an additional accessible pedestrian detector **shall** be provided in the median.

5.7.3. Walk Indications

- Technology that provides different sounds for each non-concurrent signal phase has frequently been found to provide ambiguous information Vibrotactile indications

provide information to pedestrians who are blind and deaf or have low vision to confirm the walk signal in noisy situations, *Should* be utilized as practicable:

- Accessible pedestrian signals **shall** have both audible and vibrotactile walk indications.
- Vibrotactile walk indications **shall** be provided by a tactile arrow on the pushbutton that vibrates during the walk interval.
- Accessible pedestrian signals **shall** have an audible walk indication during the walk interval only.
- The audible walk indication **shall** be audible from the beginning of the associated crosswalk.
- The accessible walk indication **shall** have the same duration as the pedestrian walk signal except when the pedestrian signal rests in walk.
- Where two accessible pedestrian signals are separated by a distance of at least 3 m, the audible walk indication **shall** be a percussive tone. Where two accessible pedestrian signals on one corner are not separated by a distance of at least 3 m, the audible walk indication **shall** be a speech walk message.

- If the pedestrian signal rests in walk, the accessible walk indication *Should* be limited to the first 7 seconds of the walk interval. The accessible walk indication *Should* be recalled by a button press during the walk interval provided that the crossing time remaining is greater than the pedestrian change interval.
- The volume of audible walk indications and pushbutton locator tones *Should* be set to be a maximum of 5 dBA louder than ambient sound, except when audible beaconing is provided in response to an extended pushbutton press. Automatic volume adjustment in response to ambient traffic sound level **shall** be provided up to a maximum volume of 100 dBA.
- The sound level of audible walk indications and pushbutton locator tones *Should* be adjusted to be low enough to avoid misleading pedestrians who have visual disabilities when the following conditions exist:
  - Where there is an island that allows unsignalized right turns across a crosswalk between the island and the sidewalk.
  - Where multi-leg approaches or complex signal phasing require more than two pedestrian phases, such that it might be unclear which crosswalk is served by each audible tone.
- An alert tone, which is a very brief burst of high-frequency sound at the beginning of the audible walk indication that rapidly decays to the frequency of the walk tone, may be used to alert pedestrians to the beginning of the walk interval.
- Speech walk messages communicate to pedestrians which street has the walk interval. Speech messages might be either directly audible or transmitted, requiring a personal receiver to hear the message. To be a useful system, the words and their meaning need to be correctly understood by all users in the context of the street environment where they are used. speech walk messages:
  - **Shall** provide a clear message that the walk interval is in effect, as well as to which crossing it applies. Speech walk messages **shall** be used only at intersections where it is technically infeasible to install two accessible pedestrian signals at one corner separated by a distance of at least 3 m.

  - Speech walk messages that are used at intersections having exclusive pedestrian phasing **shall** be patterned after the model: "Walk sign is on for all crossings".
  - **Shall** not contain any additional information, except they **shall** include designations such as "Street" or "Avenue" where this information is necessary to avoid ambiguity at a particular location.
- A speech walk message may be not required at times when the walk interval is not timing, but, if provided:
  - It **shall** begin with the term "wait".
  - It need not be repeated for the entire time that the walk interval is not timing.
- Following the audible walk indication, accessible pedestrian signals **shall** revert to the pushbutton locator tone during the pedestrian change interval.

5.7.4. Tactile Arrows and Locator Tones

- Pushbuttons **shall** clearly indicate by means of tactile arrows which crosswalk signal is actuated by each pushbutton, to enable pedestrians who have visual disabilities to distinguish and locate the appropriate pushbutton at an accessible pedestrian signal location.
- Tactile arrows **shall** be located on the pushbutton, have high visual contrast (light on dark or dark on light), and **shall** be aligned parallel to the direction of travel on the associated crosswalk.
- An accessible pedestrian pushbutton **shall** incorporate a locator tone. A pushbutton locator tone is a repeating sound that informs approaching pedestrians that a pushbutton to actuate pedestrian timing or receive additional information exists, and that enables pedestrians with visual disabilities to locate the pushbutton.
- Pushbutton locator tones:
  - **Shall** have a duration of 0.15 s or less, and **shall** repeat at 1-s intervals.
  - **Shall** be deactivated when the traffic control signal is operating in a flashing mode. This requirement **shall** not apply to traffic control signals or pedestrian hybrid beacons that are activated from a flashing or dark mode to a stop-and-go mode by pedestrian actuations.
  - **Shall** be intensity responsive to ambient sound and be audible 1.82 to 3.65 m from the pushbutton, or to the building line, whichever is less.

5.7.5. Extended Pushbutton Press Features

- Pedestrians may be provided with additional features such as increased crossing time, audible beaconing, or a speech pushbutton information message as a result of an extended pushbutton press. If an extended pushbutton press is used to provide any additional feature(s), a pushbutton press of less than one second **shall** actuate only the pedestrian timing and any associated accessible walk indication, and a pushbutton press of one second or more **shall** actuate the pedestrian timing, any associated accessible walk indication, and any additional feature(s).
- Audible beaconing is the use of an audible signal in such a way that pedestrians with visual disabilities can home in on the signal that is located on the far ends of the crosswalk as they cross the street. Not all crosswalks at an intersection need audible

beaconing; audible beaconing can actually cause confusion if used at all crosswalks at some intersections. Audible beaconing is not appropriate at locations with channelized turns or split phasing, because of the possibility of confusion. Audible beaconing *Should* only be considered following an engineering study at:

  - Crosswalks longer than 21.3 m, unless they are divided by a median that has another accessible pedestrian signal with a locator tone.
  - The louder locator tone comes from both ends of the crosswalk.
  - The louder locator tone comes from an additional speaker that is aimed at the center of the crosswalk and that is mounted on a pedestrian signal head.

- Audible beaconing may be provided in several ways, any of which are initiated by an extended pushbutton press.
- If audible beaconing is used, the volume of the pushbutton locator tone during the pedestrian change interval of the called pedestrian phase **shall** be increased and operated in one of the following ways:
  - The louder audible walk indication and louder locator tone comes from the far end of the crosswalk, as pedestrians cross the street.
  - The louder locator tone comes from both ends of the crosswalk.
  - The louder locator tone comes from an additional speaker that is aimed at the center of the crosswalk and that is mounted on a pedestrian signal head.
- Speech pushbutton information messages may provide intersection identification, as well as information about unusual intersection signalization and geometry, such as notification regarding exclusive pedestrian phasing, leading pedestrian intervals, split phasing, diagonal crosswalks, and medians or islands. if speech pushbutton information messages are made available by actuating the accessible pedestrian signal detector, they **shall** only be actuated when the walk interval is not timing:
  - Speech pushbutton **shall** begin with the term "Wait," followed by intersection identification information. If information on intersection signalization or geometry is also given, it **shall** follow the intersection identification information.
  - Speech pushbutton information messages *Should* not be used to provide landmark information or to inform pedestrians with visual disabilities about detours or temporary traffic control situations.

5.8. Pedestrian Hybrid Beacons

5.8.1. Application

- A pedestrian hybrid beacon is a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk. If used, pedestrian hybrid beacons **shall** be used in conjunction with signs and pavement markings to warn and control traffic at locations where pedestrians enter or cross a street or highway. A pedestrian hybrid beacon **shall** only be installed at a marked crosswalk.
- If a traffic control signal is not justified under the signal warrants of Section 5.2 and if gaps in traffic are not adequate to permit pedestrians to cross, or if the speed for vehicles approaching on the "Major Street" is too high to permit pedestrians to cross, or if pedestrian delay is excessive, the need for a pedestrian hybrid beacon *Should* be

considered on the basis of an engineering study that considers "Major Street" volumes, speeds, widths, and gaps in conjunction with pedestrian volumes, walking speeds, and delay.

- For a "Major Street" where the posted or statutory speed limit or the 85th-percentile speed is 60 km/h or less, the need for a pedestrian hybrid beacon *Should* be considered if the engineering study finds that the plotted point representing the vehicles per hour on the "Major Street" (total of both approaches) and the corresponding total of all pedestrians crossing the "Major Street" for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 5-24 for the length of the crosswalk.
- For a "Major Street" where the posted or statutory speed limit or the 85th-percentile speed exceeds 60 km/h, the need for a pedestrian hybrid beacon *Should* be considered if the engineering study finds that the plotted point representing the vehicles per hour on the "Major Street" (total of both approaches) and the corresponding total of all pedestrians crossing the "Major Street" for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 5-25 for the length of the crosswalk.
- For crosswalks that have lengths other than the four that are specifically shown in Figure 5-25; the values *Should* be interpolated between the curves.

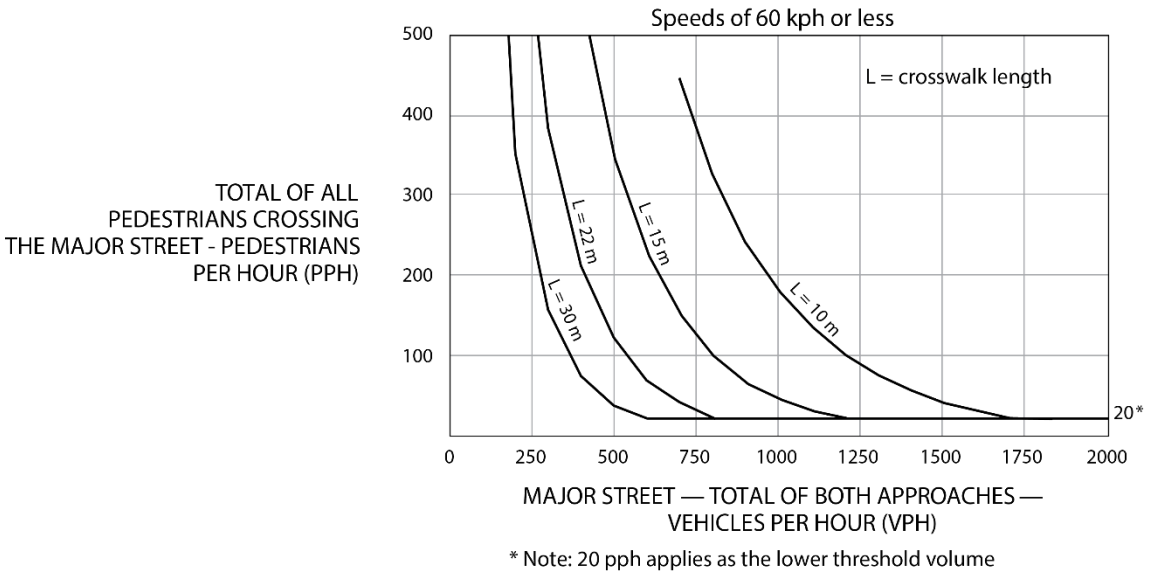


Figure 5-24 Guidelines for the Installation of Pedestrian Hybrid Beacons on Low-Speed Roadways

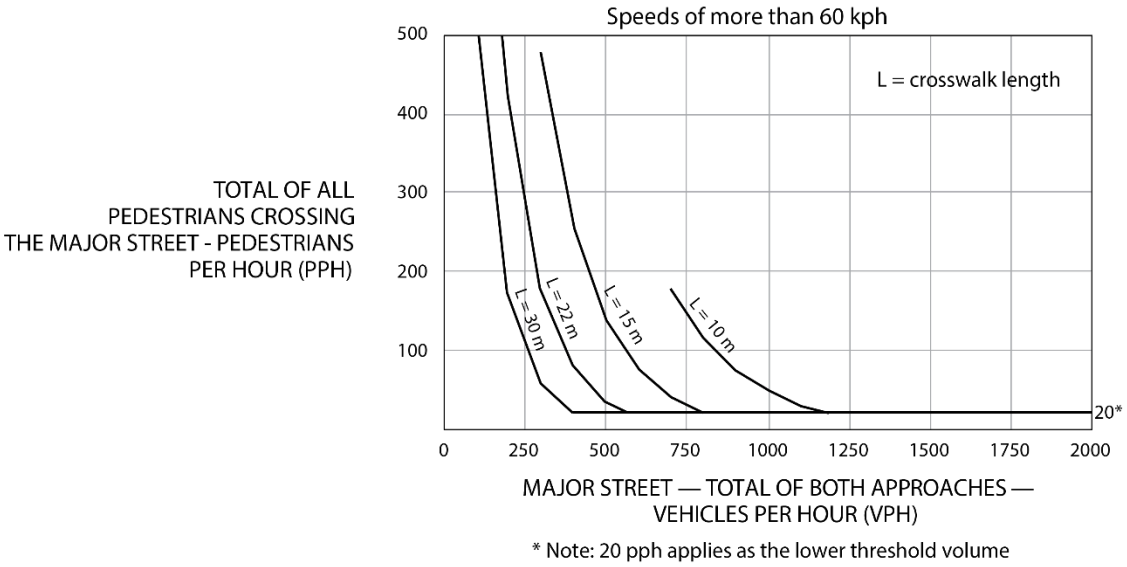


Figure 5-25 Guidelines for the Installation of Pedestrian Hybrid Beacons on High-Speed Roadways

5.8.2. Operation of Pedestrian Hybrid Beacons

- Pedestrian hybrid beacon indications **shall** be dark (not illuminated) during periods between actuations.
- Upon actuation by a pedestrian, a pedestrian hybrid beacon face **shall** display a flashing circular yellow signal indication, followed by a steady circular yellow signal indication, followed by both steady circular red signal indications during the pedestrian walk interval, followed by alternating flashing circular red signal indications during the pedestrian clearance interval. Upon termination of the pedestrian clearance interval, the pedestrian hybrid beacon faces **shall** revert to a dark (not illuminated) condition.
- The pedestrian signal heads **shall** continue to display a steady raised hand (symbolizing don't walk) signal indication when the pedestrian hybrid beacon faces are either dark or displaying flashing or steady circular yellow signal indications. The pedestrian signal heads **shall** display a walking person (symbolizing walk) signal indication when the pedestrian hybrid beacon faces are displaying steady circular red signal indications. The pedestrian signal heads **shall** display a flashing upraised hand (symbolizing don't walk) signal indication when the pedestrian hybrid beacon faces are displaying alternating flashing circular red signal indications. Upon termination of the pedestrian clearance interval, the pedestrian signal heads **shall** revert to a steady upraised hand (symbolizing don't walk) signal indication.
- Where the pedestrian hybrid beacon is installed adjacent to a roundabout to facilitate crossings by pedestrians with visual disabilities and an engineering study determines that pedestrians without visual disabilities can be allowed to cross the roadway without actuating the pedestrian hybrid beacon, the pedestrian signal heads may be dark (not illuminated) when the pedestrian hybrid beacon faces are dark.
- The duration of the flashing yellow interval *should* be determined by engineering judgment. The duration of the steady yellow change interval **shall** be determined using engineering practices. The steady yellow interval *should* have a minimum duration of 3 seconds and a maximum duration of 6 seconds. The longer intervals *should* be reserved for use on approaches with higher speeds.

5.9. Traffic Control for Emergency-Vehicle Access

5.9.1. Application

- An emergency-vehicle traffic control signal is a special traffic control signal that assigns the right-of-way to an authorized emergency vehicle.
- If a traffic control signal is not justified under the signal warrants of Section 5.2 and if gaps in traffic are not adequate to permit the timely entrance of emergency vehicles, or the stopping sight distance for vehicles approaching on the "Major Street" is insufficient for emergency vehicles, installing an emergency-vehicle traffic control signal *Should* be considered.
- An emergency-vehicle hybrid beacon may be installed instead of an emergency-vehicle traffic control signal.

5.9.2. Operation of Emergency-Vehicle Traffic Signals

- Right-of-way for emergency vehicles at signalized locations operating in the steady (stop-and-go) mode **shall** be obtained. As a minimum, the signal indications, sequence, and manner of operation of an emergency-vehicle traffic control signal installed at a midblock location **shall** be as follows:
    - The signal indication, between emergency-vehicle actuations, **shall** be either green or flashing yellow. If the flashing yellow signal indication is used instead of the green signal indication, it **shall** be displayed in the normal position of the green signal indication, while the steady red and steady yellow signal indications **shall** be displayed in their normal positions.
    - When an emergency-vehicle actuation occurs, a steady yellow change interval followed by a steady red interval **shall** be displayed to traffic on the "Major Street".
    - A yellow change interval is not required following the green interval for the emergency-vehicle driveway.
- Emergency-vehicle traffic control signals located at intersections **shall** either be operated in the flashing mode between emergency-vehicle actuations or be full-actuated or semi-actuated to accommodate normal vehicular and pedestrian traffic on the streets.
- Warning beacons, if used with an emergency-vehicle traffic control signal, **shall** be flashed only:
    - For an appropriate time in advance of and during the steady yellow change interval for the "Major Street"; and
    - During the steady red interval for the "Major Street".
- The duration of the steady red interval for traffic on the "Major Street" *Should* be determined by on-site test run time studies but *Should* not exceed 1.5 times the time required for the emergency vehicle to clear the path of conflicting vehicles.
- An emergency-vehicle traffic control signal sequence may be initiated manually from a local control point such as a fire station or law enforcement headquarters or from an emergency vehicle equipped for remote operation of the signal.

5.9.3. Emergency-Vehicle Hybrid Beacons

- Emergency-vehicle hybrid beacons **shall** be used only in conjunction with signs to warn and control traffic at an unsignalized location where emergency vehicles enter or cross a street or highway. Emergency vehicle hybrid beacons **shall** be actuated only by authorized emergency or maintenance personnel.
- Emergency-vehicle hybrid beacons *Should* only be used when all the following criteria are satisfied:
    - The conditions justifying an emergency-vehicle traffic control signal are met.
    - An engineering study, considering the road width, approach speeds, and other pertinent factors, determines that emergency-vehicle hybrid beacons can be designed and located in compliance with the requirements contained in this Section, such that they effectively warn and control traffic at the location.
    - The location is not at or within 30 m from an intersection or driveway where the side road or driveway is controlled by a Stop or Yield sign.
- An emergency-vehicle hybrid beacon face **shall** consist of three signal sections, with a circular yellow signal indication centered below two horizontally aligned circular red signal indications (see Figure 5-26).
- Emergency-vehicle hybrid beacons **shall** be placed in a dark mode (no indications displayed) during periods between actuations.
- Upon actuation by authorized emergency personnel, the emergency-vehicle hybrid beacon faces **shall** each display a flashing yellow signal indication, followed by a steady yellow change interval, prior to displaying two circular red signal indications in an alternating flashing array for a duration of time adequate for egress of the emergency vehicles. The alternating flashing red signal indications **shall** only be displayed when it is required that drivers on the "Major Street" stop and then proceed subject to the rules applicable after making a stop at a Stop sign. Upon termination of the flashing red signal indications, the emergency-vehicle hybrid beacons **shall** revert to a dark mode (no indications displayed) condition.
- The duration of the flashing yellow interval *Should* be determined by engineering judgment.
- The duration of the steady yellow change interval **shall** be determined using engineering practices.

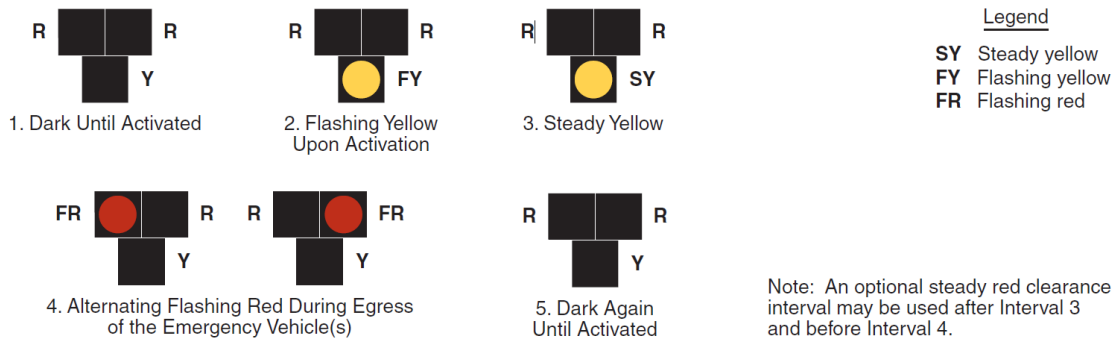


Figure 5-26 Sequence for an Emergency-Vehicle Hybrid Beacon (Phases 1 to 5)

- The steady yellow change interval *Should* have a minimum duration of 3 seconds and a maximum duration of 6 seconds. The longer intervals *Should* be reserved for use on approaches with higher speeds. More guidance is provided in SHC 601 (Traffic Engineering).
- A steady red clearance interval may be used after the steady yellow change interval.
- Emergency-vehicle hybrid beacons may be equipped with a light or other display visible to the operator of the egressing emergency vehicle to provide confirmation that the beacons are operating.
- Emergency-vehicle hybrid beacons may be supplemented with an advance warning sign, which may also be supplemented with a Warning Beacon. If a Warning Beacon is used to supplement the advance warning sign, it *Should* be programmed to flash only when the emergency-vehicle hybrid beacon is not in the dark mode.
- At least two emergency-vehicle hybrid beacon faces **shall** be installed for each approach of the "Major Street" and a stop line **shall** be installed for each approach of the "Major Street".
- On approaches having posted or statutory speed limits or 85th-percentile speeds more than 60 km/h, and on approaches having traffic or operating conditions that would tend to obscure visibility of roadside beacon faces, both minimum of two emergency-vehicle hybrid beacon faces *Should* be installed over the roadway.
- On multi-lane approaches having posted or statutory speed limits or 85th-percentile speeds of 65 km/h or less, either an emergency-vehicle hybrid beacon face *Should* be installed on each side of the approach (if a median of sufficient width exists) or at least one of the emergency-vehicle hybrid beacon faces *Should* be installed over the roadway.
- An emergency-vehicle hybrid beacon *Should* comply with the signal face location provisions described in Section 5.5.
- Stop lines and emergency signal—stop here on red (G-13-1) sign **shall** be used with emergency-vehicle hybrid beacons.
- If needed for extra emphasis, a stop here on red (G13-1) sign may be installed with an emergency-vehicle hybrid beacon.

6. Traffic Control for Special Zones

6.1. General Provision

6.1.1. Application

The provision of Traffic Control Devices in special zones **shall** be intended to notify road users of traffic control regulations and communicate warnings and guidance needed for the uniform and efficient operation of all elements of these areas with special uses and conditions, in a manner intended to minimize the occurrences of crashes.

Special Zones are categorized into urban areas with land uses subject to different regulations, and rural areas with special site conditions. This chapter includes typical traffic control for special zones as follows:

- Traffic Control for School Zones.
- Traffic Control for Special Bicycle and Pedestrian Facilities.
- Traffic Control for Typical Traffic Control for Preferential Managed Lanes.
- Traffic Control for Special Roadside Facilities (Rest Areas and Truck Inspection Stations).
- Traffic Control for Special Rural Zones (Low-Volume Rural Highways and Tunnels in Mountainous Terrain).

6.1.2. Typical Traffic Control Devices

It is possible, in many cases, to provide essential information to road users on special zones with a limited number of traffic control devices. The focus **shall** be on devices that:

- Warn of conditions not normally encountered.
- Prohibit unsafe movements.
- Provide minimal destination guidance.

The provisions contained in this chapter **shall** not prohibit the installation or the full application of the standard traffic control devices where conditions justify their use. Additional traffic control devices and provisions contained in other sections of the volume *Should* be considered for use for special zones in this chapter.

Traffic control devices for special zones, either exist within urban or rural context, **shall** be designed in accordance with the general provisions contained in Chapter 2, and where required, in other applicable sections of this volume.

All signs **shall** be retroreflective or illuminated to show the same shape and similar color both day and night, unless specifically stated otherwise in other applicable guideline in this volume. The requirements for sign illumination **shall** not be satisfied by street, highway, or strobe lighting. More guidance on "Signs" is provided in Chapter 3.

All marking **shall** be visible at night and **shall** be retroreflective. Other pavement and curb markings, including paints or thermoplastic, raised pavement markers, colored pavements, may be used, in conformance with "Marking" guidelines provided in Chapter 4.

6.2. Typical Traffic Control for School zones

6.2.1. Typical Signs for School Zones

6.2.1.1. Children crossing advance warning sign (W47-1) and supplementary plate with warning flasher (W47-2SP)

In case of Traffic Control for School Zones without Mid-Block Crossings the following **shall** be taken into consideration:

- Consistent with the requirements in Section 3.3.47 an advance warning assembly **shall** be provided, warning of children ahead. This is shown in Figure 6-2 and as Installation A in Figure 6-10.
- The supplementary plate **shall** say "School" both in Arabic and English.
- The assembly **shall** be typically located between 150 and 100 m prior to the start of the reduced speed segment within the zone.
- On streets with speed limits over 50 km/h, a yellow flasher (300 mm diameter) above the warning sign **shall** be provided. It **shall** be activated during those periods when schoolchildren are present (before, during and after school hours) - see Figure 6-1.

In case of School Zones with Dedicated School Crossings the following **shall** be taken into consideration:

- Advance "children crossing" warning signs **shall** be located at least 100 m from the start of the speed zone in each direction approaching the crossing (the supplementary plate is shown in Figure 6-2).

Figure 6-1 Children Crossing Advance Warning with Supplementary Plate and Warning Flasher (W47-1 and W47-2SP)

Figure 6-2 Children Crossing - Supplementary Plate for School (W47-2SP)

6.2.1.2. Speed limit sign and supplementary plate with warning flasher

In case of Traffic Control for School Zones without Mid-Block Crossings the following **shall** be taken into consideration:

- Consistent with the requirements in Section 3.2.4, a general speed limit sign (30 km/h) **shall** be provided with supplementary plate indicating "When Flashing" (R3-7SP). This is shown as installation B in Figure 6-10.
- On streets with normal speeds over 50 km/h, a yellow flasher (300 mm diameter) above the school zone speed limit sign **shall** be provided. It **shall** be activated during those periods when schoolchildren are present.
- On streets with normal 30 km/h speed limits or less, installation B is optional. In no case **shall** the speed limit for the school zone be greater than the normal regulatory speed limit for the street.

For dual carriageway routes, identical installations as indicated, may be located on both sides of the carriageway to maximize visibility if needed due to shifts in vertical and horizontal geometry.

In case of School Zones with Dedicated School Crossings the following **shall** be taken into consideration:

- Consistent with the requirements in Section 3.2.4, a general speed limit sign (30 km/h) **shall** be provided with supplementary plate indicating "When Flashing" (R3-7SP) - Figure 6-4 - as well as a 300 mm warning flasher for routes with higher than 30 km/h normal speeds (Figure 6-3).
- The speed limit sign and warning flasher **shall** be located a minimum of 100 m prior to the school crossing.

Figure 6-3 Speed Limit with Supplementary Sign and Warning Flasher (Combination of R3-1 and R3-7SP)

Figure 6-4 Supplementary Sign When Flashing (R3-7SP)

6.2.1.3. End of school zone sign

A text sign (English and Arabic) shall be provided indicating the end of the school zone (Figure 6-5). This is shown as installation C in Figure 6-10.

Figure 6-5 End School Zone Sign (W47-3SP)

6.2.1.4. Children crossing sign with yield sign

In case of School Zones with Dedicated School Crossings the following **shall** be taken into consideration:

- Children Crossing regulatory signs (R2-3SP) **shall** have a white legend and border with a red background (Figure 6-7).
- Children Crossing regulatory sign **shall** be placed on a post beneath Yield sign at the location of the zebra crossing on the near side of approaching traffic on a signal pedestal with flashing amber indication at the top (300 mm diameter) of the Yield sign (Figure 6-6). If a crossing is located just beyond an intersection, the sign and pedestal with flasher ball **shall** be on the far side of the zebra crossing.

Figure 6-6 Children Crossing Sign with Yield Sign. Amber Flasher Should be Used at Peak Periods (W2-1 and R2-3SP)

Figure 6-7 Children Crossing (R2-3SP)

6.2.1.5. No parking zone signs

- As per Section 3.2.41, when used in case of School Zones with Dedicated School Crossings No Parking Zone signs (R21-1) **shall** be installed on the right side of the street at least 20 m prior to the zebra crossing.

6.2.2. Typical Markings for School Zones

In case of School Zones with Dedicated School Crossings the following **shall** be taken into consideration:

- A solid line **shall** be placed at the school zone speed limit sign, across the direction of pavement in which the school zone starts.
- A line **shall** also be placed across the direction of pavement in which the school zone ends, next to the End School Zone Sign installation.

6.2.2.1. Zebra crossing

- A stop line **shall** be provided at least 5m prior to the crossing on either side of the zebra crossing.

6.2.2.2. Zigzag lines approaching zebra crossings

- For crossing locations with parking and/or speeding problems requiring additional reinforcement of traffic control strategies, the use of longitudinal zigzag markings may be provided on either side of the direction of travel alongside the centerline and curb. For two-lane approaches, a zigzag line is placed between the two-lanes in lieu of lane line marking direction of travel alongside the centerline and curb. For two-lane approaches, a zigzag line **shall** be placed between the two-lanes in lieu of lane line marking.
- The standard pattern shall consist of 2 m long markings placed between the initiation of the "No Parking" zone prior to the crossing, and the stop line in front of the crossing (a distance of 20 m), or a minimum of eight 2 m long marks. Typical details for zigzag markings are illustrated in Figure 6-8. Figure shows a two-lane directional approach.

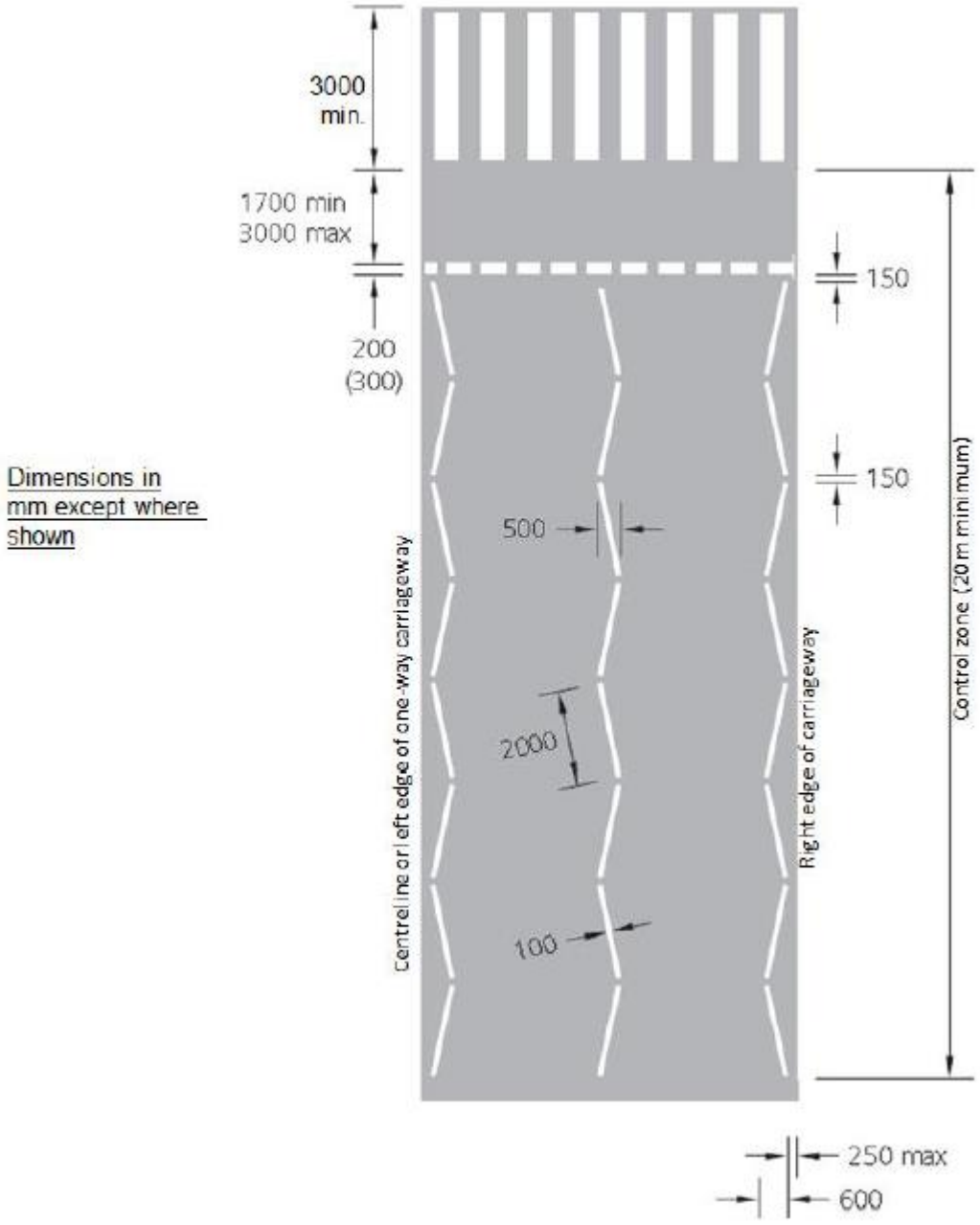


Figure 6-8 Use of Traffic Slowing (Zigzag) Lines in Advance of Zebra Crossing (Two-Lane Example)

6.2.3. School Area Traffic Control Signals and Flashers

- Traffic control signals and flashers for school areas **shall** be provided in accordance with The School Crossing signal warrant described in Section 5.2.5. More guidance is provided in Chapter 5 "Signals".

6.2.4. Traffic Control for School Zones without Mid-Block Crossings

- A school zone which does not include mid-block street crossings *Should* be provided to reduce travel speeds during periods when there are large numbers of children or others on sidewalks in the vicinity of the major street and at controlled intersections in

the vicinity of the school (e.g., stop sign or signal control). The reduced speeds allow for quicker stopping times *Should* there be children within the roadway or stopped vehicles in the vicinity of the school, including school buses. Mid-block, unsignalized school crossings are not provided in this type of school zone.

- The zone **shall** contain signs warning the driver they are entering the school zone, regulatory signs with reduced speed limits during designated hours, and signs informing the driver they are leaving the school zone, ending the speed reduction during school hours.

6.2.4.1. School zone (without mid-block crossings) layout

- For dual carriageway routes meeting the speed criteria for provision of school zones, dual installations (one on each side of the carriageway) are appropriate to enhance visibility of the school zone and the speed restrictions contained therein. As discussed in the notes below, if a fence separates each of the dual carriageways, the carriageway not on the school side does not need to be signed as a school zone unless school children are directed to cross at nearby controlled intersections with dedicated crossings.
- If a school zone is located on a cross street near the intersection, a Children warning sign with a supplemental left or right advance arrow on a supplementary plaque Sign mounted below the warning sign may be installed on each approach of the street or highway to warn road users making a turn onto the cross street that they will encounter a school zone soon after making the turn (see Figure 6-9).

Figure 6-9 Warning Sign with a Supplemental Right (or Left) Advance Arrow (W47-1 and W47-4SP)

- Figure 6-10, as already aforementioned, provides a description of the layout of a typical school zone for a single carriageway route without dedicated mid-block, non-signalized crossings. The following considerations **shall** be utilized to further reinforce the school zone and speed regulations contained therein:

- If warranted, a school zone **shall** be established for, at a minimum, the entire length of the school compound facing the zone and, at a maximum, up to 150 m past the school boundary in either direction. The extent to which a school zone extends beyond the school boundary up to 150 m *Should* be determined by the engineer on site, depending on prevailing approach speeds and visibility.
- To warn drivers that they are approaching a school zone, an advance warning sign and flasher (active during school hours), shown as installation A, **shall** be placed 100 m in advance of the school zone.
- The beginning of a school zone *Should* be marked with installation B. Installation B includes a 30 km/h speed limit sign and warning flasher (active during school hours). The speed limit sign will be qualified with a supplemental plate in Arabic and English indicating "when flashing".
- The end of a school zone *Should* be marked by Installation C.
- A school zone *Should* be marked for both directions of traffic, even if the street is divided by a median. If there is a fence in the median preventing pedestrians from crossing outside of a crosswalk, the lane of the street not adjacent to the school *Should* not be marked for a school zone.

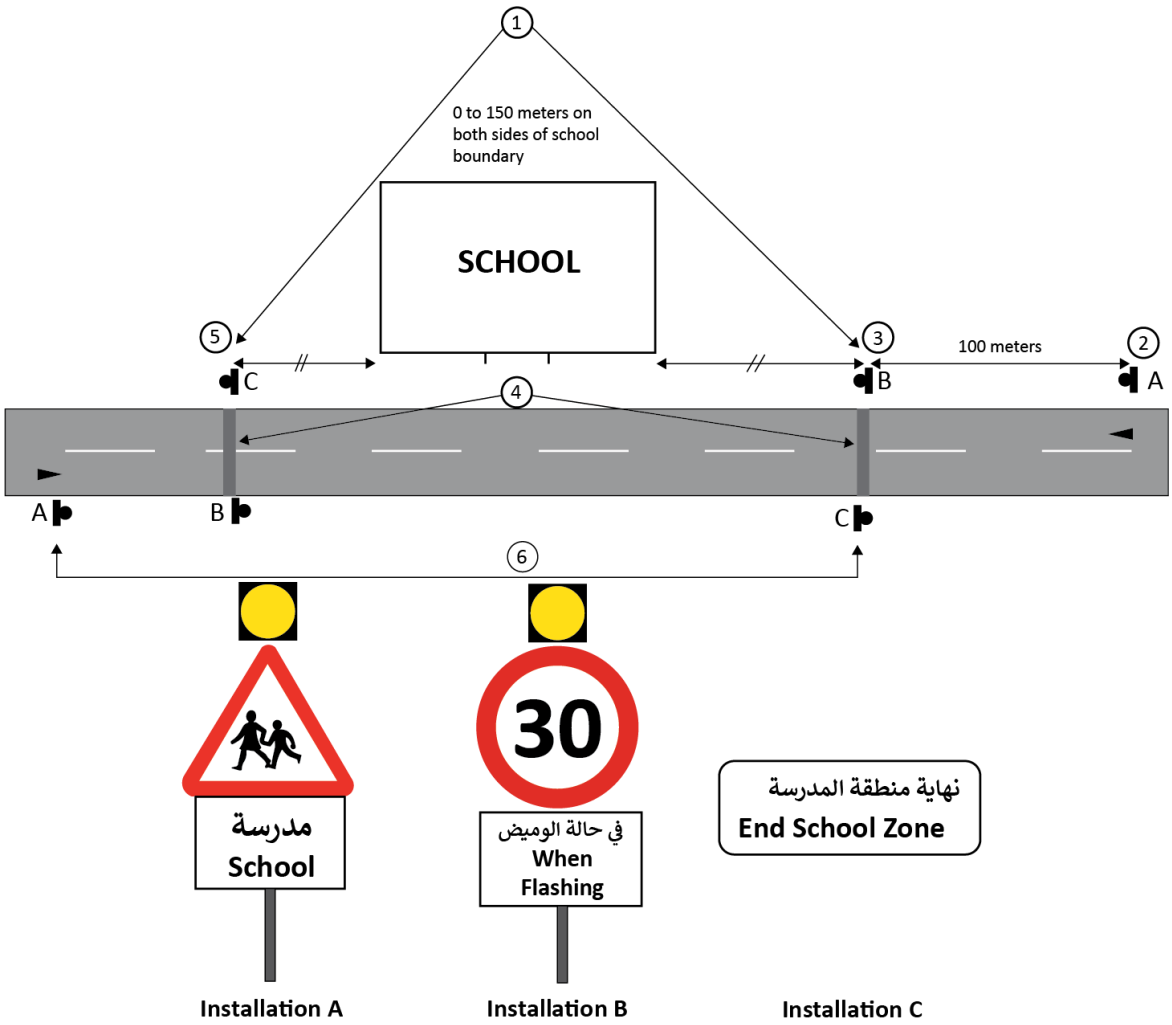


Figure 6-10 Basic Installation of Traffic Signs in School Zone

6.2.5. School Zones with Dedicated School Crossings

- School zones **shall** be installed near school locations where the requirements for such a facility arise only during specific and limited times of the school day. One distinctive feature of a school zone is its part-time nature, being designed to operate as a zone only at such times as when one or more advance warning signs are displayed to vehicular traffic and warning flashers are activated to indicate that the school zone and pertinent speed limit are active.
- School zones **shall** contain dedicated school crossings consist of advance warning signs and flashers, speed limit signs with flashers indicating the school zone operational status and zebra crossings with accompanying regulatory signs and zebra crossing warning lights indicating the crossing. The crossing may be "mid-block" (between streets) or at intersections. For locations with poor gap availability, high-speeds, and multiple lanes, crossings are to be made at locations with stop signs or traffic signals.
- When the delay between the occurrences of adequate gaps becomes excessive, students might become impatient and endanger themselves by attempting to cross the street during an inadequate gap. In these instances, the creation of sufficient gaps **shall** be considered to accommodate the crossing demand. The frequency of gaps in the traffic stream that are sufficient for student crossing is different at each crossing location.
- School zones require zebra crossings where:
    - There are substantial numbers of students that require access across the streets adjoining the school within the school zone.
    - There are not any signalized intersections with pedestrian crossings within 100 to 200 m of the school.
- When constructing school (zebra) crossings they **shall** include the following:
    - Reduced travel speeds to 30 km/h, within school zones during designated periods.
    - Use of warning flashers with advance warning signs and school zone speed limit signs to indicate to drivers that the school zone is active.
    - Use of routes with two lanes or less per carriageway. Crossings on all other routes **shall** be at signalized or stop sign-controlled intersections or signalized mid-block zebra crossings where adequate gap time is allocated.
    - A minimum pedestrian flow rate of 25 children per hour at the dedicated school crossing (based on length of crossing period), during the periods in which children are travelling to and from school.
    - A minimum of one adequate gap per minute, or one adequate gap every 30 seconds if over 100 students per hour use the crossing during the periods in which children are travelling to and from school.
    - Normal posted speed limit during non-school crossing periods **shall** not be greater than 60 km/h, less if the design speed for the roadway is less.
    - Minimum sight distance to the crossing location of 100 m from both directions approaching the crossing.

6.2.5.1. School zone (with dedicated school crossings) layout

- In the rare case that a school crossing occurs on a dual carriageway route meeting the speed criteria for provision of school zones, dual installations (one on each side of the carriageway) of signage are appropriate to enhance visibility of the school zone and the speed restrictions contained therein (example is shown in Figure 6-11). If a fence separates each of the dual carriageways, the carriageway not on the school side does not need to be signed as a school zone unless school children are directed to cross at nearby controlled intersections with dedicated crossings.

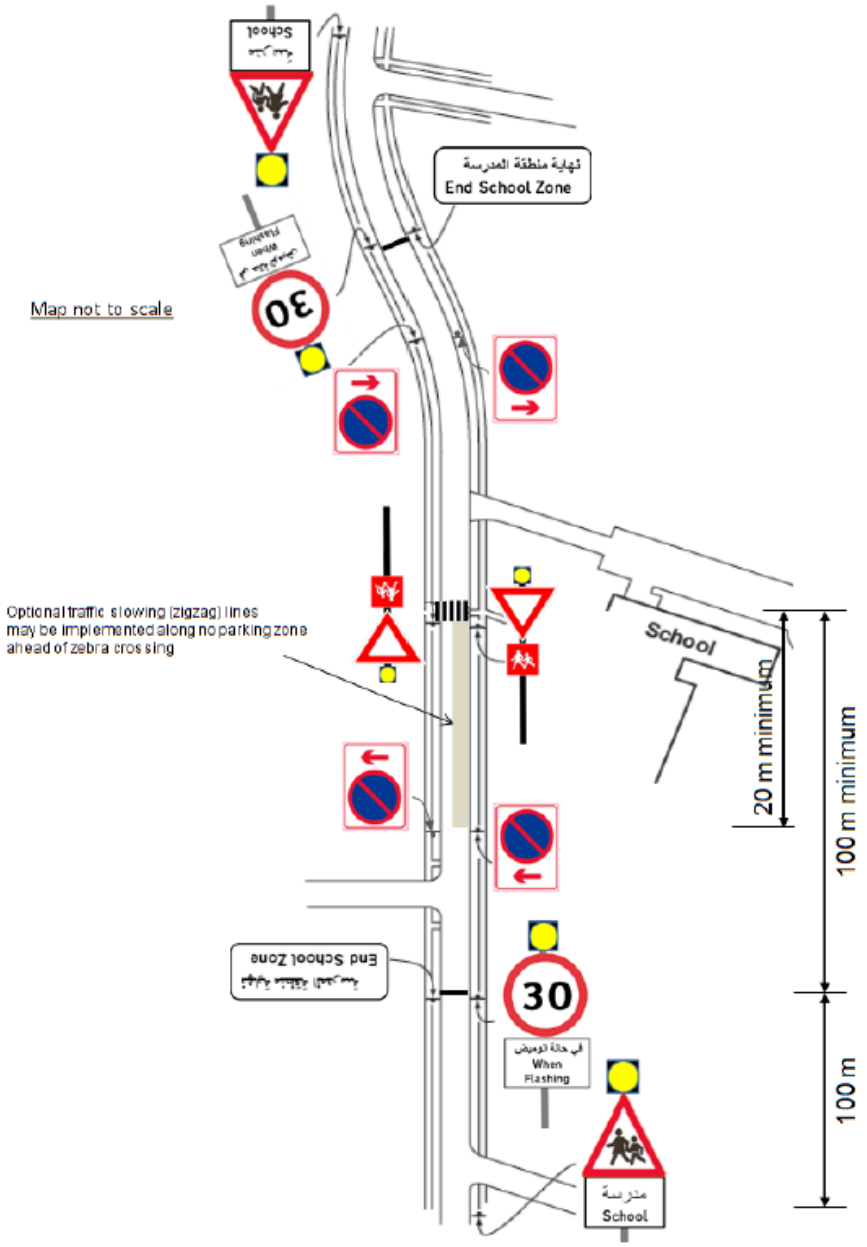


Figure 6-11 A Typical Installation of a School Crossing within a School Zone

6.2.6. Layout for School Crossings Outside School Zone

- The sign configurations referenced in Section 6.2.1.1 and 6.2.1.4 are illustrated in Figure 6-12 which shows a crossing located at an intersection, with the zebra crossing situated over non-controlled movements along the carriageway (i.e., only the side street is controlled with a Stop or Yield sign). Advance Children signs are placed 100 m prior to the zebra crossing, while Children crossing signs are placed at the zebra crossing.

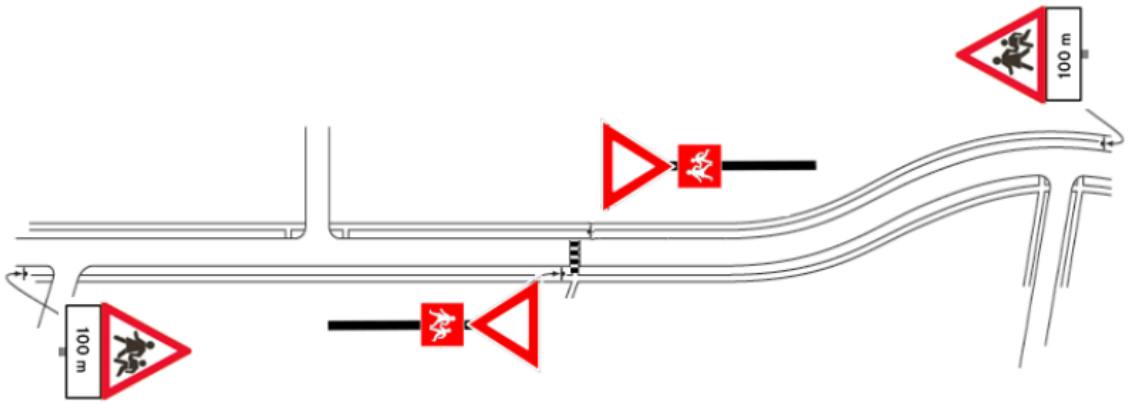


Figure 6-12 Example of Signing for a School Crossing Outside of a School Zone. Amber Flashers Should be Used at Peak Times

6.3. Typical Traffic Control for Bicycle Facilities and Pedestrian Facilities

Bicycle may operate on both roadways and shared-use paths. For with-flow bicycle lanes, the direction of flow for bicycles is the same direction as the flow for the adjacent lane(s) of traffic. Whereas for contra-flow bicycle lanes, the direction of flow for bicycles is in the opposite direction of the traffic flow for the adjacent lane(s) of traffic. Contra-flow bicycle lanes *Should* be reserved for one-way highways only. Bicycle lanes can be categorized into two main types:

- Mandatory bicycle lane requires regulation that prohibits other vehicles from using that part of the carriageway while the lane is in operation.
- Advisory bicycle lanes do not require a specific prohibitive order for other vehicles and may be used in situations where mandatory lanes would be too restrictive, typically where road width is restricted, and motor vehicles might occasionally need to encroach on the lane.

6.3.1. Typical Signs for Bicycle Facilities

Signs for the exclusive use of bicyclists *Should* be located so that other road users are not confused by them. The clearance for overhead signs on shared-use paths *Should* be adjusted when appropriate to accommodate path users requiring more clearance, such as equestrians, or typical maintenance or emergency vehicles. Bicycle Lane signs and plates *Should* be used in

advance of the upstream end of the bicycle lane, at the downstream end of the bicycle lane, and at periodic intervals along the bicycle lane as determined by engineering judgment based on prevailing speed of bicycle and other traffic, block length, distances from adjacent intersections, and other considerations.

- Bicycle signs **shall** be standard in shape, legend, and color.
- All signs **shall** be retro-reflectorized for use on cycleways, including shared-use paths and bicycle lane facilities.
- Where signs serve both bicyclists and other road users, vertical mounting height and lateral placement **shall** be as provided in in accordance with Chapter 3.
- Where used on a shared-use path, no portion of a sign or its support **shall** be placed less than 700 mm laterally from the near edge of the path, or less than 2,600 mm vertically over the entire width of the shared-use path (see Figure 6-13).
- Mounting height for post-mounted signs on shared-use paths **shall** be a minimum of 1,300 mm, measured vertically from the bottom of the sign to the elevation of the near edge of the path surface (see Figure 6-13).

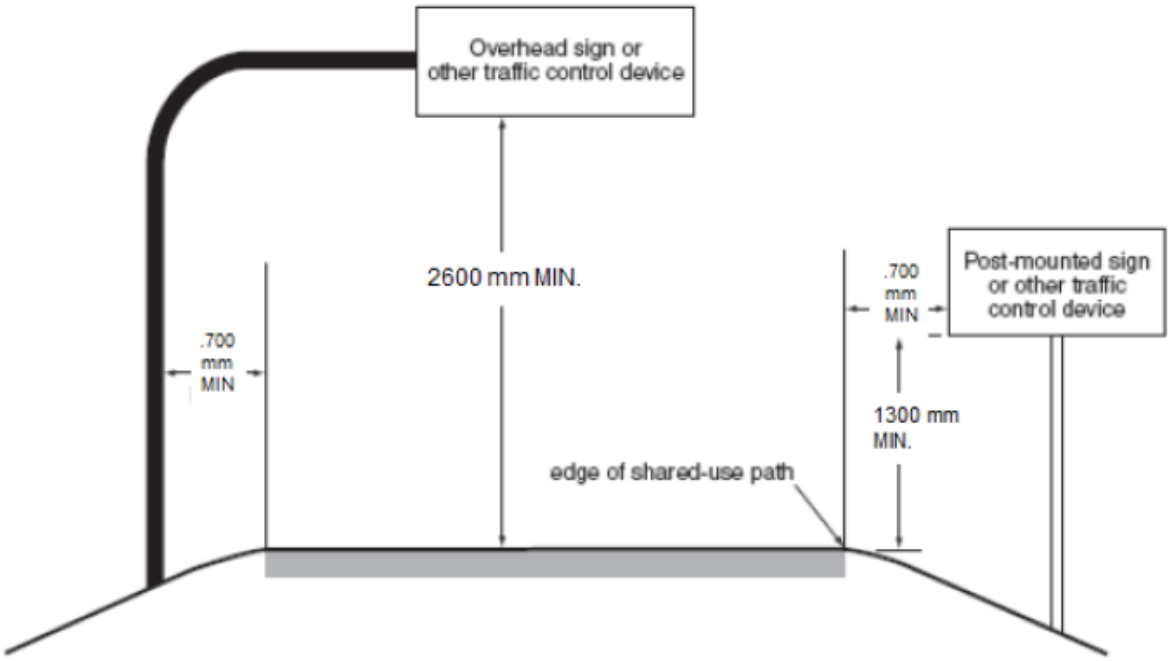


Figure 6-13 Sign Placement on Shared Use Paths

Uniformity in design of bicycle signs and plaques includes shape, color, symbols, arrows, wording, lettering, and illumination or retro-reflectorizing.

- If the sign or plaque applies to motorists and bicyclists, then the size **shall** be as shown for conventional roads.
- The minimum sign and plaque sizes for bicycle facilities **shall** not be used for signs or plaques that are placed in a location that would have any application to other vehicles.
- Except for size, the design of signs and plaques for bicycle facilities *Should* be identical to that provided in this Manual for signs and plaques for streets and highways. Larger size signs and plaques may be used on bicycle facilities when appropriate.

6.3.1.1. Stop and yield signs (R1-1 and R2-1)

- Stop Sign R1-1 **shall** be installed on shared-use paths at points where bicyclists are required to stop.
- Yield Sign R2-1 **shall** be installed on shared-use paths at points where bicyclists have an adequate view of conflicting traffic as they approach the sign, and where bicyclists are required to yield the right-of-way to that conflicting traffic.

6.3.1.2. Bicycle lane sign – start of lane (R40-9)

- For mandatory bicycle lanes, warning signs *Should* normally be placed in advance of the lane. For instances where a taper has been applied to start the lane, the sign *Should* be placed.
- Where the speed limit is equal to or below 40 km/h, the sign *Should* be sited 20 m in advance of the taper, with a minimum clear visibility distance of 45 m. Where the speed limit is 60 km/h, the sign *Should* be sited 40 m in advance of the taper with a minimum clear visibility distance of 60 m. Where location of the sign is likely to be difficult and where the bicycle lane is clearly visible to drivers, the sign may be omitted. Figure 6-14 shows a Start of Bicycle Lane. Figure 6-18 illustrates a typical layout.

Figure 6-14 Bicycle Lane Sign – Start of Lane (R40-9)

6.3.1.3. Bicycle lane regulatory sign (R40-10)

- The sign (R40-10, see Figure 6-15) *Should* be provided at the start of the continuous line denoting the edge of the bicycle lane (i.e. immediately following a taper). This is a regulatory sign that prohibits motor vehicles from encroaching on the bicycle lane. The sign *Should* be provided after each road intersection on the same side as the bicycle lane, even if the side road is one way leading away from the major road. The sign *Should* also be provided after an intersection on the opposite side of the highway if vehicles can turn right from it to join the flow of traffic alongside the bicycle lane. No two signs *Should* be more than 300 m apart; it might be necessary, therefore, to provide additional signs between intersections. Figure 6-18 illustrates a typical layout.
- Bicycle Lane Regulatory Sign (R39-1) in Figure 6-16 (see section 3.2.61) *Should* be provided on the right-hand side of the road at the entrance to the contra-flow bicycle lane. Figure 6-18 illustrates a typical layout. Figure 6-19 illustrates a typical layout.

Figure 6-15 Bicycle Lane Regulatory Sign (R40-10)

Figure 6-16 Bicycle Lane or path Regulatory Sign (R39-1)

6.3.1.4. Bicycle lane advance warning sign (W44-1)

- The Bicycle Lane sign (W44-1, see Figure 6-17) is intended mainly for use in conjunction with contra-flow bicycle lanes. However, it may be provided on side roads to warn emerging drivers of the presence of a with-flow bicycle lane on the major road, although this is not essential. The arrow on the sign indicates the direction of travel within the bicycle lane and will normally point to the right, as a sign is not required to indicate a lane on the opposite side of the road.
- The sign *Should* be mounted below any Yield or Stop sign or, if the intersection is controlled by traffic signals, mounted a sufficient distance in advance of the intersection so as not to obstruct the view of the signal head. Figure 6-18 illustrates a typical layout.

Figure 6-17 Bicycle Lane Advance Warning Signs (W44-1)

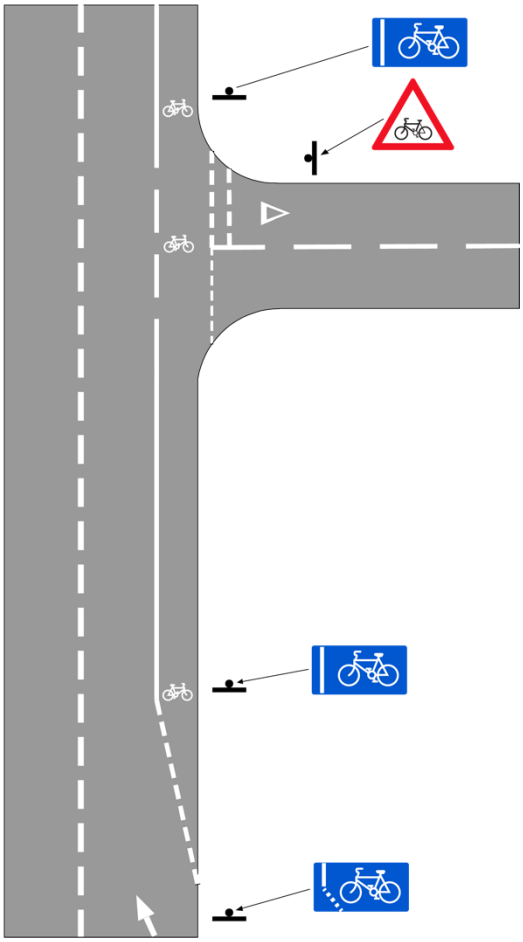


Figure 6-18 Bicycle Lane Signs Typical Layout

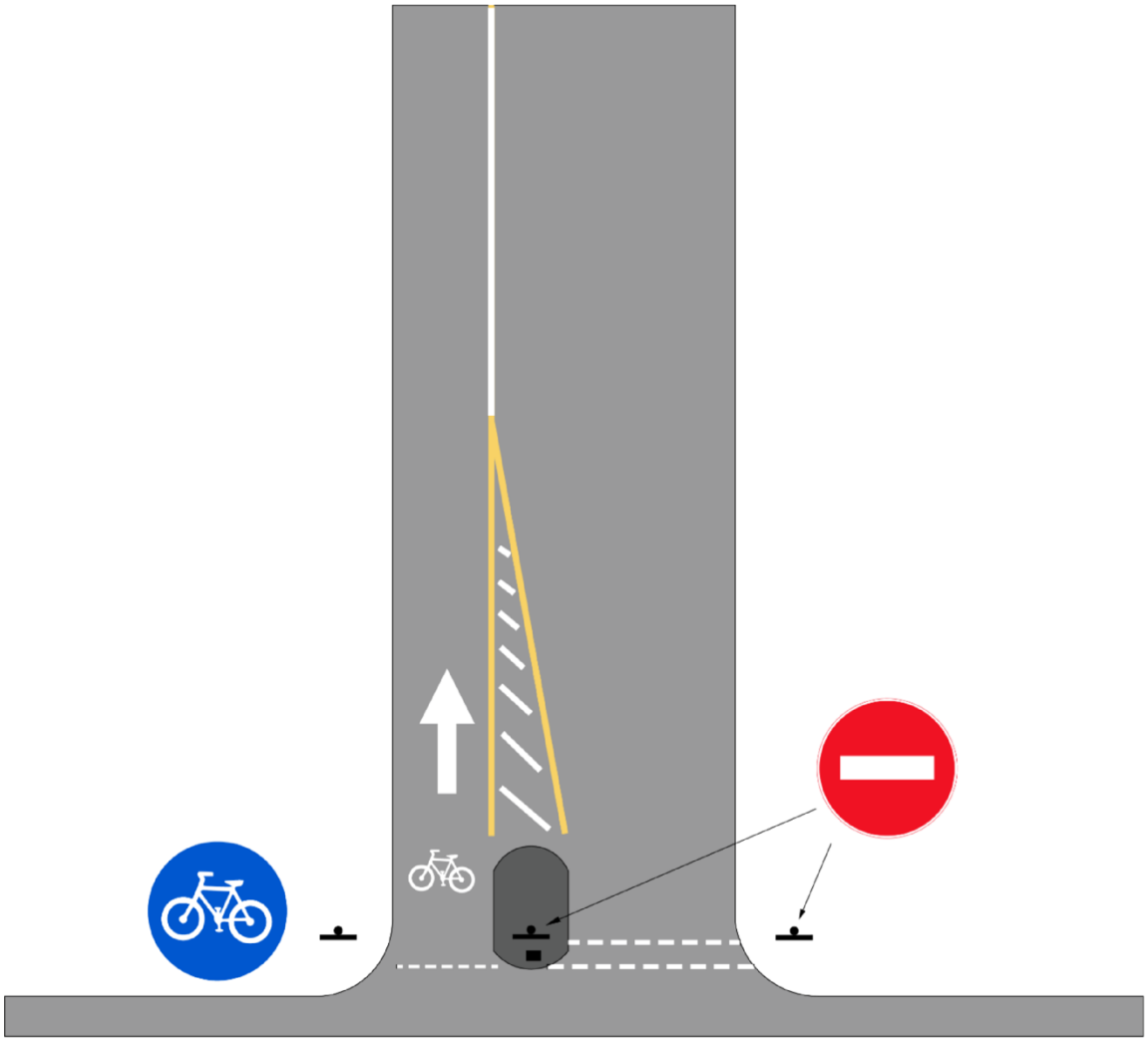


Figure 6-19 Typical Arrangement at the Start of a Contra-Flow Bicycle Lane

6.3.1.5. Contra-flow bicycle lane sign (R40-7)

- Contra-flow bicycle lanes *Should* only be established on one-way roads. Figure 6-21 shows a typical entry to a one-way street and the required signs. Sign R40-7 (see Figure 6-20) *Should* be located at the beginning of the road and after every intersection, in each case on both sides of the road. Additional signs *Should* be provided where the distance between them would otherwise exceed 300 m.
- Contra-flow bicycle lane *Should* be separated from opposing traffic by a traffic island in the center of the road.; the exit side of the road, used by all traffic, *Should* be protected by a pair of "no entry" signs as for ordinary one-way roads the sign *Should* be varied to indicate the number of lanes available in that direction. Figure 6-21 shows a typical arrangement at the start of a contra-flow bicycle lane.

Where possible, traffic islands *Should* be provided at the start and end of contra-flow bicycle lanes. Where a traffic island segregates traffic from the opposing bicycle lane, the Entry Prohibited Sign *Should* be located on this island. The number of arrows pointing upwards on the left-hand side of the sign *Should* be varied to indicate the number of lanes available in that direction. Figure 6-21 shows an example of an entrance to a bicycle lane to one-way street.

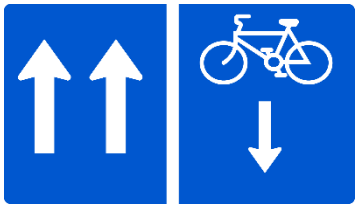


Figure 6-20 Contra-Flow Bicycle Lane Sign (R40-7)

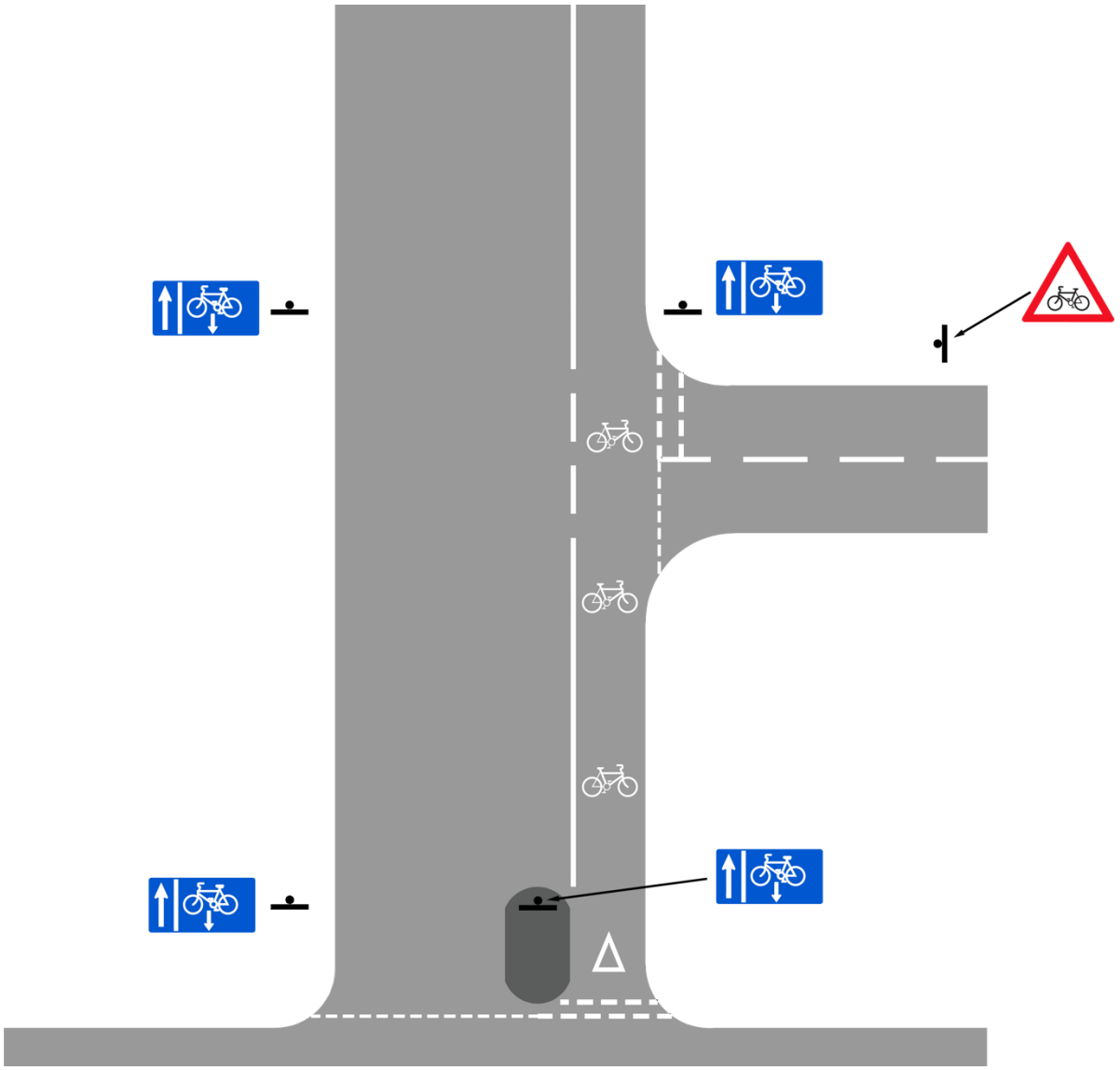


Figure 6-21 Typical Entry to a One-Way Street

6.3.1.6. Bicycle lane – pedestrian warning

- Sign R39-1 warns pedestrians of the presence of a bicycle lane; it *Should* not be used as a substitute for a sign to warn drivers approaching the bicycle lane from a side road. The sign is normally used for contra-flow lanes where cycles will be approaching from the opposite direction to the flow of traffic. The signs *Should* be sited where a majority of pedestrians cross the carriageway. Where pedestrians first cross a general traffic

lane, the sign, varied to Look Left with the symbols facing right, *Should* be located on the opposite side of the highway, adjacent to the bicycle lane. Signs may be located on a pedestrian refuge adjacent to the bicycle lane.

6.3.1.7. Advisory contra-flow bicycle lane sign (R40-8)

- Where it is not practicable to provide a mandatory contra-flow bicycle lane (prohibiting other traffic from using that part of the carriageway reserved for cycles), an advisory contra-flow lane might be considered and a relevant sign shall be mounted (R40-8, see Figure 6-22). This is likely to occur where:
  - Oncoming vehicles need occasionally to encroach into the bicycle lane, for example to pass parked vehicles on the opposite side or to pass cyclists travelling in the with-flow direction.
  - Occasional loading and unloading needs to be allowed for within the lane.
  - It is not possible to prohibit waiting in the lane at all times.
- Advisory contra-flow lanes *Should* normally be considered only where either the 85th percentile speed of traffic is less than 40 km/h, or vehicle flows are less than 1,000 vehicles per day.

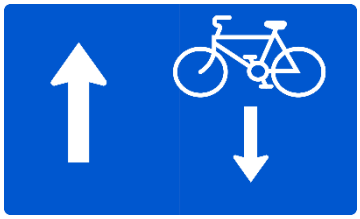


Figure 6-22 Advisory Contra-Flow Bicycle Lane Sign (R40-8)

6.3.1.8. Shared bicycle / pedestrian tracks sign (R43-series)

- Where a footway (forming part of a highway) or footpath (e.g., through a park) has been converted to a route shared by pedestrians and cyclists, signs R43-1 or R43-2 **shall** be used. These prohibit the use of the route by any other vehicles.
- Sign R43-1 indicates an unsegregated route. It *Should* be located where the shared route begins and **shall** be used as a repeater, at regular intervals to remind both pedestrians and cyclists that pedal cycles can be legally ridden on the footway or footpath.
- Sign R43-2 indicates a segregated shared route that *Should* be delineated by a continuous white marking. The sign may be reversed in a mirror image according to which side of the route is used by cyclists and which side by pedestrians. The sign *Should* be located at the start of the segregated route and must be used as a repeater at regular intervals along the route.

Figure 6-23 Shared Bicycle/Pedestrian Tracks Sign (R43-2)

6.3.1.9. End of bicycle lane, track or route sign

- The end of a bicycle track or shared route may be indicated by sign R40-2, although this is not essential. The sign might be helpful where bicyclists rejoin the main carriageway of a road at the end of a shared footway. It *Should* not be used at an intermittent break in a bicycle track or shared route, such as at a road crossing.
- Sign R40-1 (Cyclists Dismount) may be used together with sign R40-2, or on its own. The sign *Should* be provided only where cyclists are required to use a pedestrian crossing facility that they cannot legally bicycle on, at the entrance to a pedestrian area, at a location with a low headroom or width restriction (e.g. a subway or bridge) or at places where visibility is restricted to such an extent that cycling would be unsafe.

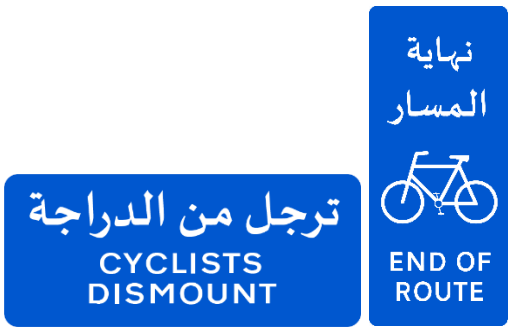


Figure 6-24 Cycling Dismount and End of Bicycle Lane (R40-1 and R40-2)

6.3.2. Typical Markings for Bicycle Facilities

Markings indicate the separation of the lanes for road users, assist the bicyclist by indicating assigned travel paths, indicate correct position for traffic control signal actuation and provide advance information for turning and crossing maneuvers.

- Bicycle lanes **shall** be a minimum of 1.5 m wide.
- Markings used on cycleways **shall** be retro-reflectorized.
- The colors, width of lines, patterns of lines, symbols, and arrows used for marking bicycle facilities **shall** be as defined in Chapter 4.
- Widths less than 1.5 m give cyclists very little room to maneuver around debris, surface defects or gulley gratings. Slightly narrower widths may nevertheless sometimes be helpful over short lengths, e.g., on the immediate approach to an intersection. Where bicycle flows are heavy, there may be advantages in increasing the width up to 2.0 m, but lanes wider than this are more likely to be abused by other traffic. Bikeway design guides *Should* be used when designing markings for bicycle facilities.

- A bicycle symbol (Figure 6-25) is prescribed with alternative dimensions. The width of lane available and the required conspicuity of the marking will determine the appropriate size; the largest (1,700 mm) is used with the advanced stop line. When used with a right turn arrow, the bicycle symbol *Should* be reversed to face right.

Figure 6-25 Bicycle Symbol Marking

6.3.2.1. Mandatory bicycle lane markings

- Mandatory bicycle lanes are parts of the carriageway which other vehicles **shall** not enter except to pick up or set down passengers, or in case of emergency. They may be either with flow or contraflow.
- With-flow mandatory bicycle lanes **shall** be bounded by a 150 mm continuous white line
- At side road intersections the mandatory lane *Should* change to an advisory lane bordered by a 150 mm wide dashed line (with a 4,000 mm, 2,000 mm gap or 6,000/3,000 for speeds greater than 65 km/h)
- The start of a bicycle lane **shall** be marked with a broken line marking (600 mm mark, 300 mm gap). If the speed limit is 65 km or less, the 150 mm wide line is used, otherwise it *Should* be 200 mm wide. As other traffic must not enter a mandatory bicycle lane, adequate warning of the approach *Should* be given by ensuring that the inclination of this line is no sharper than 1:10. Bicycle symbol markings **shall** be placed at the start of the lane and *Should* be repeated after every break, as well as at suitable intervals on long uninterrupted lengths. Sign (R40-9) *Should* be used in advance of a mandatory bicycle lane, together with an arrow, and Sign (R40-10) must be used at intervals along its length.
- Contra-flow mandatory bicycle lanes are marked in a similar way to with-flow lanes, except that broken line marking at the start of the lane **shall** be laid at right angles to it, as the lane normally starts at a intersection. Sign R40-7 **shall** be used to warn traffic travelling in the opposite direction.
- For contra-flow mandatory bicycle lanes, waiting and loading **shall** be prohibited at all times to avoid the lane becoming obstructed and thereby putting cyclists into conflict with oncoming vehicles.
- The bicycle lane marking may be continued across private driveways; however, the marking **shall** be interrupted for the length of any bus stop. The bicycle lane *Should* be monitored as needed in order to prevent other vehicles from using the lane (except for emergency and statutory purposes) and to prohibit waiting and loading during the operational hours of the lane.

Figure 6-26 and Figure 6-27 present examples of with-flow and contra-flow bicycle lane accordingly.

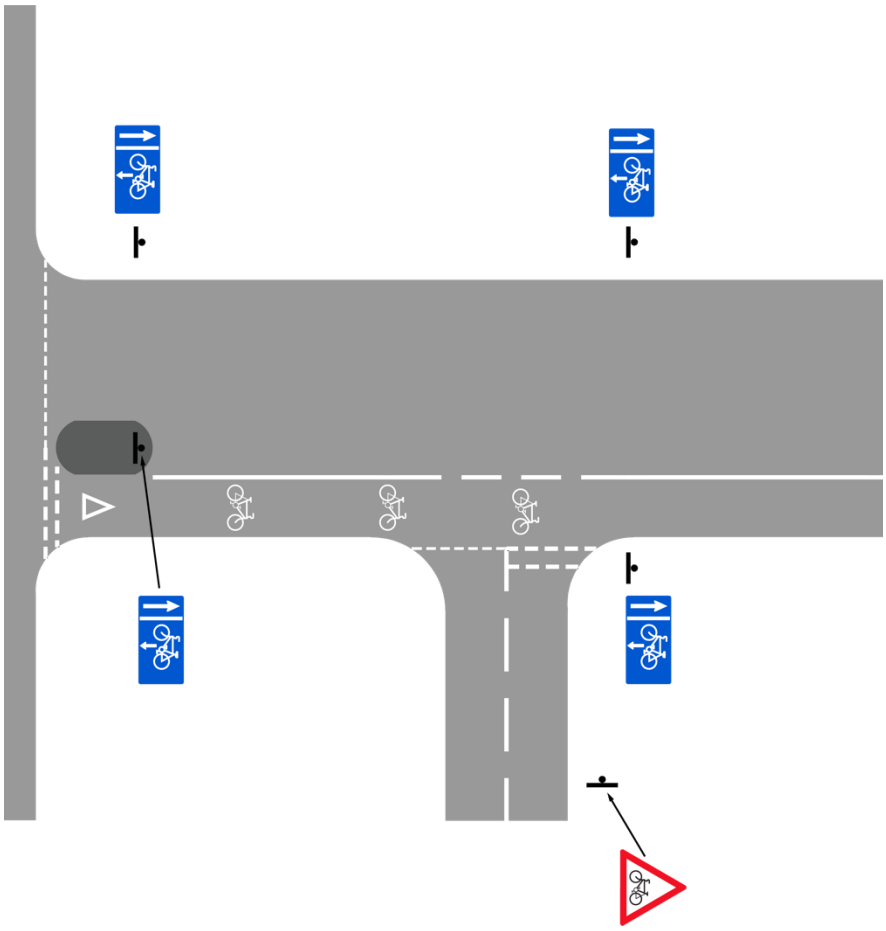


Figure 6-26 With-Flow Mandatory Bicycle Lanes

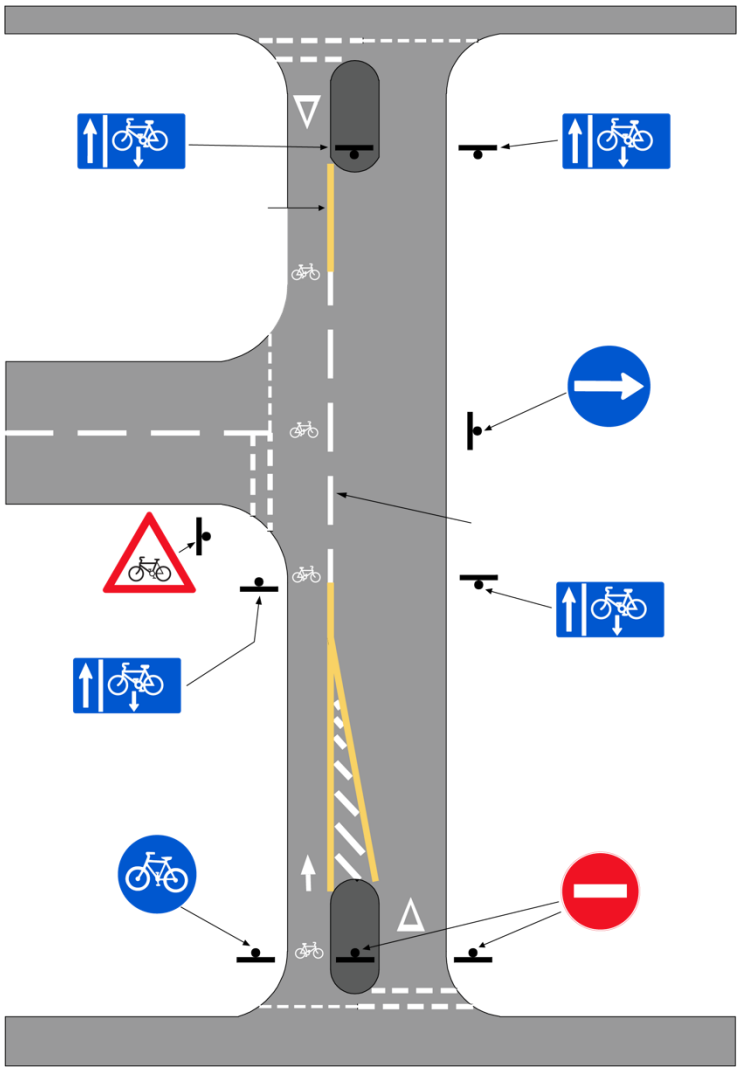


Figure 6-27 Contra-Flow Mandatory Bicycle Lanes

6.3.2.2. Advisory bicycle lane markings

- Advisory bicycle lanes are parts of the carriageway which other vehicles *Should* not enter unless it is seen to be safe to do so. They *Should* normally be with-flow, but may be contra-flow, in which case the signs would need to be specially authorized.
- Advisory bicycle lanes **shall** be bounded by a 100 mm wide lane guidance marking (L18-1) (with a 4000 mm, 2,000 mm gap or 6,000/3,000 for speeds greater than 65 km/h). The line may be widened to 150 mm for greater emphasis, but in a two-way road it shall never be wider than the center line. For a contra-flow lane, the wider line shall always be used.
- The start of a bicycle lane **shall** be marked with broken line (600 mm mark, 300 mm gap). If the speed limit is 65 km/h or less, the 150 mm wide line is used, otherwise it *Should* be 200 mm wide. As the lane is advisory, it is not essential for other vehicles to be deflected in advance of it. Angles between the line and the curb of 30 to 45 ° are therefore often adequate, although longer taper lengths may be used. Bicycle symbol markings (Figure 6-25) and cycle lane or path signs (R39-1) must be placed at the start

of the lane and after every break, as well as at suitable intervals on long uninterrupted lengths.

- Waiting and loading restrictions *Should* be implemented to cover the times when the lane is most heavily used and *Should* be indicated by the use of yellow lines, curb markings and appropriate upright signs.
- An advisory bicycle lane may be continued on the off side of a parking bay. Adequate clearance *Should* be provided to allow for carelessly opened car doors.

6.3.2.3. Bicycle track markings

- Bicycle track may be a physically segregated part of a highway or form a separate highway entirely distinct from the road system. It may form a route for bicycles only, a segregated route shared with pedestrians where cyclists and pedestrians use separate parts of the track, or an unsegregated route where both cyclists and pedestrians use the full width of the track.
- Where a route is divided into separate parts for the use of cyclists and of pedestrians, segregation may be achieved using the continuous marking (150 mm width) or by the raised profile marking. The latter is more easily detected by blind and partially sighted pedestrians. Alternatively, separation may be affected by the use of railings, a difference in level, or by the use of contrasting colored surfaces.

6.3.3. Signals for Bicycle Facilities

For purposes of signal warrant evaluation, cyclists may be counted as either vehicles or pedestrians.

- At installations where visibility-limited signal faces are used, signal faces **shall** be adjusted so bicyclists for whom the indications are intended can see the signal indications. If the visibility-limited signal faces cannot be aimed to serve the cyclist, then separate signal faces **shall** be provided for the cyclist.
- On cycleways, signal timing and actuation **shall** be reviewed and adjusted to consider the needs of cyclists.

6.4. Typical Traffic Control for Preferential Managed Lanes

Preferential lanes are a portion of the roadway designated for the preferential or exclusive use of transit vehicles, sometimes permitting limited use by other vehicles. They are often repurposed from a general traffic lane, designated by striping, signage, and pavement markings. Traffic control for preferential managed lanes in this chapter may be applicable to the following facilities:

- On-Road Public Transit Lanes (Buses, BRT and LRT Lanes).
- HOV Managed Lanes.

On-road public transit lanes allow transit vehicles (buses and trams) to easily enter and exit the lane to suit their routes. These lanes may be longitudinally separated by curbs, barriers, etc., with at-grade crossings for other vehicles and pedestrians, or mixed traffic, where public

transport vehicles may travel with other vehicles (may include some allocation of priority to public transport but without physical segregation).

HOV managed lanes are preferential lane designated for exclusive use by high occupancy vehicles for all or part of a day, including a designated lane on a freeway, other highway, street, or independent roadway on a separate right of way.

More guidance regarding "Classification of Transit Modes" is provided in SHC 201 (Planning Process).

6.4.1. Typical Signs and Marking for Urban LRT Crossings

For urban LRT crossings, which are treated similarly to other vehicle crossings (meaning some form of traffic control signalization or signage which alternates right-of-way between trams and other vehicle flows), the focus is on advance warning of an intersection in which trams may be crossing. A key safety emphasis is on pedestrians, assuring they are not crossing in front of a moving tram as it is approaching an intersection or pathway. To this end, movable "swing gates" may be provided that block pedestrian crossings over the LRT right-of-way when a tram is approaching. Side road or driveway approaches to the LRT facility **shall** be protected at the minimum with a Stop Sign.

6.4.1.1. Advance LRT crossing warnings

- Where the LRT crossing is protected by a modified railway crossing assembly, advance warning signage **shall** be provided (Figure 6-28).

Figure 6-28 Advance Railway Crossing Warnings (W52-1, R45-3SP and W52-3SP -Top to Bottom-)

6.4.1.2. Traffic signal ahead at LRT crossing assembly

- For advance warning LRT crossings protected by traffic signal operations, Traffic Signal Ahead Assembly (see Figure 6-29) consists of an LRT Plate Sign which **shall** be provided underneath a standard Traffic Signal Ahead Sign or, where needed (for approach speeds of 80 km/h and higher). The Assembly **shall** be installed and placed as per the requirements of Chapter 3 for advance traffic signal ahead signs.

Figure 6-29 Traffic Signal Ahead (W18-1 and R45-5SP)

6.4.1.3. Unsignalized crossing of LRT facility on local street or driveway

6.4.1.3.1. LRT crossing on side road assembly

- If a side road or driveway crosses an LRT facility travelling on the outer edge of an urban roadway (but physically separated from the roadway), an Advance LRT Crossing Assembly (Figure 6-30) **shall** be provided with an advance LRT crossing warning sign and a Supplementary Sign containing the appropriate directional arrows as per the requirements of Section 3.2.
- Advance warnings for left or right turn across LRT tracks **shall** be required for crossroads, assuming they provide adequate time and space for the driver to see the oncoming tram. An electronic "no right turn" display is to be provided at the unsignalized side road intersection and activated when trams are approaching the side road crossing on the right. If the access is to the left side of the carriageway, an electronic "no left turn" display **shall** be provided at the unsignalized side road intersection.

Figure 6-30 Crossing with Arrow Supplementary Plate (W54-1 and R47-3SP)

6.4.1.3.2. Advance warning of LRT crossing (Stop-controlled, no signal or gate)

- For local streets approaching an LRT crossing where the LRT facility is travelling on the outer edge of an urban roadway (but physically separated), a stand-alone Advance LRT Crossing Warning Sign **shall** be mounted a minimum 200 m from the crossing.

6.4.1.3.3. LRT crossing, stop control assembly and stop line marking

- For local streets crossing an LRT facility travelling on the outer edge of an urban roadway (but physically separated), LRT Crossing, Stop Control Assembly (Figure 6-31) **shall** consist of a Stop Sign provided a minimum of 10 m prior to the outer track with a "Watch for Trams" sign placed below the stop sign. Stop Line Marking **shall** be provided in the direction of travel approaching the LRT crossing, no more than 5 m prior to the Assembly installation.

Figure 6-31 LRT Crossing, Stop Control Assembly (R1-1, R49-4SP, and R45-5SP)

6.4.1.4. Overhead flashing signals assembly

- Overhead Flashing Signals Assembly (Figure 6-32) *Should* be used in conjunction with pedestal mounted assemblies in the following cases:
  - Where stopping sight distance to the pedestal mounted assembly is inadequate, e.g. because of vertical or horizontal alignment or other sight obstruction.

- Where sue to sight obstruction caused either by road geometry or frequent presence of high vehicles, the pedestal mounted assembly is not continuously visible as the road user approaches the crossing over the stopping sight distance.
- Where there are more than two traffic lanes on the approach.
- Overhead signals *Should* be omitted if there is a likelihood that they could appear confusing in relation to an adjacent signalized intersection.

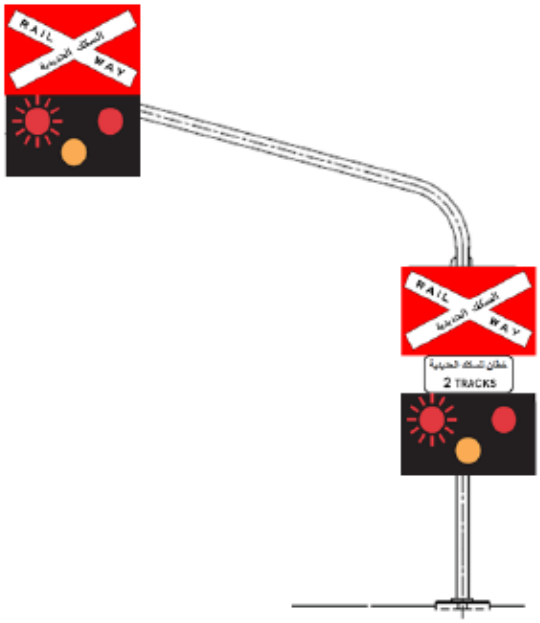


Figure 6-32 Overhead Flashing Signal Assembly

- Overhead signals may be needed on side road approaches to a crossing if any of these requirements are met for traffic on these approaches. The overhead signals **shall** be identical to except intermediate sign (number of tracks) or (LRT symbol) **shall** not be provided on the overhead assembly. The bottom edge of the overhead flasher **shall** be no lower than 5,600 mm above the crown of the pavement.

6.4.1.5. Exclusive LRT / tram lane signs (R49-series)

If trams utilize specific lanes (either curb or median lanes) exclusively, they are to be configured in a similar fashion to those for bus lanes. The signs indicate to drivers that a roadway or lane dedicated for the use of trams or an access to a facility so signed is reserved for trams only. Although these facilities may be adjacent to the roadway, they are not always part of the road right of way. Tram Lane signs **shall** define the presence of a lane only open to trams. Each of the signs **shall** function as follows:

- Tram Lane Ahead on Right Sign (Figure 6-33) indicates the start of a tram lane on the right (a left-hand tram lane **shall** be indicated by a mirrored image of the sign). These are typically provided where LRT tracks merge from another roadway or separate facility into the roadway.

Figure 6-33 Tram Lane Ahead on Right Sign (R49-1)

- Tram Lane Intermediate Sign (Figure 6-34) indicates the continuity of the tram lane on the right (a left-hand tram lane **shall** be indicated by a mirrored image of the sign End Of Tram Lane Sign indicates the end of a tram lane on the right (a left-hand tram lane **shall** be indicated by a mirrored image of the sign). In reality, the LRT tracks may not "end" but may divert to another route or facility.

Figure 6-34 Tram Lane Intermediate Sign (R49-2)

End of Tram Lane Sign (Figure 6-35) indicates the end of a tram lane on the right (a left-hand tram lane **shall** be indicated by a mirrored image of the sign. The LRT tracks may not "end" but may divert to another route or facility.

Figure 6-35 End of Tram Lane Sign (R49-3)

6.4.1.6. Pedestrian signs for tramways or LRT lines (R50-1)

- Tramway or LRT line - look both ways (Figure 6-36) **shall** be used to warn pedestrians of the presence of a tramway or an LRT line. The legend "Look Both Ways" may vary to "Look Left" or "Look Right":
    - The sign *Should* be sited where the majority of pedestrians cross the roadway and *Should* always be located adjacent to a tramway or LRT line.
    - The sign **shall** be shown in both Arabic and English text. The aleph-height (x–height) of sign R50-1 *Should* be 85 mm (50 mm). A smaller aleph-height (x-height) of 68 mm (40 mm) may be considered in situations where there are space limitations (e.g., at a pedestrian refuge or island).

Figure 6-36 Tramway or LRT line - Look Both Ways (R50-1)

6.4.1.7. Pedestrian wayfinding signs for tramways or LRT stations (R51-1)

- Sign Pedestrian wayfinding for Tramway or LRT stations (Figure 6-37) may be used to give guidance to pedestrians on the location of a tramway or LRT station:
    - The sign *Should* be positioned in appropriate locations to make certain it is clearly visible to pedestrians and is unlikely to be obscured by street furniture or parked vehicles on the footway.
    - The sign **shall** be shown in both Arabic and English text. The aleph-height (x-height) *Should* be between 51 mm (30 mm) and 85 mm (50 mm).

Figure 6-37 Pedestrian Wayfinding for Tramway or LRT Stations (R51-1)

6.5. Typical Traffic Control for Rest Areas & Truck Inspection Stations

Typical signs and marking for special roadside facilities, Rest Areas (RA) and Truck Inspection Stations (TIS), **shall** be provided in compliance with the design guidelines and details presented in SHC 303 (Highway Facilities and Utilities Design – Rest Areas, Truck Inspection Stations, Parking and Garage Facilities).

Sufficient advance signposting *Should* be provided to enable drivers with adequate time to decide to use a particular rest area. Signs for dedicated heavy vehicle rest areas *Should* not show the facilities available in order to minimize use by motorists and tourist traffic appropriate advance signs located at 500 m, 300 m and 200 m before a rest area (depending on the speed environment), and at the turn-off to the facility.

In addition, advance warning signs are desired at:

- 10 km – indicate type of rest area.
- 2 km – indicate type of rest area and the distance to the next rest area.
- 1 km – indicate upcoming rest areas a further safety measure, a "Fasten Seat Belts" sign *Should* also be placed adjacent to the exit points of all rest areas.

6.5.1. Typical Signs and Markings for Rest Areas & Truck Inspection Stations

6.5.1.1. Rest areas (RA)

- A combination of advance and onsite signage *Should* be included to assist drivers. Recommended locations are as follows:
- "Advance" signs located at 500 m, 300 m and 200 m ahead of the Rest Area (RA) (depending on the speed limit)
- Additional desirable advance signs to inform about the layout of Rest Areas along the road at a distance of:
    - 10 km to the Rest Area (RA), the type of Rest Area (RA) is indicated.
    - km – type of the Rest Area (RA) and distance to another Rest Area (RA) is stated.
    - 1 km – an approaching Rest Area (RA) is indicated.
- Internal signage for the safe and efficient movement of vehicles circulating within the site, including dedicated signage in truck Rest Areas for 'no parking' *Should* be included.
- Signing and pavement markings at the exit and entrance ramps to the Rest Area *Should* be in accordance with Chapters 3 and 4 in this Volume.

6.5.1.2. Truck inspection stations (TIS) (R52-series)

- Sign R52-1 is used to indicate the location of a Truck Inspection Stations (TIS) to drivers of heavy goods vehicles.
- The distance may be included on supplementary plate R52-4SP mounted below sign R52-4SP.
- Sign R52-1 **shall** be on the right side of the roadway at a distance of approximately 1 km (500 m minimum) from the Truck Inspection Stations (TIS).
- Sign R52-2 is to indicate the point that trucks must exit the main roadway. Sign R52-2 *Should* be provided on a ground mounted sign at the start of the deacceleration lane.
- Sign R52-3 **shall** be provided at the start of the painted gore to indicate the exit.
- The character heights of signs R52-1, R52-2 and R52-3 are 85 mm aleph-height (50 mm x-height) for a 50 km/h roadway and 130 mm aleph–height (75 mm aleph-height) for an 80 km/h roadway.

Figure 6-38 Weighbridge Ahead (R52-1)

Figure 6-39 Weighbridge (R52-2)

Figure 6-40 Weighbridge Flag Sign (R52-3)

Figure 6-41 Supplementary Plate (R52-4SP)

6.5.1.3. Parking for buses, trucks, bicycles, and motorcycles (R45-series)

Most parking signs are prescribed an x-height of either 20 mm or 40 mm. The appropriate x-height for parking signs is determined by the need to ensure the sign is conspicuous rather than by the speed of approaching traffic. Therefore, the smaller 20 mm x-heights are more appropriate for parking signs displaying larger amounts of information.

- Sign R15-1 may be used in combination with a supplementary plate mounted below to indicate parking reserved for:
  - Trucks (R45-1SP).
  - Buses (R45-2SP).
  - Bicycles (R45-3SP).
  - Motorcycles (R45-4SP).

Figure 6-42 Truck Supplementary Plate (R45-1SP)

Figure 6-43 Buses Supplementary Plate (R45-2SP)

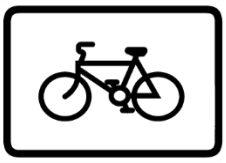


Figure 6-44 Bicycles Supplementary Plate (R45-3SP)

Figure 6-45 Motorcycles Supplementary Plate (R45-4SP)

6.6. Typical Traffic Control for Special Rural Zones

6.6.1. Low-Volume Rural Highways

A low-volume roadway **shall** be a facility lying outside of built-up areas of cities, towns, and communities, and it **shall** have a traffic volume of less than 400 Annual Average Daily Traffic (AADT).

- A low-volume highway **shall** not be a freeway, an expressway, an arterial, an interchange ramp, a freeway/expressway/arterial service road, or a residential street in a neighborhood. In terms of highway classification, it **shall** be a variation of a conventional road, or a special purpose road.
- A low-volume road **shall** be classified as either paved or unpaved road. At some locations on low-volume roads, the use of traffic control devices might be needed to provide the road user limited, but essential, information regarding regulation, guidance, and warning. Other chapters of this Manual contain provisions applicable to all low-volume roadways; however, this chapter specifically supplements and references the provisions for traffic control devices commonly used on low-volume rural highways.

6.6.2. Typical Signs and Markings

6.6.2.1. Typical regulatory signs

Provisions for regulatory signs that are specific to low-volume roads are contained in this chapter. See Section 3.2 for more details regarding Regulatory Signs.

6.6.2.1.1. Stop and yield signs

Stop and Yield signs *Should* be considered for use on low-volume roads where engineering judgment or study, consistent with the provisions of Sections (see Section 3.2.1 and 3.2.3).

A Stop / Yield sign may be warranted at an intersection where one or more of the following conditions exist:

- Intersection on a less important road with a main road where application of the general right-of-way rule (i.e. right-of-way to the right) is unduly hazardous.
- Unsignalized/uncontrolled intersection where priority is not clear.
- Other intersections where a combination of high speed, restricted view, and serious collision record indicates a need for control by the Stop sign.

6.6.2.1.2. Speed limit signs

Speed limits **shall** be established in accordance with Section 3.2.4.

Speed limit signs **shall** be used on low-volume roads that carry traffic from, onto, or adjacent to higher-volume roads that have posted speed limits.

6.6.2.1.3. Traffic movement and prohibition signs

The regulatory signs (see Section 3.2) in this section inform road users of required, permitted, or prohibited traffic movements involving turning movements, the alignment ahead, exclusion of certain vehicles, and pedestrians.

If used, signs for traffic prohibitions or restrictions **shall** be placed in advance of the prohibition or restriction so that traffic can use an alternate route or turn around.

Signs *Should* be used on low-volume roads to indicate traffic prohibitions and restrictions such as road closures and weight restrictions.

Signs for traffic prohibitions or restrictions may be used on a low-volume road near and at the intersections or the connections with a higher class of road, and where the regulatory message is essential for transition from the low-volume road to the higher-class facility or vice versa.

6.6.2.1.4. Parking signs

Parking signs (see Section 3.2.29) may be installed selectively on low-volume roads with due consideration of enforcement.

6.6.2.1.5. Other Regulatory Signs

Other regulatory signs used on low-volume roads that are not discussed in Section 3.2 **shall** comply with the provisions contained in other Parts of this Manual.

6.6.2.2. Typical warning signs

The purpose of a warning sign is to provide advance warning to the road user of unexpected conditions on or adjacent to the roadway that might not be readily apparent.

The provisions for warning signs are contained in Section 3.3 and in other sections of this manual. Provisions for warning signs that are specific to low-volume roads are contained in this chapter.

6.6.2.2.1. Horizontal alignment warning signs on low-volume roads

Horizontal Alignment signs (see Section 3.3.1) to be used where engineering judgment indicates a need to inform the road user of a change in the horizontal alignment of the roadway.

6.6.2.2.2. Intersection warning signs

Intersection signs (see Section 3.3.40) include the crossroad, side road, T-symbol, Y-symbol, and circular intersection signs**.**

Intersection signs may be used where engineering judgment indicates a need to inform the road user in advance of an intersection.

6.6.2.2.3. Stop ahead and yield ahead signs

A Stop Ahead (W16-1) sign (see Section 3.3.16) **shall** be used where a Stop sign is not visible for a sufficient distance to permit the road user to bring the vehicle to a stop at the Stop sign.

A Yield Ahead (W17-1) sign (see Section 3.3.17) **shall** be used where a Yield sign is not visible for a sufficient distance to permit the road user to bring the vehicle to a stop, if necessary, at the Yield sign.

6.6.2.2.4. Narrow bridge sign

The narrow bridge sign W8-1 to be used on approach to a bridge or culvert that has a two-way clear width less than that of the approach roadway (see Section 3.3.9).

6.6.2.2.5. One lane bridge sign

A one lane bridge (W7-1) sign (see Section 3.3.8) *Should* be used on low-volume two-way roadways in advance of any bridge or culvert:

Having a clear roadway width of less than 4.8 m or having a clear roadway width of less than 5.5 m when commercial vehicles constitute a high proportion of the traffic or having a clear roadway width of 5.5 m or less where the approach sight distance is limited on the approach to the structure.

6.6.2.2.6. Hill sign

An engineering study of vehicles and road characteristics, such as percent grade and length of grade, may be conducted to determine hill signing requirements (see Section 3.3.6).

6.6.2.2.7. Pavement ends sign

A pavement ends sign may be used to warn road users where a paved surface changes to a gravel or earth road surface (see Section 3.3.22).

6.6.2.2.8. Vehicular traffic warning and non-vehicular warning signs

Vehicular Traffic Warning signs Should be used to alert road users to locations where frequent unexpected entries into the roadway by trucks, bicyclists, farm vehicles, fire trucks, and other vehicles might occur. Such signs Should be used only at locations where the road user's sight distance is restricted or the condition, activity, or entering traffic would be unexpected.

Non-Vehicular Warning signs may be used to alert road users in advance of locations where unexpected entries into the roadway or shared use by pedestrians, large animals, or other crossing activities might occur.

If the activity is seasonal or temporary, the sign Should be removed or covered when the condition or activity does not exist.

6.6.2.2.9. Dead end or no through signs

The dead-end sign or no through road sign (W15-Series) (see Sections 3.3.15) may be used to warn road users of a road that has no outlet or that terminates in a dead end or cul-de-sac.

If used, these signs **shall** be placed at a location that gives drivers of large commercial or recreational vehicles an opportunity to select a different route or turn around.

6.6.2.2.10. Other warning signs

Other warning signs used on low-volume roads that are not discussed in Section 3.3, but are in this manual, **shall** comply with the provisions contained in other Parts of this Manual. Warning signs that are not provided in this Manual **shall** comply with the provisions in Section 3.3.

6.6.2.2.11. Object markers and barricade

The purpose of object markers is to mark obstructions located within or adjacent to the roadway, such as bridge abutments, drainage structures, and other physical objects.

The end of a low-volume road **shall** be marked with a Type 3 object marker.

A Type 2 Barricade may be used where engineering studies or judgment indicates a need for a more visible end-of-roadway treatment. Barricades used on low-volume roads **shall** comply with the provisions contained in Section 7.3.5.

6.6.2.3. Typical guide signs

The purpose of a guide sign is to inform road users regarding positions, directions, destinations, and routes.

The provisions for guide signs, in general, are contained in Sections 3.4 and 3.5. Provisions for guide signs that are specific to low-volume roads are contained in this Section 6.1.

The familiarity of the road users with the road *Should* be considered in determining the need for guide signs on low-volume roads. Low-volume roads generally do not require guide signs to the extent that they are needed on higher classes of roads. Because guide signs are typically only beneficial as a navigational aid for road users who are unfamiliar with a low-volume road, guide signs might not be needed on low-volume roads that serve only local traffic.

If used, destination names *Should* be as specific and descriptive as possible. Destinations such as desert camps, recreational areas, and the like *Should* be clearly indicated so that they are not interpreted to be communities or locations with road user services.

Guide signs may be used at intersections to provide information for road users returning to a higher class of road.

6.6.2.4. Typical markings

The purpose of markings on highways is to provide guidance and information for road users regarding roadway conditions and restrictions.

The provisions for markings and delineators, in general, are contained in Chapter 4.1 and in other sections of this manual. Provisions for markings that are specific to low-volume roads are contained in this Chapter 4.

6.6.2.4.1. Center line / no passing markings

Where center line markings and/or no-passing zone markings are installed, they **shall** be as in Section 4.2.1.

Center line markings *Should* be used on paved low-volume roads consistent with the principles of this Volume and with the policies and practices of the road agency (RGA) and on the basis of either an engineering study or the application of engineering judgment. Center line markings may be placed on roadways with or without edge line markings.

6.6.2.4.2. Edge line markings

The purpose of edge line markings is to delineate the left-hand and right-hand edge of the roadway see Section 4.2.5. Edge line markings *Should* be considered for use on paved low-volume roads based on engineering judgment or an engineering study.

Edge line markings may be placed on roadways with or without center line markings.

Edge line markings may be placed on paved low-volume roads for roadway features such as horizontal curves, narrow bridges, pavement width transitions, curved alignment, and at other locations based on engineering judgment or an engineering study.

6.6.2.4.3. Delineators

The purpose of delineators is to enhance driver safety where it is desirable to call attention to a changed or changing condition (see Section 4.7).

Delineators may be used on low-volume roads based on engineering judgment, such as for T-intersections, and abrupt changes in the roadway width. In addition, they may be used to mark the location of driveways or other minor roads entering the low-volume road.

6.6.2.4.4. Other markings

Other markings, such as stop lines, crosswalks, pavement legends, channelizing devices, and islands, used on low-volume roads **shall** comply with the provisions contained in this Volume.

7. Typical Traffic Control for Work Zones

7.1. General Provision

Basic factors for the realization of a project are both the installation and removal procedures of the work site as well as the necessary traffic adjustments during the works which *Should* be done in a short period of time in order to avoid any charge of traffic.

Since traffic must not be interrupted for any reason, traffic changes must be made in such a way as to ensure the safety of both drivers and workers on the work site.

Traffic control devices for construction, maintenance, and utility work zones include signs, channelizing devices, temporary pavement markings, hand signaling signs or flags, lighting units, arrow panels, and high-level danger warning devices.

The following items *Should* be considered when selecting work zone signing:

a. Select signs that appropriately and accurately describe the work area situation.
b. Select the message according to the action the driver is required to make.
c. Place a Warning sign in advance of and at the beginning of the work area. As drivers approach the work area, other signs with increasingly more specific messages will be necessary.
d. The overall effect of the sign series and the attendant supporting devices *Should* be evaluated. This is to ensure that the driver is aware of the condition being approached and his/her resultant action is appropriate.

Each situation requires varying the application of the devices to fit, but some basic requirements relate to most conditions:

e. The flaggers **shall** be used only in emergency cases.
f. Operations restricting vehicular movement, so traffic in both directions must use a single lane, **shall** only be allowed while flaggers are on duty or when a temporary traffic signal is installed to assign right-of-way.
g. Steady burning lights used on Type I or Type II barricades will not be required for day operations.
h. A minimum of two flashing lights **shall** be used at night on each approach in advance of the work area. Flashing lights **shall** be installed above at least the first sign in the series.
i. Longitudinal dimensions may be adjusted slightly to fit field conditions.
j. All signs **shall** be post mounted if the closure time exceeds 3 days.
k. When a side road intersects the highway where work is being performed, additional traffic control devices **shall** be erected as directed by the Engineer.
l. The Engineer may require plastic drums to be used to supplement the barricades if the closure time is of a longer-term activity period over and above maintenance or utility work.
m. Cones may be substituted for barricades during day operations.
n. All taper lengths are in accordance with cones.
o. At the completion of the day's operations all temporary signs pertinent to the operation **shall** be removed or fully covered not to be visible.

p. Type I or Type II barricades used for delineation at night **shall** be equipped with steady burning lights.
q. Roadwork signs are removed when no work is being performed. Any unattended obstacle or excavation in the work area **shall** be protected with Type I or Type II barricades with flashing lights.
r. Cones have a greater visibility than do tubular markers, but are not as visible as barricades, drums, or panels. For this reason, they *Should* only be used where the speed of traffic is low or moderate, and for temporary installations of a few hours at most (see Section 7.3.1).
s. Drums are most commonly used to channelize or delineate traffic flow but may also be used singly or in groups to mark specific hazards (see Section 7.3.4).
t. Type I barricades are intended for use where traffic is maintained through a work area. Type I barricades may be used singly or in groups to warn of a specific hazard or in a series for channelizing traffic. Type I barricades are normally used where sufficient lateral space is available. Type II barricades are intended for road closures (see Section 7.3.5).
u. High level warning devices, consisting of several red flags on a tall support, are used to supplement other devices to warn of work areas or obstructions in the roadway. These devices are most commonly used in urban, high-density traffic where short-time work such as pavement patching, surveying or utility installation, and repair is being done.
v. Delineators may be used to show the roadway alignment on highway sections in work areas or on detours. Barricades or other channelizing devices **shall** be used where more than the usual hazard exists (see Section 7.4.2).
w. Flashing Warning Arrow Panels are useful devices to supplement Warning signs where traffic volumes and speeds are high (see Section 7.5.3).

Temporary redirecting concrete or steel barriers may be the best and most economical device for channelizing and protecting traffic in a lane transition or merging area and are re-usable. These barrier sections are especially effective and desirable where a great hazard could occur to any vehicle which left the roadway.

7.2. Temporary Signs

Highways or streets work area signs fall into the same three major categories as do other traffic signs: Warning signs, Regulatory signs, and Informative signs. Existing regulatory and warning signs may be appropriate for use in work areas. Many signs normally used elsewhere also can be used for work area operations. Special work area signs follow the basic standards for shapes of all highway signs. However, warning and regulatory signs in work areas **shall** have a black legend on a yellow background with a red border. Informative signs within work areas may have a black legend and border on a yellow background.

The temporary signs must be manufactured under similar standards with those of the permanent ones. The temporary signs must be clearly visible during the night. The reflectivity of the signs must be adequate using adequate retroreflective sheeting so that they are clearly legible to drivers according to the surrounding environment of the work zone area.

The reflective surface of the signs must be made of aluminum, aluminum composite or Glass-Reinforced Plastic (GRP). Moreover, the materials used for their construction must be like the ones used for the permanent signs. In any case the materials must be lightweight, strong, durable and able to resist deformation under normal climatic conditions.

Materials such as steel, wood, plywood, cardboard, lightweight flexible plastic or other similar materials must not be used. The temporary signs must be easily and quickly removed and covered when not in use.

The size of a sign is determined by the speed of traffic approaching it. For signs associated with work zones, this speed **shall** be taken as the permanent speed limit for all signs within the advance warning and transition areas. If a temporary speed limit is applied, sign sizes in the works and termination areas may be reduced by one level, for example, on a 120 km/h road, within a work zone subject to a temporary speed limit, signs may be 900 mm rather than 1,200 mm. Worded signs are to be used for the specified aleph and x-heights.

Table 7-1 Standard Sign Sizes in Work Zones (Qatar WZTMG – Rev 1.2)

Speed Limit (Permanent)	Minimum Diameter / Height Circular / Triangular signs (mm)	Worded signs First letter / x-height (mm)	Minimum forward visibility (m)
≤ 50	600	130 / 75	60
51 - 80	750	170 / 100	75
81 - 100	900	255 / 150	100
101 - 120	1200	255 / 150	100

Table 7-2 Standard Character Sizes in Work Zones Signs (Qatar WZTMG – Rev 1.2)

85th Percentile Speed (km/h)	Advance Directional Guide Signs / Far Advanced Directional Guide Signs		Directional Guide Signs		Route Confirmation Guide Signs	
	Aleph-height (mm)	x-height (mm)	Aleph-height (mm)	x-height (mm)	Aleph-height (mm)	x-height (mm)
≤ 45	170	100	130	75	130	75
> 45 - 60	170	100	130	75	130	75
> 60 - 80	255	150	170	100	170	100
> 80 - 100	340	200	255	150	255	150
> 100	425	250	340	200	340	200

7.2.1. Position of Signs

Signs **shall** be placed in positions to convey messages most effectively, and placement must be accommodated to highway design alignment. Signs **shall** be placed to allow the driver adequate time for response.

As a rule, signs **shall** be located on the right-hand side of the roadway. Where special emphasis is necessary (e.g. three or more lanes on a dual carriageway), dual installations may be made, which consist of duplicate signs opposite each other on the left and the right sides of the roadway respectively.

Within a work area however, if you have shoulder and lane closures for example, it is often necessary and/or desirable to erect signs on portable supports placed on the permanent roadway itself (protected with an adequate VRS if not passively safe). It is also permissible to mount appropriate signs on barricades.

Typical standards for height and lateral clearance of roadside signs are shown in Figure 7-1.

Signs mounted on barricades or temporary supports may be mounted at lower heights, but the bottom of the sign **shall** be no less than 1.5 m above the pavement elevation. However, higher mounting heights are desirable.

Where open highway conditions prevail on the approach to the work area, advance warning signs *Should* be placed well in advance of the condition. Where a series of advance warning signs is used, the signs *Should* be placed generally as shown in SHC 305 (Highway Facilities and Utilities Design – Work Zone Design).

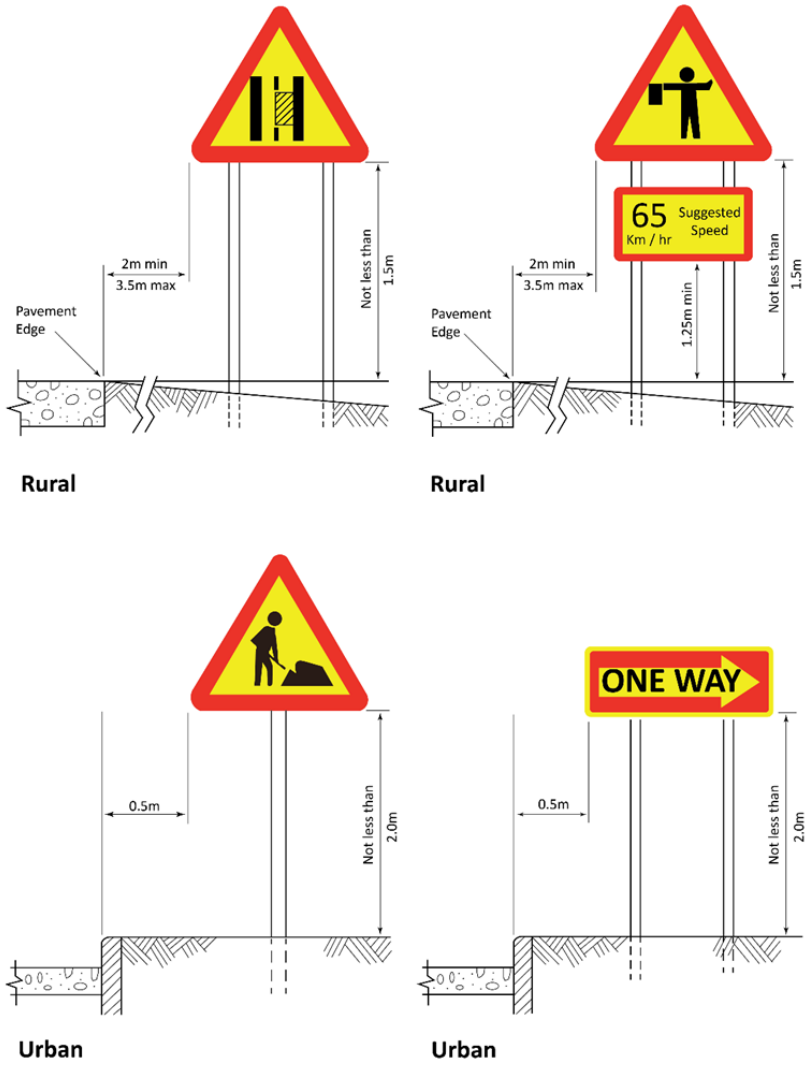


Figure 7-1 Height and Lateral Location of Signs – Typical Installation

7.2.2. Mounting of Signs

Signs on fixed supports are usually mounted on a single post, although those larger than 1 m^2 area *Should* generally be mounted on two posts. Signs mounted on portable supports are suitable for temporary conditions. All such installations *Should* be constructed to yield upon impact to minimize hazards to motorists.

For maximum mobility on certain types of work area operations, a large sign may be effectively mounted on a vehicle stationed in advance of the work or moving along with it. This may be the working vehicle itself or a vehicle provided expressly for this purpose (see Figure 7-2).

Typical methods of mounting signs other than on posts are shown in Figure 7-3.

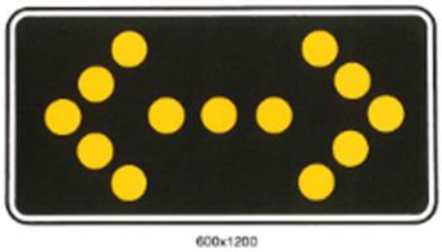


Figure 7-2 Vehicle Mounted Flashing Arrow Panel

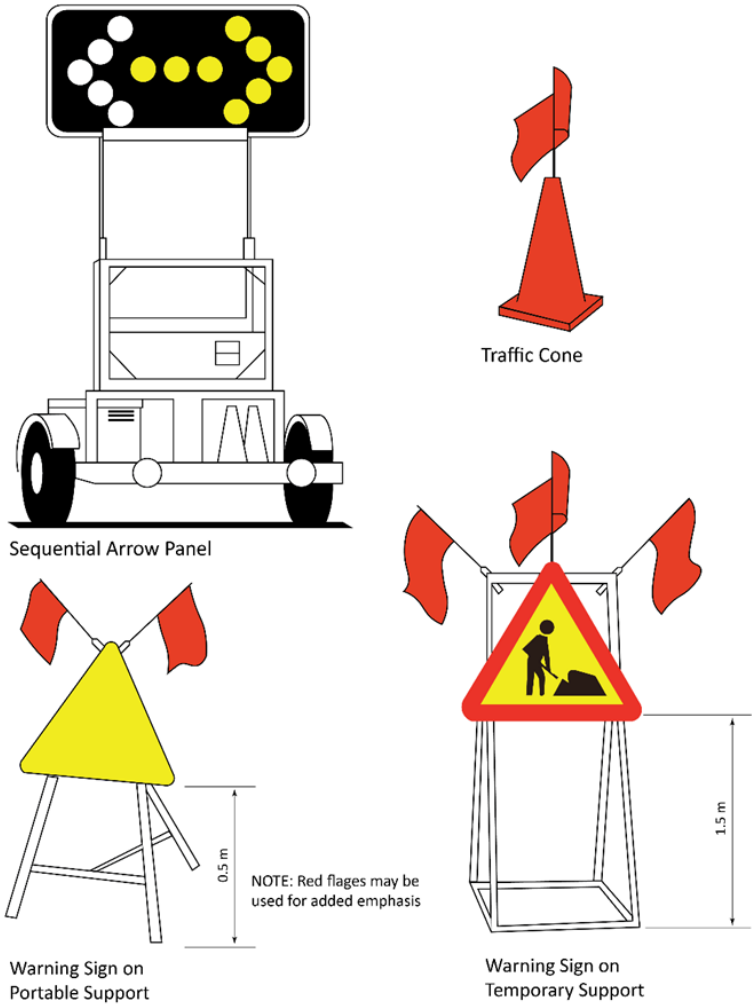


Figure 7-3 Methods of Mounting Signs Other Than on Posts

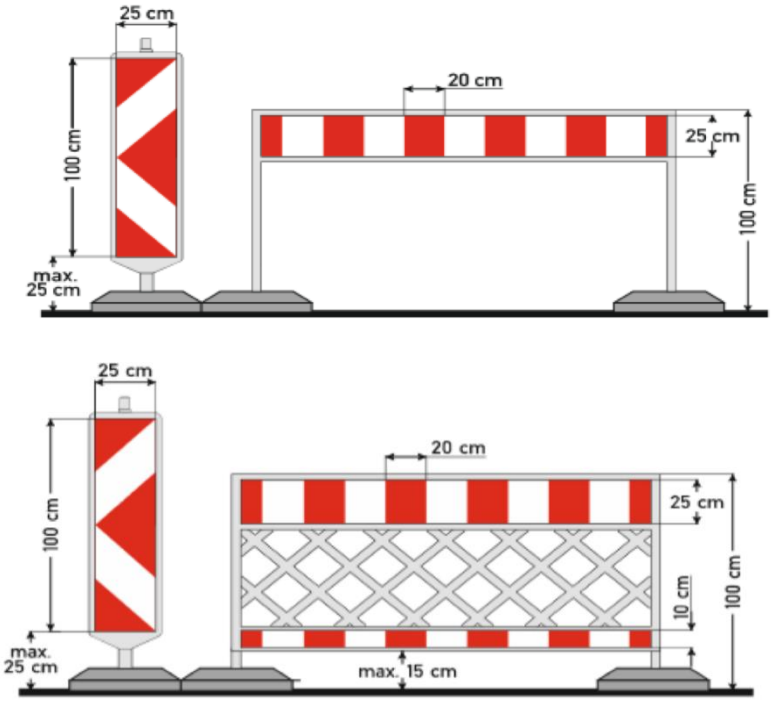


Figure 7-4 Types of Barricades (RSA 21, Corporation "TRAFFIC SAFETY ZONE", Traffic Safety Supply Corporation)

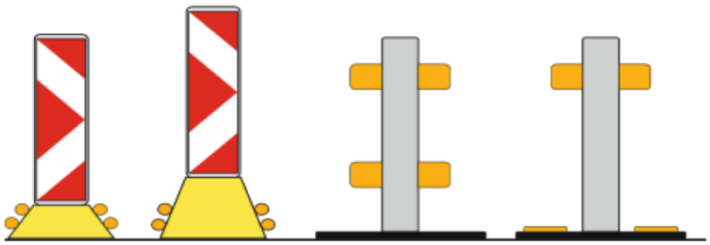


Figure 7-5 Temporary Barriers (SASO-EN 1317)

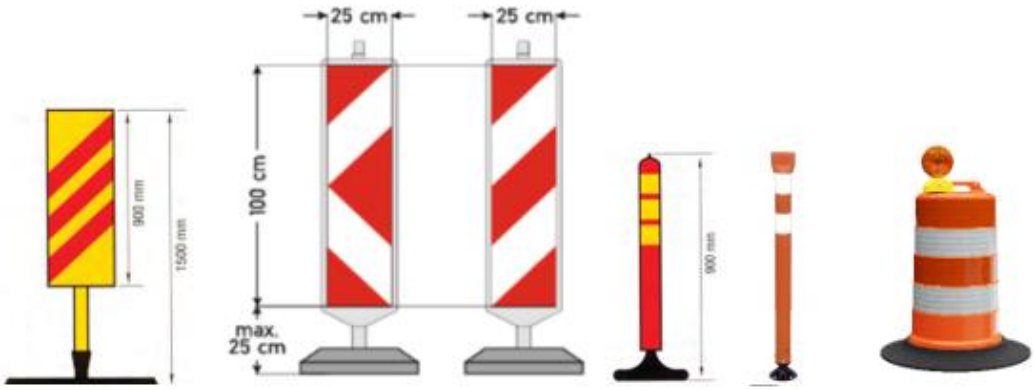


Figure 7-6 Delineation Equipment (RSA 21, Corporation "TRAFFIC SAFETY ZONE", Traffic Safety Supply Corporation)

7.2.4. Regulatory Signs

Regulatory signs impose legal obligations and/or restrictions on all traffic. It is essential that use of this signs be in conformance with the Kingdom's Regulations and this Volume's standards.

Work area operations represent unusual roadway conditions and warrant special attention. If work area operations require regulatory measures different from those normally in effect, the existing permanent regulator devices **shall** be removed or covered and superseded by the appropriate temporary regulatory sign, taking into account applicable regulations of the jurisdiction.

A catalogue of temporary regulatory signs is included in Appendix D.

7.2.5. Warning Signs

Warning signs for work area projects are used to notify drivers of specific hazards which may be encountered, when those operations are underway. Within the work zone there may be a variety of temporary roadside facilities. Pavement width may be reduced. Open excavations may be present in or near the roadway, or travel across an unpaved section may be required. Drivers *Should* be properly alerted to possible dangers ahead in sufficient time to adjust their speed for the hazard.

Specific Warning signs frequently used in work areas are as follows: Road Work, Flagger, Closure, Soft Shoulder, and Two-Way Traffic.

Various circumstances will occur which will require extra advance warning because of limited sight distance, or the nature of the obstruction may require a motorist to bring his vehicle to a stop.

Construction and maintenance operations for highway and utility work require a large number of standard signs that are specifically applicable to construction and maintenance activities. These signs **shall** have n reflectorized yellow background with black message or symbol, and red border.

A catalogue of temporary warning signs is included in Appendix E.

7.2.4.1. Dangerous curve sign (TW 1-1)

This sign (Figure 7-7) is intended for use where engineering investigations of roadway geometries and operating conditions show the recommended speed on the curve to be in the range between 50 and 100 km/h and equal to or less than the speed limit established by law. Additional protection may be provided by the use of a Suggested Speed Plate posted below the Curve sign.

Figure 7-7 Dangerous Curve Sign (TW 1-1R)

7.2.4.2. Turn sign (TW 1-2)

The Turn sign (Figure 7-8) is intended for use where engineering investigations of roadway geometries and operating conditions show the recommended speed on a turn to be 50 km/h or less, and this recommended speed is equal to or less than the speed limit established by law.

Figure 7-8 Turn Sign (TW 1-2)

7.2.4.3. Chevron alignment sign (TW 2-1)

Chevron Alignment signs (Figure 7-9) may be used to supplement pavement markings and raised reflective pavement markers. It is intended to provide additional emphasis and guidance for motorists, concerning changes in the horizontal alignment of the roadway.

Figure 7-9 Chevron Alignment Sign (TW 2-1R)

7.2.4.4. Two-way traffic sign (TW 11-1)

The Two-Way Traffic sign (Figure 7-10) *Should* be used as needed at periodic intervals in both directions to remind drivers they are on a two-way highway with traffic following in both directions.

Figure 7-10 Two-Way Traffic Sign (TW 11-1)

7.2.4.5. Highway work area sign (TW 50-1)

The Highway Work Area (Figure 7-11) sign **shall** be used in advance of major or minor construction, maintenance, or utility operations for the protection of workers in or near the roadway.

When any obstruction is in the traveled way, it may be used in repetition or in conjunction with other construction signs and/or traffic control devices.

Figure 7-11 Highway Work Area Sign

7.2.4.6. Lane closed sign (TW 50-2)

The Lane Closed sign (Figure 7-12) is intended for use in advance of a point where one lane of a two-way roadway is closed. A supplemental sign **shall** be installed below this sign to indicate the priority for oncoming traffic. Additional protection *Should* be provided by the use of delineators and object markers.

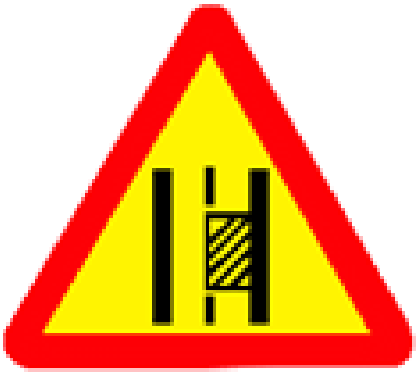


Figure 7-12 Lane Closed Sign (TW 50-2)

7.2.4.7. Flagger ahead sign (TW 50-3)

A flagger *Should* only be used in emergency situations (calming traffic on the approach to a road traffic collision for example). The flagger Ahead sign (Figure 7-13) **shall** be used in advance of any point where a flagman is stationed (in emergency situations only) to control traffic through a construction or maintenance project. It carries the flagger symbol. When needed, an appropriate distance message may be displayed in Arabic on a supplemental plate below the symbol sign. It may be used in repetition or in conjunction with other construction signs and/or traffic control devices.

The sign **shall** be promptly removed, covered, or turned to face away from the roadway whenever the flagger is not at his station.

Figure 7-13 Flagger Ahead Sign (TW 50-3)

7.2.6. Information Signs

Information signs *Should* be designed to be easily readable, permitting drivers to make timely and proper responses. This means high visibility, large lettering, and short legends for quick comprehension. Standard shapes and colors are required so the signs can be promptly recognized.

Specific Informative signs used in work areas include signs which relate to the Detour Ahead.

A catalogue of temporary information signs is included in Appendix F.

7.2.5.1. Detour sign (TI 8-1)

The Detour sign (Figure 7-14) is a chevron-based sign used at a point where a detour roadway or route is established because a street or highway is closed to through traffic.

The Detour sign uses, at each location, a chevron arrow pointed to the right or left as required. DETOUR **shall** be written in Arabic above and English below next to the Chevron arrow.

Each detour **shall** be adequately marked with standard detour and destination signs.

Figure 7-14 Detour Sign (TI 8-1)

7.2.5.2. Detour ahead (TI 2-1, TI 2-2)

The Detour Ahead sign **shall** be used in advance of the point where traffic is diverted over a temporary roadway or route. It carries the legend DETOUR AHEAD in Arabic and English. It can also have the message DETOUR 2 km to indicate the kilometers to the detour. The sign may be used in conjunction with other construction signs and/or traffic control devices.

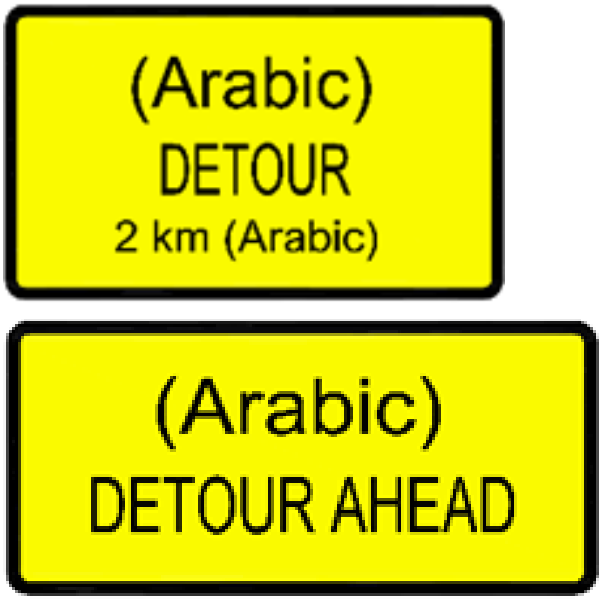


Figure 7-15 Detour Ahead Sings (TI 2-1) and (TI 2-2) Respectively

7.2.5.3. End highway work sign (TI 1-2)

The End Road Work sign (Figure 7-16) **shall** be erected approximately 200 meters beyond the end of a construction or maintenance operation. The legend **shall** appear in Arabic and English.

Figure 7-16 End Highway Work Sign (TI 1-2)

7.2.7. Diagrammatic Warning Signs (TDI 1-1), (TDI 3-1), (TDI 5-1), and (TDI 6-2)

This class of warning sign has great potential to assist drivers to negotiate road works sites safely. In general, they are recommended for use in advance of the start of a Transition Area. It is also recommended practice to locate signs on both sides of a roadway and, in addition, to repeat this treatment approximately 300 meters closer to the Transition Area.

Additional diagrammatic warning signs are provided in Appendix G and for alternative diagrammatic warning sign face designs must be approved prior to implementation.

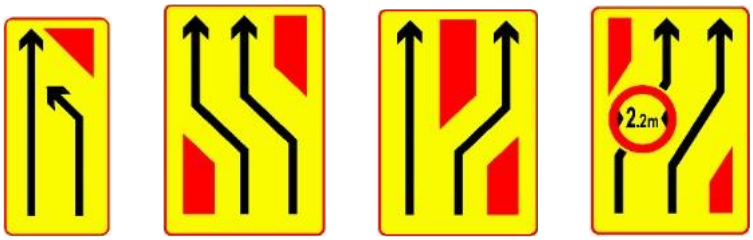


Figure 7-17 Diagrammatic Warning Signs (TDI 1-1), (TDI 3-1), (TDI 5-1), and (TDI 6-2)

7.3. Temporary Channelization and Devices

The purpose of channelization is to guide drivers and prevent conflict with hazards caused by construction and maintenance operations. Channelization *Should* be designed so traffic can move easily and smoothly in the required direction without abrupt movements/turns. Where channelizing devices are used on both sides of a traffic lane, separation between the devices *Should* accommodate the largest vehicle without allowing space for two lanes of smaller vehicles.

7.3.1. Traffic Cones and Tubular Markers

Traffic cones and tubular markers of various types are available. Cones and tubes, including the bases, **shall** be made of material which will withstand impact from vehicles without damage to cones or tubes or the vehicle. Cones **shall** have a minimum height of 450 mm and **shall** have a square base wide enough to prevent their being overturned and rolled into a traffic

lane by the rush of air caused by passing vehicles. Larger and taller cones and tubes **shall** be used on roadways where speed is high and more conspicuous guidance is needed.

Red **shall** be the predominant color of cones and tubes. It is usually best to use cones and tubes made from red-colored material rather than having the red color applied to the outer surface of the cone or tube. Tubes and cones **shall** be reflectorized and *Should* be kept reasonably clean and bright for maximum target value. Cones **shall** have a yellow-colored reflectorized band at least 150 mm in width placed no more than 75 mm from the top of the cone.

Figure 7-18 Traffic Cones and Tubular Markers (Corporation ''TRAFFIC SAFETY ZONE'')

Traffic cones may have a weighted base, but it *Should* not be heavy or hard enough to damage a vehicle which strikes it. One cone may he placed over another for added weight where necessary. Tubular markers must be attached to the roadway.

Since cones and tubular markers can easily be overturned or knocked aside, placement *Should* be inspected frequently to assure the cones or tubes remain in proper position.

7.3.2. Vertical Panels

Vertical panels are warning devices having reflectorized red stripes on a reflectorized yellow background and are used for delineation or channelization of be 300 mm in width and **shall** have a vertical dimension of 900 mm. Vertical panels are used for traffic separation or shoulder barricading where space is at a minimum.

Warning lights may be placed at night on these panels as described in the section on lighting.

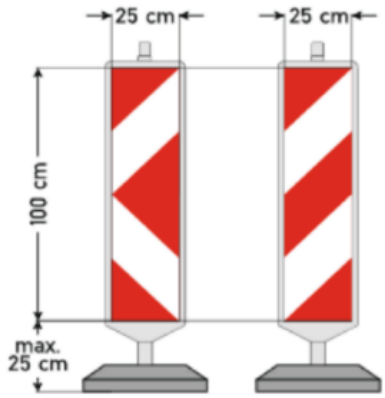


Figure 7-19 Vertical Panels (RSA 21)

7.3.3. Traffic Separators

This devise is used to separate lanes and traffic on the road with the additional ability to place on them vertical panels which are easily removed. Furthermore, plastic New Jersey (NJ) can be used as traffic separators.

Figure 7-20 Vertical Panels (TSS Traffic Safety Systems Corporation)

7.3.4. Drums

Drums are cylindrical containers used for channelization or delineation. Drums **shall** have a minimum height of at least 800 mm and a minim um diameter of at least 500 mm. The markings on each drum **shall** consist of at least two horizontal reflecting yellow and two red bands which completely encircle the drum. Each such band **shall** be between 100 and 200 mm in width and if there are non-reflectorized bands between the horizontal red and yellow stripes, they **shall** be a maximum of 50 mm wide. Only plastic drums may be used. The standard. size, colors, and banding of drums are as illustrated. The red and yellow bands **shall** be reflectorized with a material that has a smooth, sealed outer surface, which will have approximately the same color both day and night.

Drums **shall** not be weighted with rocks, concrete, asphalt, sand, or any other substance to the extent drums become hazardous to motorists if struck. Generally, no more than 250 mm of sand or similar material in the bottom of a drum will be sufficient to prevent it from being moved by the wind from passing vehicles. Each drum *Should* have drain holes in its bottom to release accumulated water. Where drums are placed in the roadway, advance warning signs **shall** also be used.

During the hours of darkness, warning or delineation lights may be placed on drums. Arrow signs may be mounted on the top of drums where necessary.

Figure 7-21 Drums (Traffic Safety Supply Corporation)

7.3.5. Barricade

A barricade is a fixed or portable device made from wood, light metal, or plastic, having either one or more horizontal members (portable plastic safety barrier can also be used). The physical dimensions, stripes, and colors are shown in Figure 7-22 and Figure 7-23. The entire area of red and white **shall** be reflectorized with a material which has a smooth, sealed outer surface, which will have approximately the same color day and night. The supports for a barricade *Should* not be reflectorized. However, the supports *Should* be white except that light gage, unpainted galvanized iron or aluminum components may be used.

Barricade rails *Should* be flat. The supporting members may be of any appropriate design provided the supports hold the barricade rails in the required position and relation to each other. The supports must also hold the barricades in place during normal storms and the wind from passing vehicles. Both the reflectorized rails and supporting structure *Should* be constructed so that if hit by a vehicle, no serious damage occurs to the vehicle or harm to the occupants.

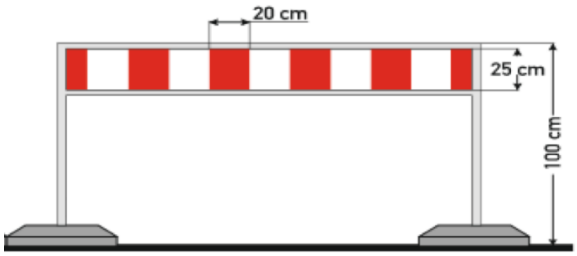


Figure 7-22 Type 1 Barricade Channelizing Device (RSA 21), (Portable Plastic Safety Barrier Can Also be Used, (SASO-2980, 2022))

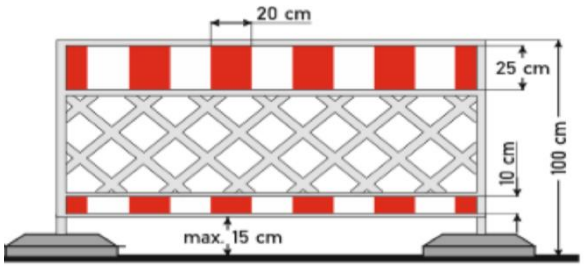


Figure 7-23 Type 2 Barricade Road Closure (RSA 21), (Portable Plastic Safety Barrier Can Also be Used, (SASO-2980, 2022))

Because of its height and area, barricades might be overturned by wind and the rush of air from passing vehicles, especially trucks. To prevent barricades from being overturned, could be used specific barrier foots (see Figure 7-24) in order to increase their stability. Additionally, barricade supports constructed of tubular materials may have ballast added to the hollow components at the bottom of the barricade. It is noted that stones, pieces of concrete or asphalt and similar hard, heavy articles **shall** not be used for this purpose.

Figure 7-24 Specific Barrier Foots (LA SAFETY SUPPLIES Ltd)

When used to channelize traffic, barricades *Should* be placed essentially at right angle to the movement of traffic. Barricades *Should* not be placed parallel to traffic because that would greatly reduce its visibility, especially at night.

When a road section is closed to traffic, barricades **shall** be erected across the road at all points of access to the closed section. When provision must be made for access of authorized traffic to the closed section, the barricade may have a gate or moveable section. A responsible person must be assigned to assure the barricades arc closed at night or whenever access is not allowed. Sometimes a road section must be closed to through traffic but will remain open to local traffic. In these cases barricades are usually set so only one lane leads into the closed section. Suitable signs warning of the road closure and allowing use of the road only by local traffic *Should* be erected on the barricade.

Barricades may be placed in a sequence on each side of the road, staring at the outer edge of the shoulder and becoming progressively closer to the pavement. This gives motorists the illusion of the narrowing of the roadway which alerts and tends to slow them. During periods when barricades are not needed, the barricades *Should* be removed or turned to face away from the road.

Signs may be placed on barricades. When practicable, the bottom of signs on barricades **shall** be not less than 500 mm above the adjacent traveled way. The Road Closed sign may be mounted on a Type II barricade which is used to close a road.

Sidewalks and roadways may be closed with barricades. Where the proper alternate path for pedestrians is not clearly evident, or where it is necessary to protect pedestrians from vehicular traffic, barricades *Should* be used. These barricades *Should* be placed parallel to the pedestrian path to delineate it. Unless adequate illumination is present, steady burning warning lights *Should* be placed at intervals along such barricades.

Finally, it is mentioned that except barricades could be used portable plastic safety barrier systems with the same effects.

7.3.6. Portable Barriers

Portable barriers are devices intended to prevent vehicles from leaving the roadway/shoulder area at that point. These barriers are also used to channelize traffic, to separate two-way traffic which is on adjacent lanes and prevent vehicles from hitting roadside objects or workers. The barriers *Should* be designed to redirect impacting vehicles with as little injury to the occupants or damage to the vehicle as possible

Portable barriers are designed to be used for a time at one site and then moved to another site for use. They may be made of reinforced concrete, metal, or any material designed to be strong enough to withstand the forces generated by impacting vehicles. When used in work areas, adjacent barrier sections **shall** be strongly connected to each other. If practicable, barriers may also be fastened to the surface upon which they rest.

When used for channelizing traffic, portable barriers **shall** be light-colored for increased visibility and **shall** have a reflective delineator with a minimum area of not less than 100 cm^2 mounted on the top of each barrier segment. In curved or narrowed transition areas, other reflectorized delineation devices, such as vertical panels or barricades may be needed for greater visibility. Warning lights, as described in Section 7.5, may be used to provide added delineation. Portable barriers *Should* be considered for use at the beginning of a zone, which must be operated with two-way traffic on one roadway of a normally divided highway.

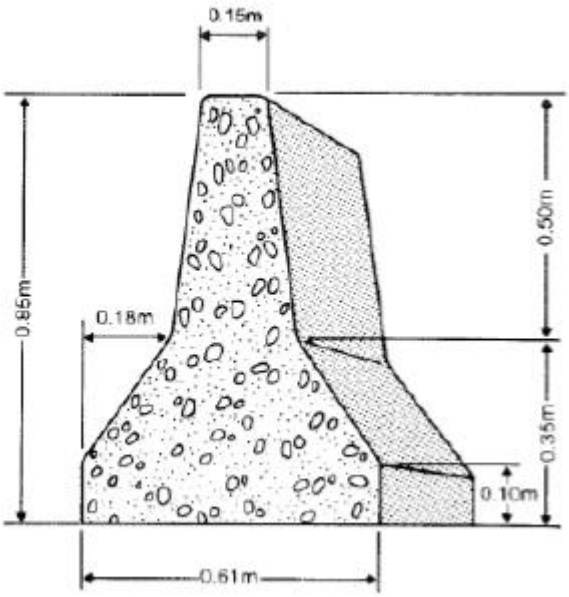


Figure 7-25 Portable Safety Barrier

The start of a section of portable barrier would be a serious hazard unless precautions were taken to prevent the unguarded vertical face of the barrier from being hit by vehicles. Where practicable, the leading end of the barrier *Should* be flared out from the 'edge of the roadway and fitted with a sloping terminal section. As an alternative, a crash cushion can be placed at the beginning of a portable barrier.

7.3.7. High Level Warning Devices

High level warning devices consist principally of three or more red flags on a tall support. These devices *Should* be high enough to be seen over the tops of preceding passenger vehicles. When night visibility is required, a Type B high intensity flashing warning beacon **shall** be mounted on the support at the base of the flags. An appropriate warning or other sign may also be attached to the support at the correct height.

The flags **shall** be not less than 400 mm square and **shall** be red in color. A typical high level warning device is as illustrated.

Figure 7-26 High Level Warning Device

7.3.8. Truck Mounted Attenuators (TMA)

Truck Mounted Attenuators (TMAs), or lorry mounted crash cushions, are used to reduce the severity of a rear-end collision with a stationary or slow-moving works vehicle. These devices are designed to manage collisions from vehicles up to 2,000 kg but are, inevitably, less effective at reducing the severity of collisions involving larger vehicles or vehicles travelling at excessively high speeds. Any TMA deployed **shall** comply with the current MASH testing criteria to minimum test level TL3 (2,000 kg test vehicle at 100 km/h impact speed). Tests on TMAs are typically conducted with a support vehicle having a test internal mass of 9,000 kg ± 450 kg. Lower support vehicle weights must not be used.

- Where TMAs are to be used on roads with a posted speed limit of 120 km/h or more, an additional TMA MUST be utilized to provide additional protection to the workforce.

TMAs are typically used in situations where a works vehicle must be positioned or operated in a location where it is likely to be struck from the rear by a moving vehicle. Examples of these types of operations include line-marking operations, temporary repairs to the carriageway or placement of TCDs required to close a lane on a high-speed carriageway. When a works vehicle fitted with a TMA is struck from the rear by a moving vehicle, the works vehicle will move forwards.

To minimize this effect, the works vehicle *Should* be parked with its brakes on. For vehicles that will undertake stop-start working or will move along the carriageway slowly (e.g., to protect line-marking operations) consideration *Should* be given to fitting an automatic braking system which will activate the works vehicle's brakes in the event that the TMA is struck.

Drivers of works vehicles fitted with a TMA can be injured in an impact due to the sudden forward acceleration of the works vehicle causing neck injury. Drivers and other occupants of TMA vehicles must therefore always wear an appropriate restraint (seatbelt/harness) and position the headrest of their seat correctly to support the head in the event of an impact.

When planning works, designers **shall** take account of the post-impact forward travel of a works vehicle fitted with a TMA by requiring a safety zone of 75 m (± 25 m) in front of the works vehicle. No personnel or vehicles **shall** be allowed in this safety zone.

All works vehicles fitted with TMAs **shall** comply with the requirements for vehicle conspicuity markings and **shall** have a reflectorized (keep left/right) signs mounted on the rear of the

vehicle to indicate which side traffic *Should* pass. For such vehicles, the requirement for rear red retroreflective markings specified in the previous section **shall** apply although it is recognized that, whilst in use, the signage mounted on the rear of the vehicle will conceal some of these markings. When not in use of (keep left/right) **shall** be covered or rotated such that the arrow points downwards. *Should* a TMA be required on a road where the speed is greater than 120 km/h then the TMA units may be doubled up and two can be used back-to-back to absorb any impact. The attenuator must be attached to a suitable truck, or it will not be effective. The detachable "trailer type" units must not be used on their own.

7.4. Temporary Markings

Pavement markings are an important device for guiding and directing traffic in work areas. Markings are used in combination with warning signs, channelizing devices, and delineators to clearly indicate vehicle paths.

Pavement markings include paint, hot or cold thermoplastics, epoxies, polyesters and similar material, pressure sensitive reflective tape, and raised pavement markers. Raised pavement markers are almost always used to supplement other types of pavement markings.

The type of material used will depend upon how long the marking will be needed and amount of traffic using the roadway. When the pavement marking will have to be removed after the work is completed, reflective tape is generally the preferable material as it is usually much easier to remove than the other materials. Raised pavement markers are also easy to place and remove and can be used in such cases to supplement the tape. Any of the materials referred to above can be used on temporary roadways, which will be removed when the work has been completed.

7.4.1. Types and Uses

Depending on the category of the highway, the temporary markings are as follows:

Multi-lane divided highways (including arterials)

x. Channelizing line: continuous yellow line 200 mm in width placed in the median.
y. Edge line: continuous yellow line 200 mm in width placed just within the pavement edge or for the creation of emergency lane.
z. Traffic lane: broken line 150 mm width with 6 m white and 12 m gap.

Multi-lane undivided highways (including arterials)

aa. Center line: Two continuous white lines 120 mm in width separated by a space 100 mm in width.
bb. Traffic lane: broken line 120 mm width with 6 m white and 12 m gap.
cc. Edge line: continuous yellow line 200 mm in width placed just within the pavement edge or for the creation of emergency lane.

Rural and urban roads

dd. Center line: Two continuous white lines 120 mm in width separated by a space 120 mm in width.

ee. Edge line: continuous yellow line 200 mm in width placed just within the pavement edge or for the creation of emergency lane.

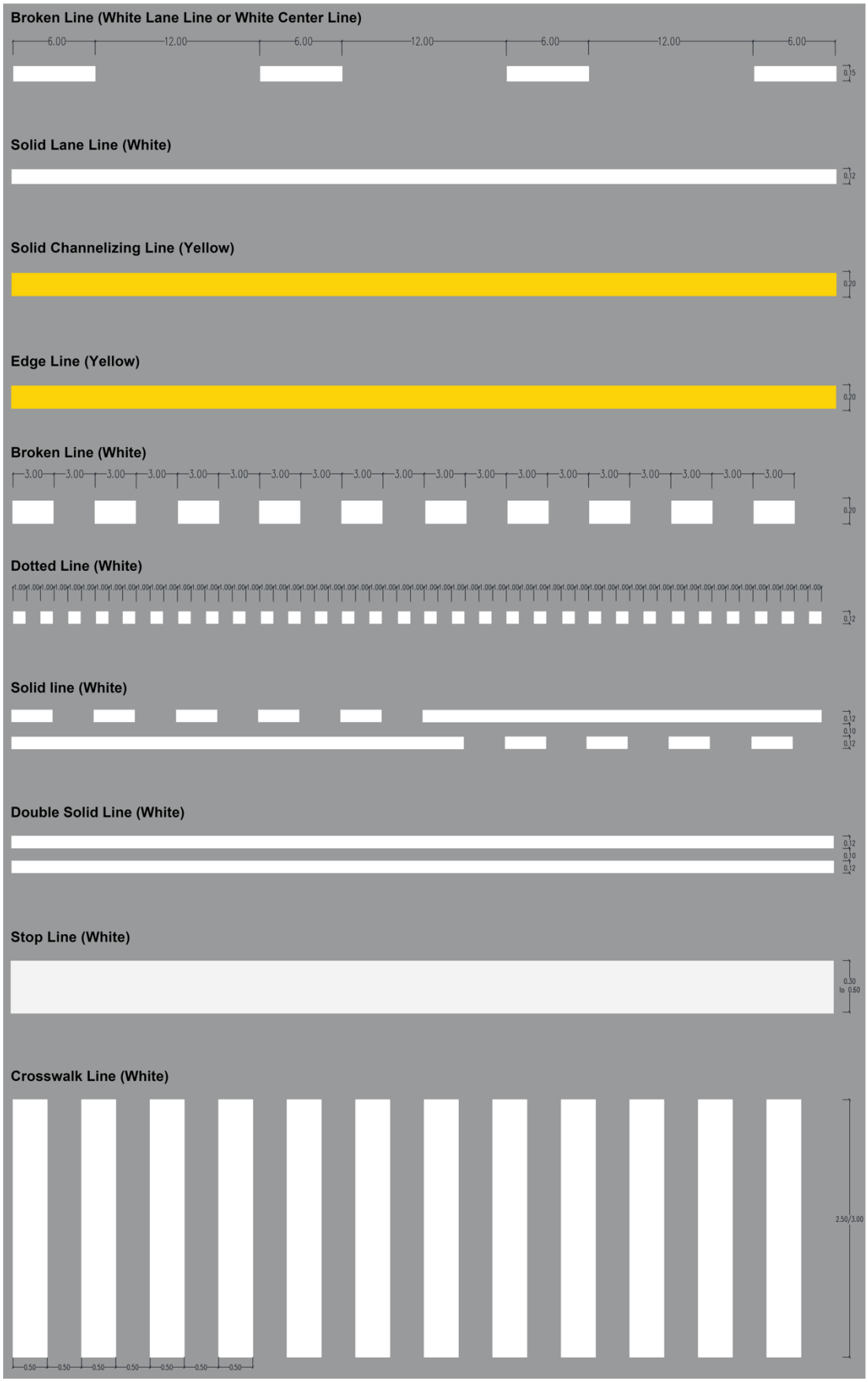


Figure 7-27 Typical Pavement Marking Lines and Patterns

It is mentioned that another useful device for improvement of traffic conditions when temporary marking designed are the temporary raised reflective pavement markers (see Section 7.4.3).

Previous pavement markings that might confuse or misdirect motorists **shall** be removed or obliterated, preferably before traffic has been re-routed. Removal or obliteration *Should* be done in such a way as to leave a minimum of scars on the pavement. Painting over existing stripes does not meet the requirement for obliteration as the over painting will wear off and expose the original paint. However, existing markings may be overpainted or covered with reflecting tape in an emergency until removal can be accomplished or for a very short period.

Whenever possible, pavement markings as well as other necessary devices *Should* be placed before traffic is moved onto a new travel lane. This applies not only to temporary lanes necessitated by construction, but also the final pavement when it is ready to be opened to traffic.

In work areas, motorists need more than the usual amount of warning, guidance, and delineation. For this reason, pavement markings *Should* be placed on roadways in work areas wherever markings exist on the adjacent sections of undisturbed highway. Generally, pavement markings are not required in work areas on minor urban streets except those carrying large traffic volumes.

On resurfacing projects where traffic is maintained, temporary center and lane lines **shall** be installed prior to terminating the work each day. These temporary pavement markings **shall** consist, as a minimum, of a 3-meter segment of line approximately 120 mm wide with 6-meter gaps. It is recommended temporary marking tape or temporary raised pavement markers be used to provide these markings.

Pavement markings are not appropriate for situations in which the path of vehicles will be changed at frequent intervals, for example, more often than every 2 or 3 days. In such situations, delineation of the temporary vehicle paths can be accomplished by channelizing devices such as cones or barricades or plastic NJ barriers. For this reason, pavement markings are normally not used in maintenance work areas.

7.4.2. Plastic Delineators

Delineators are retro-reflective devices, which can be seen in darkness under normal atmospheric conditions from a distance of 300 m when illuminated by the upper beam of standard automobile headlights located at the point of observation.

The reflective element of a delineator **shall** have a minimum area of not less than 100 cm^2.

Delineators, when used, **shall** be mounted on suitable supports so the reflecting unit is approximately 1.2 m above the near pavement edge. Delineators **shall** be placed between 1 and 2 m outside the outer edge of the berm or in the line of a guardrail, if used. The color of the reflecting element of delineators **shall** be white. Delineators *Should* be spaced along the roadway in accordance with Section 7.2.2.

Delineators may be used in work areas and on detours to indicate the alignment of the roadway and outline the required vehicle path. Delineators **shall** not be used alone or in groups to warn of hazards. Delineators may have value on detours where the road is curving and frequent bends occur. Delineators are customarily used on roadway sections which may

be traveled at or near normal speed. Barricades and similar channelizing devices rather than delineators are to be used in areas where traffic is being diverted from its normal path, or where more than usual hazard exists because of adjacent traffic, excavation, or other work.

7.4.3. Temporary Raised Reflective Pavement Markers

A temporary raised reflective pavement marker is a safety device used on roads. It is made of plastic or ceramic, and come in a variety of shapes and colors. It includes a lens or sheeting that enhances its visibility by reflecting vehicle headlights.

Figure 7-28 Typical Raised Reflective Pavement Marker (Source: Company "ANCA INC." USA)

7.5. Lighting Devices

7.5.1. Battery-Operated Warning and Delineation Lights

These warning lights are portable, battery-operated lights with a plastic lens which gives a yellow light. These lights are intended for use on maintenance and construction work with warning signs, barricades, drums, reflecting panels or other devices. Three types are used:

- Type A is a low brightness flasher.
- Type B is a high brightness flasher.
- Type C gives a steady light.

Warning and delineation lights **shall** be attached by vandal-resistant fasteners to warning and channelization devices. Type A and C lights **shall** be designed to automatically turn off during the daylight hours.

When the lights are placed on barricades or plastic/concrete NJ barriers, the lights **shall** be mounted with the bottom of the lens approximately 1 m above the ground. Battery-operated warning lights **shall** meet or exceed the requirements in Table 7-3.

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Table 7-3 Warning Lights

Characteristics	Type A Low Brightness	Type B High Brightness	Type C Steady Burn
Lens Directional faces	1 or 2	1	1 or 2
Flashing Rate per Minute	55 to 75	55 to 75	Do not flash
Flash Duration*	10 %	8 %	Do not flash
Minimum Effective Visibility	1,000 m (Night)	350 m (Sunny Day)	1,000 m (Night)
Minimum Lens Diameter	15 cm	15 cm	15 cm
Hours of Required Operation	Dusk to Dawn	All Times	Dusk to Dawn
*NOTE: Length of time instantaneous brightness is equal to or greater than effective brightness.			

Type A low brightness flashing warning lights are most frequently attached to barricades, drums, vertical reflecting panels, and supports for advance warning signs. Type A is intended to call attention to the device and warn drivers they are approaching or passing through a hazardous area. Type A flashing lights **shall** not be used on barricades and similar devices which are being used for delineation purposes.

Type B high brightness bashing warning lights are normally used with the first Advance Warning signs on the approach to a work area. Type B may also be used with barricades, signs, and other supports where extremely hazardous conditions exist within a work area. These lights are bright enough to be effective during the day as well as night and are designed to operate at all times.

Type C steady burning lights are intended to supplement reflective panels and longitudinal barricades to delineate the path which vehicles *Should* follow through a work area.

Figure 7-29 Warning Light (Eastern Metal (Signs & Safety) Company)

7.5.2. Hazard Identification Beacons

A Hazard Identification Beacon is a type of traffic signal giving a flashing YELLOW ROUND indication. It **shall** be used only to supplement an appropriate Warning or Regulatory sign. The beacon **shall** operate whenever the hazard exists and could be placed on cones,

barricades, plastic New Jersey NJ, temporary barriers as well as on TMA and on work zone vehicle.

A Hazard Identification Beacon **shall** have a yellow lens with a visible diameter of at least 200 mm and, preferably, 300 mm. The beacon **shall** be mounted above the sign with a clearance from the sign of between 300 and 400 mm. The beacon **shall** flash at a rate of not less than 50 or more than 80 times per minute. The illuminated period **shall** be not less than one-half or more than two-thirds of the total cycle. A lamp having a nominal minimum rating of 600 lumens **shall** be used with the smaller lens and a lamp having a nominal minimum rating of 1,750 lumens with the larger lens.

A Hazard Identification Beacon may consist of a single flashing unit placed above a sign, or it may have two flashing units. In this case, one flashing unit is placed above the sign, and the other is placed below the sign. When the sign and beacons are over the roadway and the width of the sign exceeds its height, the flashing units may be aligned horizontally. The flashing indications **shall** be alternately illuminated.

A Hazard Identification Beacon is usually a single section of a traffic control signal head, operating from a 110 V or 220 V alternating current power source. The beacon *Should* be connected to a power main if practicable but may be operated from a portable electric generator if its reliability can be assured.

A Hazard Identification Beacon may also be a self-contained unit consisting of flasher, power source and sign, generally mounted on a small trailer for easy transport. The beacon is operated from batteries or an electric generator on the trailer. Most units have racks or other devices for holding the Warning and Regulatory signs which **shall** be used with these devices.

Trailer-mounted Hazard Identification Beacons are useful for giving warnings in advance of work sites on all classes of highways. These beacons are especially adaptable to being towed slowly along a highway to give advance warning of moving maintenance operations.

The signs and flashing lights on trailer-mounted Hazard Identification Beacons may be mounted at less than the normal height above the roadway provided the beacons are adequately visible to approaching traffic. The lens size, color, light distribution, brightness, rate and duration of flash, however, **shall** conform to the general requirements for Hazard Identification Beacons.

Figure 7-30 Hazard Identification Beacon

7.5.3. Flashing Warning Arrow Panels

Flashing Warning Arrow Panels are useful devices to supplement Warning signs. These panels are used primarily where traffic volume is heavy and approach speeds are high. The panels also may be used for roadway or lane closures, or for slow moving maintenance and

construction operations on the roadway. These panels are used at or in advance of the point where traffic is required to turn or leave its normal path.

Flashing Warning Arrow (Chevron) Panels consist of yellow light units arranged in the shape of an arrow or chevron on a rectangular panel with a matte black background. The lights all flash simultaneously giving a flashing arrow or chevron effect.

Flashing Warning Arrow (Chevron) Panels **shall** meet the requirements in Table 7-4.

Table 7-4 Warning Flashing Arrow Panels

Type	Minimum Size (mm)	Minimum Number of Panel Lamps	Minimum Legibility Distance (km)
A	600 x 1,200	12	0.80
B	750 x 1,350	13	1.25
C	1,200 x 2,400	15	1.50

- Type A Flashing Warning Arrow Panels *Should* normally be used on local and collector streets and highways, particularly where traffic volume is moderate and traffic speed is not great.
- Type B panels *Should* be used on arterial streets and highways, and expressways. Also, may be desirable on some local and collector streets and highways.
- Type C panels are intended for use on heavily traveled expressways and for any situation where the combination of vehicle speed and volume, especially with poor roadway geometrics, requires the best warning devices available.

The minimum legibility distance requirement in Table 7-4 is the distance at which the direction in which the arrow is pointing can be reliably determined by an average driver on a sunny day or a clear night.

Arrow panels **shall** be capable of giving each of the following four indications:

- Left arrow only.
- Right arrow only.
- Both right and left arrows simultaneously.
- Caution flashing of four or more lamps in a pattern which does not indicate a direction.

The special features of the arrow panel *Should* be:

- 2 x 340 mm LED corner lamps.
- 25 x 200 mm LED flashing arrow lights.
- Lamp color to be amber: yellow.
- Flash Rate of 60 to 90 flashes per minute.
- Daylight - 2,000 lm (minimum).
- Night-time - 400 to 800 lm. Not to exceed 800 lm at night.

Arrow panels are normally mounted on a trailer or truck, but another suitable support may be used. Panels *Should* be mounted with the bottom of the panel at least 2.1 m above the roadway. Arrow panels mounted on motor vehicles *Should* normally have controls which will allow changing modes of indication from the driver's position (Qatar, 2015).

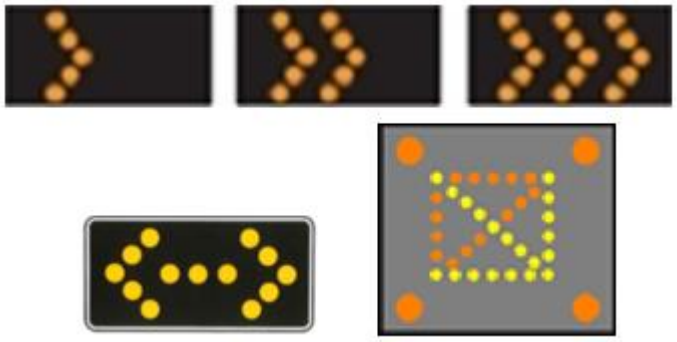


Figure 7-31 Flashing Warning Arrow Panels (Qatar, 2020)

Additionally in cases of basically short-term work zones (static or mobile), the traffic lanes or shoulders may be blocked by signing lane blocker carried either on a vehicle or on a stretcher. The lane blocking equipment consists of the standard arrangements of Figure 7-32, with the signs R 11-1 or R 11-2, and the flashing lights, to guide the traffic to the left or to the right of the blocked lane.

Figure 7-32 Mobile Signage for Blocking Lanes (RSA 21)

7.5.4. Floodlights

Floodlights (or standard highway lighting luminaires) have infrequent but important uses in both construction and maintenance work areas. When floodlights or highway luminaires are used, care *Should* be taken to light the work area without putting glaring light into the eyes of drivers. The adequacy and safety of the lighting can best be checked and adjusted by driving through the area at night.

On construction projects, lighting is most frequently warranted at flagman stations when work is done at night or at abrupt changes in alignment and similar high hazard areas. The lighting *Should* be a supplement to, not a substitute for proper signs, barricades, delineation, and other devices.

Maintenance activities on heavily traveled urban expressways must often be done at night when traffic volume is lowest. Good lighting of the work site aids the workmen and assists drivers in seeing the equipment, workmen, and work areas.

Power for lighting work areas is usually supplied by portable generators. Short-time use, frequent moves, and the lack of access to power lines normally require on-site generation.

Figure 7-33 Electric Mobile Lighting (Source: UPRENT Lifting Equipment Rentals)

7.6. Control of Traffic Through Work Areas

7.6.1. General

1. The primary function of traffic control procedures is to move traffic quickly and safely through work areas. This is an essential part of highway construction and maintenance operations. Since the conditions and requirements of work sites may change often, traffic control measures must be frequently reviewed to assure the measures are appropriate.
2. Maintaining good public relations is necessary. Work site personnel and flaggers should be courteous to motorists. Traffic should be kept moving through the work area with as little delay as possible. The safety of work-site personnel and motorists must be a primary consideration.

7.6.2. Hand Signaling Devices

7.6.2.1. Flags and warning paddles

1. Flags, Stop/Slow paddles and traffic control signals are used in controlling traffic through work areas. Flags and paddles are the most frequently used devices for this purpose.
2. Flags for hand signaling **shall** be at least 600 mm square. The flags **shall** be made of a good grade, strong red cloth and **shall** be fastened to a sturdy, light-weight staff

approximately 1 m in length. The free edge of the flag *Should* be weighted so the flag will hang vertically, even in a strong wind.

3. Sign paddles **shall** be an octagon at least 600 mm wide with letters at least one-third the height of the paddle. The paddles **shall** be mounted at the top of a round, rigid handle about 2 m in length. The paddle and handle **shall** be fabricated from suitable light-weight durable and semi-rigid material (see Figure 7-34).
4. One face of the paddle **shall** have the STOP message in reflectorized white letters on a reflectorized red background with a reflectorized white border. The other face **shall** have the SLOW message in black letters and red border on a reflectorized white background.

7.6.2.2. Flaggers

1. Flaggers are responsible for the safety of the work site crew and the motorists. They also have much contact with the public. It is necessary to select well qualified persons for this work. A flagger *Should* meet the following qualifications:
    a. Average intelligence.
    b. Good physical condition, including sight and hearing.
    c. Mental alertness.
    d. A courteous but firm manner.
    e. Neat appearance.
    f. Sense of responsibility for the safety of the public and the crew.
2. Flaggers **shall** wear a red-colored safety vest, shirt or jacket, and a red-colored safety hat. If flaggers work at night, their red safety clothing **shall** be reflectorized.
3. Flaggers are provided at work sites:
    a. to briefly stop traffic at intervals as necessitated by activities at the site, and
    b. to maintain a continuous flow of traffic past the work site at reduced speed to help protect the work crew.
4. The flagger's functions require him to be clearly visible to approaching traffic. Drivers must see the flagger far enough in advance to comply with his directions and reduce speed appropriately.

7.6.3. Flagger Stations

1. In rural areas, flagger stations shall be located 150 m in advance of the work site or farther if approach speed exceeds 80 km/h. In slow speed urban areas this distance may be 50 to 75 m. This will also enable the flagger to warn workmen of approaching danger, such as an out-of-control vehicle.
2. The flagger shall stand either on the shoulder adjacent to the lane being controlled or in a barricaded lane. At a short work area the flagger may have to stand on the shoulder opposite the obstruction. Under no circumstances may the flagger stand in a lane being used by moving traffic. The flagger shall stand alone. He shall never permit a group of workers to gather about him at the flagging station.
3. Flagger stations shall be adequately protected by standard Warning signs and flashing beacons if necessary. If flagging occurs at night, each station shall be well lighted.

7.6.4. Flagging Procedures

1. The following procedures **shall** be followed when controlling traffic with a flag. These procedures are illustrated in Figure 7-34.
    a. To stop traffic, the flagger shall face traffic and extend the flag horizontally across the traffic lane. The flag shall be held stationary so the full area of the flag hanging below the staff is visible. For greater emphasis, the free arm may be raised with the palm toward approaching traffic.
    b. When it is safe for traffic to proceed, the flagger shall turn parallel to the traffic movement. With flag lowered from the view of the driver, the flagger shall then motion traffic ahead with his free arm. The flag shall not be used to signal traffic to proceed.
    c. When the flagger wishes to alert or slow but not to stop traffic, he shall face traffic and slowly raise and lower his arm and the flag. The flag shall be moved by a sweeping motion of the extended arm up to shoulder level and back straight down. The arm and flag should not go above shoulder level.
2. The following procedure shall be followed when controlling traffic with a paddle:
    a. To stop traffic, the flagger shall face traffic. With arm extended horizontally and the staff in a vertical position, he shall turn the STOP message toward approaching traffic. The free hand may be raised with the palm toward approaching traffic for greater emphasis.
    b. When it is safe for traffic to proceed. the flagger shall turn the SLOW message toward approaching traffic and with his free arm shall motion traffic to proceed.
    c. (3) When the flagger wishes to alert or slow traffic, he shall stand in the same manner as when stopping traffic. Then he shall display the SLOW message to oncoming traffic.

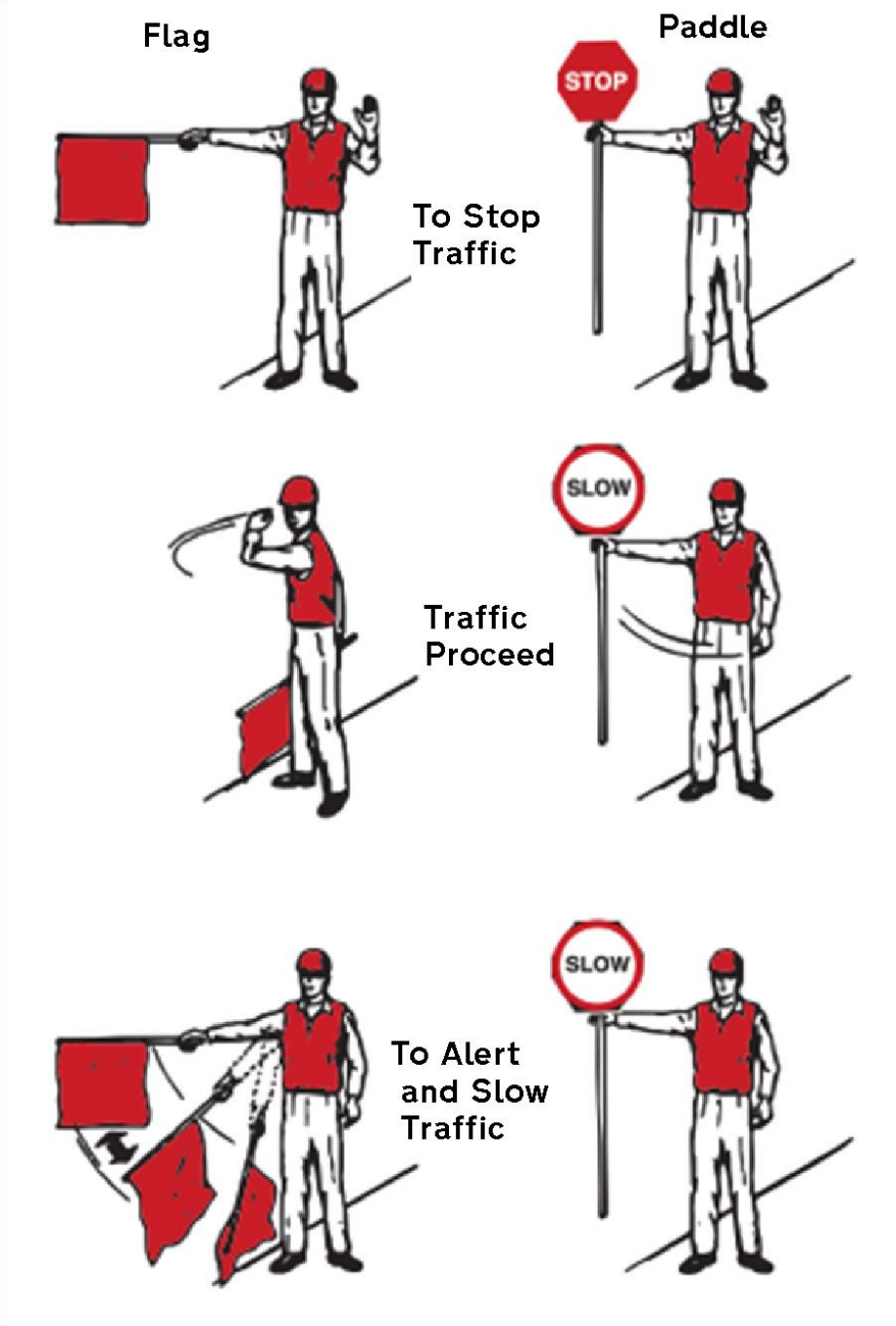


Figure 7-34 Use of Hand Signaling Devices by Flagger

7.6.5. One-Way Traffic Control

7.6.5.1. Flagger control

1. When traffic from both directions must use the same lane passing a work area, provision for alternate one-way movement must usually be made. At a very short "spot" obstruction with good sight distance on a street or road with low traffic volume, one-way movements can be allowed with a minimum of traffic control.
2. When alternate one-way movements are required on a rural road section more than about 15 m in length and total traffic is greater than approximately one vehicle per

minute, additional traffic control is needed for the safety of traffic and workmen. With slow speed traffic in urban areas, flagging may not be warranted unless vehicles are considerably more numerous. Whatever traffic control is used, it must also prevent excessive delays at each end of the area. For this purpose, control points (usually flagger stations) must be established at each end of the one-way section. It must be possible to communicate between those control points to coordinate the operations. Control points should be chosen to provide adequate sight distance for approaching traffic. The roadway at each control point should be wide enough to permit easy passing of opposing lines of vehicles.

3. Alternate one-way movement of traffic between control points can be accomplished in several ways, one of which is by flaggers. Where the one-way section is short, and the flaggers can see each other, traffic can be controlled by a flagger at each end of the section. One flagger should be designated as the chief flagger and is responsible for coordinating the flagging operations. The flaggers shall be able to communicate with each other verbally or by signals which will not be mistaken as a signal to traffic. One flagger may be sufficient for very short lane closures where adequate sight distance is available for safe handling of traffic by the flagger.
4. Where one end of a short one-lane section is not visible from the other end, the flaggers can maintain contact by radio. One flagger tells the other flagger the license number or other identification of the last vehicle which he allows to enter the one-way section. When that vehicle reaches the second flagger, he knows he can release a group of cars into the one-way section from his end.

7.6.5.2. Flag-carrying car

1. The use of a flag-carrying car is effective where the one-way section is well defined, not hazardous and of moderate length, usually 1.5 km or less. It is effective over a longer section than flagger control.
2. In this type of one-way traffic control, the driver of the last vehicle entering the section from one end is given a red flag or other token. He is instructed to deliver it to the flagger at the other end of the section. When the driver delivers the flag to him, the flagger knows it is safe to allow traffic from his end to move into the section. The last driver to enter from his end carries the flag back to the other end. The flag being carried from one end to the other should always be clean and dry.
3. A variation of this procedure is to use an "official" vehicle which always follows the last vehicle entering the section. This eliminates use of a flag and its possible loss, but requires an additional man and vehicle.

7.6.5.3. Pilot car

1. A pilot car can be used to guide a group of vehicles through a work area or detour. It is especially effective when the route is relatively long, hazardous, complicated or frequently changed. The operation of the pilot car must be coordinated with the flaggers at each end of the section, as in the case of the flag-carrying car.
2. Sufficient room must be provided for the pilot car to turn around at each end of the section. The driver of the last vehicle in the group following the pilot car should be given a small red flag to hand to the flagger at the other end of the section.

3. The pilot car should be light weight and easy to handle. The name of the contractor or contracting authority shall be prominently displayed on the vehicle. The pilot car sign shall be visible from the rear of the vehicle. A flashing yellow beacon may be mounted on the top of a pilot car for additional identification.
4. Two or more pilot cars may be needed to guide two-way traffic through a complex or hazardous detour.

7.6.5.4. Traffic control signals

1. Traffic control signals are a satisfactory and economical means for control of traffic movements at construction or major maintenance work areas:
    a. Control of a highway or street intersection with a temporary "haul road" or equipment crossing.
    b. Control of traffic at the intersection of a detour with another street or highway.
    c. Control of traffic through a one-lane, two-way section of highway.
2. To provide alternative one-way movements on a one-lane section requires the following traffic control signal operation:
    a. A green round signal indication to allow traffic to enter the section from one direction, and a simultaneous red round signal indication to prevent traffic from entering at the other end. The green interval should be long enough to allow most waiting vehicles to enter and is usually extendable by vehicle-detectors placed adjacent to or under the pavement.
    b. A short (4 - 5 seconds) yellow round change interval shall follow the green interval.
    c. A red round clearance indication shall follow the yellow interval. the red indication shall be shown simultaneously at both ends of the section. this red interval shall be long enough to allow vehicles which have entered on the green indication to drive the length of the section.
    d. Upon completion of the all red clearance interval described in paragraph (3), the green indication is displayed to the opposing vehicles that had been waiting on the opposite approach.
    e. In the absence of traffic on either approach, the signal shall continue to display a green round signal indication to the approach on which a detector was last actuated.
3. Traffic-actuated signal control of an one-lane section, as described in paragraph b, requires a vehicle detector at each end of the section. Each detector must be located where approaching vehicles will activate it before reaching the stop line. Signal heads and indications (and also detectors in the case of traffic-actuated signals) at both ends of the one-way section must be connected to the same controller or, if two controllers are used, the signals must be interconnected physically or electronically. Pretimed control is used for one-way sections where it is difficult to obtain accurate detector actuation at both ends of the section.
4. The length of the yellow and all red signal intervals are fixed, but the length of the green intervals is timed by the controller in accordance with traffic demand.
5. All traffic signal and control equipment used in construction and maintenance areas, and the installation and operation, shall meet the requirements of Chapter 5 of this Manual.

6. Traffic-actuated control should usually be installed at intersections with other highways or equipment crossings. It is usually more efficient than manual or pretimed control.

7.6.6. Work Areas on Expressways, Multi-lane Arterials and Collectors, and Other High-Volume Highways

7.6.6.1. Special problems

1. The general principles of safety, minimum delay, positive guidance, frequent inspection and adjustment of equipment, and procedures apply to traffic control in work areas on all types of highway facilities. The speed and volume of traffic on expressways and other high-volume highways, which have little seasonal variation, result in special and serious problems. The best available warning and regulatory devices are needed. Most important is the preparation of a complete traffic control plan for every stage of the project.
2. Problems and problem areas include the following:
    a. Lane closures.
    b. Median barriers that make total roadway closure difficult.
    c. Temporary merging and exit areas at interchanges and crossings.
    d. Nighttime work areas.
    e. Lack of alternate routes for detouring traffic from the work area.
    f. The requirement that traffic flow be maintained.

7.6.6.2. Signing

1. Enlarged Warning signs with standard messages which are familiar to motorists are desirable on expressways and other high-volume highways. Warning signs larger than 1,100 mm will often be needed. Flashing Warning Arrow Panels, Hazard Identification Beacons and lighting are especially applicable on these highways.
2. Where vehicles are unusually fast or numerous, warning of the work area shall be given 2 km in advance of the work site. The warning should be repeated at 1 km from the site. Where unusually long delays may occur at the work site, traffic should be given notice of these delays in advance of exits to one or more alternative routes.
3. A complete series of Warning signs shall be placed on both sides of the roadway. The signing shall give specific information (for example, which lane is closed). Suggested safe speed signs may be used and shall not show a speed lower than what is practicable considering the curvature and sight distance. Speed limit signs may be used in work areas to notify of legal speed limits. Those speed limit signs that do not apply during construction or maintenance operations shall be temporarily covered or removed.
4. Special signing, for example, to confine heavy vehicles to a specified lane or lanes, may be needed and should be large. Such regulatory signing shall be repeated at appropriate intervals, particularly beyond entrances to the facility from another highway.
5. Signing and delineation for existing exits and entrances must be carefully planned where lane closures will change established geometries. Existing signing may have to be revised or relocated temporarily to be visible and effective.

6. All supports for signs shall be breakaway or shall have an impact cushioning device to protect motorists. The design of the breakaway supports and the installation of the crash cushion is further discussed in Section 8.1.6.1.6 of SHC 306 (Highway Facilities and Utilities Design – Public Utilities, Highway and Street Lighting, Control and Monitoring Devices). Existing Regulatory Warning, and Informative signing not suitable during the period of construction or maintenance shall be removed or covered so the message is not visible.
7. A sign shall always be placed at the end of a work area to tell motorists they are leaving the area of special control.
8. Signs warning of conditions that no longer exist shall be promptly removed.

7.6.6.3. Channelization

1. One of the most critical places in work area traffic control is where traffic from a closed lane merges with traffic in adjacent lanes. Despite Advance Warning signs, most drivers do not begin the merging movement until they approach the taper where lane closure begins. Thus, the taper length must be great enough to give drivers sufficient distance to find a gap in traffic large enough for them to merge into the adjacent lane. If vehicles in the closed lane stop or slow to a speed much less than traffic in the adjacent lane, accidents are almost certain to occur.
2. The minimum taper length that may be used in lane closures is discussed in Section 4.1 of SHC 305 (Highway Facilities and Utilities Design – Work Zone Design). A taper length greater than the minimum will often be operationally better. The taper length should also be increased as required by the site conditions.
3. Standard devices such as barricades, barrels, drums, and cones may be used for transition sections. However, temporary redirecting concrete barrier sections may be the best and most economical device for the purpose and are reusable. These barrier sections are especially effective and desirable where a great hazard would occur to any vehicle which left the roadway. In addition, illumination may be necessary if it is not already present.

7.6.6.4. Pavement marking

1. Pavement marking is a valuable tool to supplement signing on an expressway or other high volume highway in a work area. Temporary reflecting pavement marking materials shall be used to delineate the traffic path, and shall be removed promptly when the path of traffic is changed. Normal pavement markings that conflict with temporary vehicle paths shall be removed.
2. Reflective raised pavement markers shall be used as follows to supplement the pavement marking on traffic diversions and detours:
    a. On the center line or all two-lane, two-way diversions which carry more than 1,000 vehicles per day and will be used for 1 month or more.
    b. On the center line and edge lines of all two-lane, two-way diversions which will carry more than 5,000 vehicles per day for more than 1 week.
    c. On the center line, lane lines, and edge lines of all four-lane, two-way diversions. It is assumed traffic volume is heavy enough to warrant two lanes in each direction.

d. On detours of major highway where unusual hazard or traffic volume is especially great.

3. Reflective tubular markers shall be used rather than raised pavement markers on two-lane two-way diversions of expressway, and other high volume highways which carry 5,000 or more vehicles per day.
4. Because work on urban expressways will frequently be done at night, illumination of work areas should be seriously considered. Battery-operated flashing warning lights shall be placed on Warning signs and steady burning lights shall be used on delineation devices.

7.6.6.5. Traffic control requirements

1. During maintenance and reconstruction of expressways and other high volume facilities, as many lanes as possible shall be kept open to traffic at all times. This will allow traffic to flow with the least interference and delay. Traffic control signals shall not be used to stop expressway traffic.
2. Participation of enforcement authorities in the planning for traffic control during work on expressways and other high volume highways is highly desirable. Additional police may be needed to assist in keeping traffic flowing. An emergency traffic operation plan should be developed for alternate routing of traffic if unacceptable congestion develops.
3. Personnel responsible for construction and maintenance work on expressways should have formal training in traffic control on those facilities. They should recognize the importance of keeping traffic moving safely and smoothly through those areas.

2. References

FGSV (2021) *Richtlinien für die verkehrsrechtliche Sicherung von Arbeitsstellen an Straßen 21 (transl. Guidelines for the lawful traffic safety of highway work zones 21), RSA 21*. Köln, Germany.

GCC (2018) *GCC Manual on Uniform Traffic Control Devices*. Gulf Cooperation Council (GCC), KSA.

MoC *Manual on Uniform Traffic Control Devices*. Ministry of Communications (MoC), KSA.

MoMRA (2014) *Technical and Organizational Guidance for Traffic Engineering on Urban Areas*. Ministry of Municipal and Rural Affairs (MoMRA), KSA.

MoT (1439 H) *Special Instructions for Setting Road Traffic Signs/Instructions for the Installation of Traffic Signs*. Ministry of Transport (MoT), KSA.

Public Works Authority "Ashghal" (2015) *Work Zone Traffic Management Guide Rev.1.2*. Doha, State of Qatar.

Ministry of Transport and Communications (MOTC) (2020) *Qatar Traffic Control Manual (QTCM)*. Ministry of Transport and Communications (MOTC), Qatar.

Riyadh AMANAH (1426 H) *Guide to Streets and Road Equipment. Part 1: Traffic Control Equipment*. Riyadh, KSA.

Government of Abu Dhabi, Department of Municipalities and Transport (2020) *Abu Dhabi Manual on Uniform Traffic Control Devices (TR-511)*. Second Edition, Abu Dhabi, United Arab Emirates.

United Nations (1968) *Treaties, Chapter XI, Transport and Communications, B. Road Traffic, 20. Convention on road signs and signals*. United Nations Publications, United States.

United Nations (2001) Agreement on International Roads in the Arab Mashreq United Nations Publications, United States.

Florida's Highway Guide Sign Program *Florida Administrative Code 14-51,* Florida State, United States.

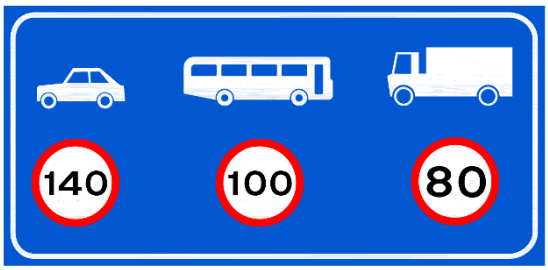
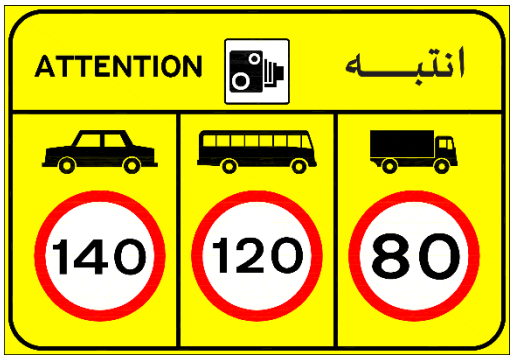
FHWA (2022) *Manual on Uniform Traffic Control Devices for Streets and Highways*. 2009 Edition, including Revisions 1,2 and 3, U.S. Department of Transportation, Federal Highway Administration, USA.

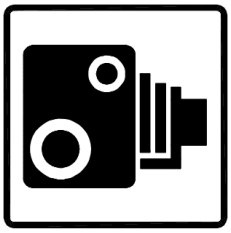
Appendix A - Regulatory Sign Catalog

Table A-1. Regulatory Signs Catalogue

No.	Sign	Name	Sign Code	Section
1		**2.1.1.1. Stop**	R1-1	3.2.1
2		All Way Supplemental Plate	R1-2SP	3.2.2
3		Yield	R2-1	3.2.3
4		Crosswalks	R2-2SP	3.2.3

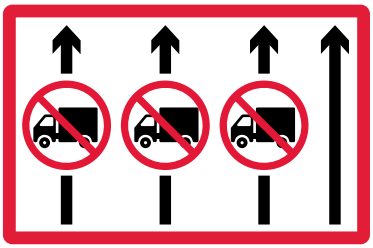
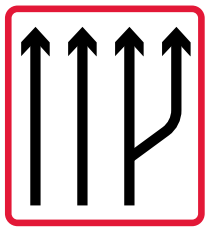
No.	Sign	Name	Sign Code	Section
5		Children Crossing	R2-3SP	6.2.1.4
6		Maximum Speed Limit	R3-1	3.2.4
7		Maximum Speed Limit for passenger vehicles	R3-2	3.2.4
8		Maximum Speed Limit for Trucks	R3-3	3.2.4
9		Maximum Speed Limit for Buses	R3-4	3.2.4

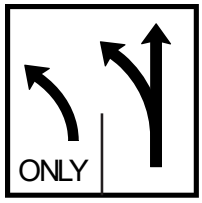
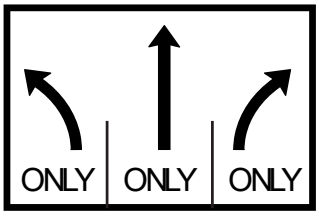
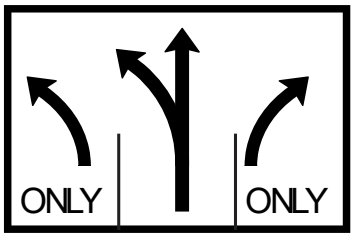
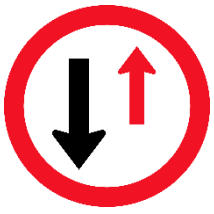
No.	Sign	Name	Sign Code	Section
10		Combined Speed Limit Signage	R3-5	3.2.4
11		Night Speed Limit	R3-6N	3.2.5
12		When Flashing	R3-7SP	6.2.1.2
13		Combination of Speed Limits	R4-1	3.2.6

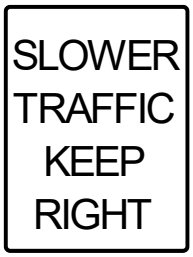
No.	Sign	Name	Sign Code	Section
14		Speed Camera	R4-2	3.2.6
15		Truck Speed Limit	R5-1	3.2.7
16		Truck Speed Limit and Vehicles Weighing More Than (x) Tons on Any One Axle	R5-2	3.2.7
17		Compulsory Minimum Speed and End of Compulsory Minimum Speed	R6-1	3.2.8

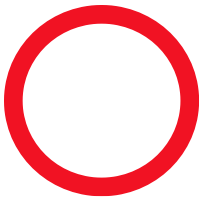
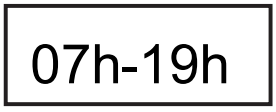
No.	Sign	Name	Sign Code	Section
18		Compulsory Minimum Speed and End of Compulsory Minimum Speed	R6-2	3.2.8
19		No Straight Through	R7-1	3.2.9
20		No Left Turn	R7-1L	3.2.9
21		No Right Turn	R7-1R	3.2.9
22		No U-Turn	R7-2	3.2.9

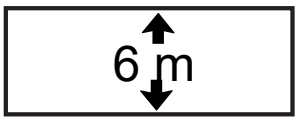
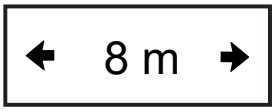
No.	Sign	Name	Sign Code	Section
23		No Left Turn and U-Turn	R7-3	3.2.9
24		Mandatory Movement (Lane-Use Control)	R8-1	3.2.10
25		Mandatory Movement (Lane-Use Control)	R8-1L	3.2.10
26		Mandatory Movement (Lane-Use Control)	R8-1R	3.2.10
27		U-Turn Permitted	R8-2	3.2.10
28		Supplementary Plate for U-Turn (no trucks are permitted)	R8-2SP	3.2.11

No.	Sign	Name	Sign Code	Section
29		Mandatory Movement (Lane-Use Control)	R8-3	3.2.10
30		Mandatory Movement (Lane-Use Control)	R8-4	3.2.10
31		Mandatory Movement (Lane-Use Control)	R8-5L	3.2.10
32		Mandatory Movement (Lane-Use Control)	R8-5R	3.2.10
33		Advance Lane Control	R9-1	3.2.12
34		Advance Lane Control	R9-2	3.2.12
35		Advance Lane Control	R9-3	3.2.12

No.	Sign	Name	Sign Code	Section
36		Advance Intersection Lane Control	R10-1	3.2.13
37		Advance Intersection Lane Control	R10-2	3.2.13
38		Advance Intersection Lane Control	R10-3	3.2.13
39		Overtaking Prohibited	R11-1	3.2.14
40		Overtaking by Trucks Prohibited	R12-1	3.2.15
41		Priority for Oncoming Traffic	R13-1	3.2.16
42		Priority for Approaching Traffic	R13-2	3.3.37

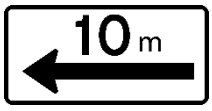
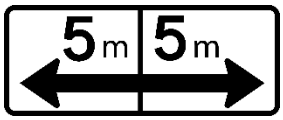
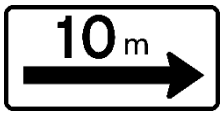
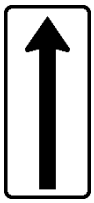
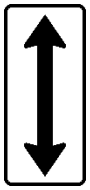
No.	Sign	Name	Sign Code	Section
43		Trucks Keep Right	R14-1	3.2.17
44		Slower Traffic Keep Right	R14-2	3.2.17
45		Pass on the Left	R15-1	3.2.18
46		Pass on the Right	R15-2	3.2.18
47		Pass Either Side	R15-3	3.2.18
48		Entry Prohibited	R16-1	3.2.19

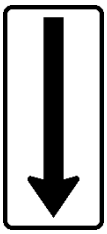
No.	Sign	Name	Sign Code	Section
49		Closed to All Vehicles in Both Directions	R16-2	3.2.20
50		No Entry to Automobiles	R16-3	3.2.21
51		No Entry by Motorcycles	R16-4	3.2.22
52		No Entry by Cycles	R16-5	3.2.23
53		No Entry by Mopeds (R6-5)	R16-6	3.2.24
54		No Entry by Goods Vehicles	R16-7	3.2.25
55		Hours of truck prohibition	R17-1SP	3.2.25
56		Weight limit (typically gross vehicle weight)	R17-2SP	3.2.25

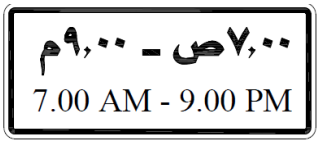
No.	Sign	Name	Sign Code	Section
57		Vehicle height	R17-3SP	3.2.25
58		Vehicle length	R17-4SP	3.2.25
59		No Entry by Truck with Trailer	R16-8	3.2.26
60		No Entry by Inflammable Goods	R16-9	3.2.27
61		Supplementary Plate for No Entry by Inflammable Goods	R16-9SP	3.2.27
62		No Entry by Taxi	R16-10	3.2.28
63		No Entry by Pedestrians	R16-11	3.2.29
64		No Entry by Animal-Drawn Vehicles	R16-12	3.2.30

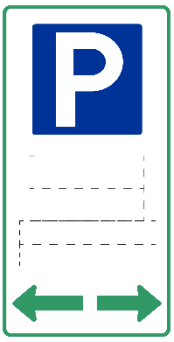
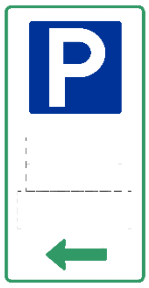
No.	Sign	Name	Sign Code	Section
65		No Entry by Handcarts	R16-13	3.2.31
66		No Entry by Power-Driven Agricultural Vehicles	R16-14	3.2.32
67		No Entry by Power-Driven Vehicles	R16-15	3.2.33
68		No Entry by Power-Driven Vehicles or Animal-Drawn Vehicles	R16-16	3.2.34
69		No Entry by Buses	R16-17	3.2.35
70		No Horn	R16-18	3.2.36
71		One-Way (straight ahead)	R18-1	3.2.37

No.	Sign	Name	Sign Code	Section
72		One-Way (right way)	R18-1R	3.2.37
73		One-Way (left way)	R18-1L	3.2.37
74		Roundabout Sign	R19-1	3.2.38
75		Parking Area	R20-1	3.2.39
76		Parking Area	R20-2	3.2.39
77		Parking Prohibition	R20-3	3.2.39
78		Parking Prohibited	R20-4	3.2.39

No.	Sign	Name	Sign Code	Section
79		Parking for Disabled	R20-5	3.2.40
80		Left Arrow Supplemental Plate (with distance in m) for parallel placement	R20-1SP	
81		Left and Right Arrow Supplemental Plate (with distance in m) for parallel placement	R20-2SP	
82		Right Arrow Supplemental Plate (with distance in m) for parallel placement	R20-3SP	
83		Arrow Supplemental Plate for perpendicular placement to the traffic	R20-4SP	
84		Arrow Supplemental Plate for perpendicular placement to the traffic	R20-5SP	

No.	Sign	Name	Sign Code	Section
85		Arrow Supplemental Plate for perpendicular placement to the traffic	R20-6SP	
86		No Parking Supplementary Plate	R20-7SP	
87		No Parking Supplementary Plate	R20-8SP	

No.	Sign	Name	Sign Code	Section
88		Parking Restriction	R21-1	3.2.41
89		Parking and Stopping Prohibition	R21-2	3.2.41
90		Clearway	R21-3SP	3.2.42
91		Parking Time Limit	R22-1	3.2.43
92		Parking Time Limit Supplementary Plate	R22-1SP	3.2.43

No.	Sign	Name	Sign Code	Section
93		Parking Time Limit	R22-2	3.2.43
94		Parking Time Limit	R22-3	3.2.43
95		No Stopping Supplementary Plate	R22-3SP	3.2.42

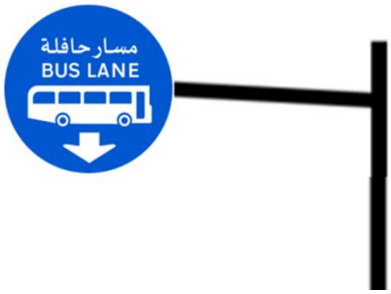
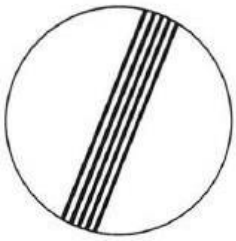
No.	Sign	Name	Sign Code	Section
96		Pay-and-Display Parking	R23-1	3.2.43
97		Pay-and-Display Parking	R23-2	3.2.43
98		Pay-and-Display Parking	R23-3	3.2.43

No.	Sign	Name	Sign Code	Section
99		Gross Vehicle Weight Restriction	R24-1	3.2.47
100		Axle Weight Restriction	R25-1	3.2.48
101		Narrow Vehicle Clearance Restriction	R26-1	3.2.49
102		Vehicle Height Restriction	R27-1	3.2.50
103		Vehicle Length Restriction	R28-1	3.2.51

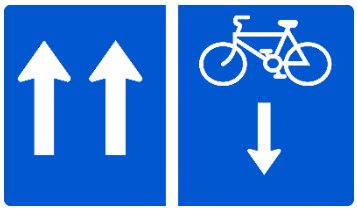
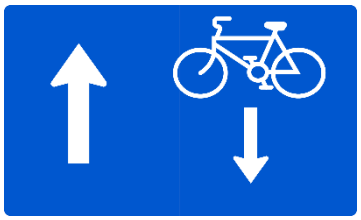
No.	Sign	Name	Sign Code	Section
104		Maximum Height Limit for Highways Allowing Overheight Vehicles	R29-1	3.2.52
105		Combined Hazard	R30-1	3.2.52
106		Required Stop at Customs	R31-1	3.2.53
107		Bus Stop	R32-1	3.2.54

No.	Sign	Name	Sign Code	Section
108		Pick-Up And Drop-Off	R33-1	3.2.55
109		Loading Zone	R34-1	3.2.56
110		Taxi Stop	R35-1	3.2.57

No.	Sign	Name	Sign Code	Section
111		Bus Lane	R36-1	3.2.58
112		(Only) Supplementary Plate	R36-1SP	3.2.58
113		Bus Lane	R36-2	3.2.58
114		Bus Lane	R36-3	3.2.58

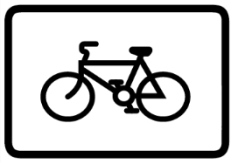
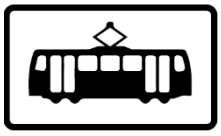
No.	Sign	Name	Sign Code	Section
115		Bus Lane	R36-4	3.2.58
116		Entering Neighborhood	R37-1	3.2.59
117		End of All Special Prohibitions Imposed on Moving Vehicles	R38-1	3.2.60
118		End of All Special Prohibitions Imposed on Moving Vehicles	R38-2	3.2.60

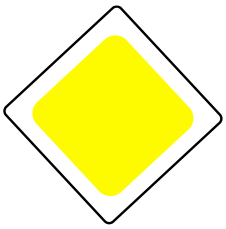
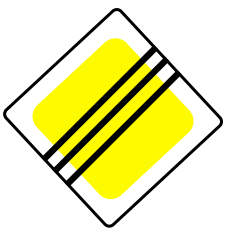
No.	Sign	Name	Sign Code	Section
119		End of All Special Prohibitions Imposed on Moving Vehicles	R38-3	3.2.60
120		Cycle Lane or Path	R39-1	3.2.61
121		Cyclists Dismount	R40-1	3.2.62
122		End of Cycle Route	R40-2	3.2.63
123		Cycles crossing	R40-3	3.2.64

No.	Sign	Name	Sign Code	Section
124		Cycle Route Crossed by Pedestrians (Look both Ways)	R40-4	3.2.65
125		Cycle Route Crossed by Pedestrians (Look Left)	R40-5	3.2.65
126		Cycle Route Crossed by Pedestrians (Look Right)	R40-6	3.2.65
127		Contra-Flow Bicycle Lane	R40-7	6.3.1.5
128		Advisory Contra-Flow Bicycle Lane	R40-8	6.3.1.8

No.	Sign	Name	Sign Code	Section
129		Bicycle Lane Sign – Start of Lane	R40-9	6.3.1.2
130		Bicycle Lane Regulatory Sign	R40-10	6.3.1.3
131		Foot Path	R41-1	3.2.66
132		Path for Riders on Animals	R42-1	3.2.67
133		Shared Paths	R43-1	3.2.68

No.	Sign	Name	Sign Code	Section
134		Separated Paths	R43-2	3.2.68
135		No Loading (24 hours prohibition)	R44-1SP	3.2.69
136		No Loading (part of the day)	R44-2SP	3.2.69
137		Prohibition of Waiting on Verge or Footway	R44-3SP	3.2.70
138		No Waiting Except Taxis, Ambulances, or Police Vehicles	R44-4SP	3.2.71

No.	Sign	Name	Sign Code	Section
139	٥ طن الأحد - الخميس منتصف الليل - ٧ صباحاً ٨ مساءً - منتصف الليل الجمعة والسبت في جميع الأوقات 5T Sun - Mon Midnight - 7 AM 8 PM - Midnight Fri - Sat At Any Time	No Waiting by Trucks and Buses	R44-5SP	3.2.72
140		Truck Supplementary plates	R45-1SP	3.2.72
141		Bus Supplementary plates	R45-2SP	3.2.72
142		Bicycles Supplementary Plates	R45-3SP	6.5.1.3
143		Motorcycles Supplementary Plate	R45-4SP	6.5.1.3
144		Tram Supplemental Plate	R45-5SP	6.5.1.3

No.	Sign	Name	Sign Code	Section
145		Tow Away Zone	R46-1SP	3.2.73
146		No Blocking Intersection	R47-1	3.2.74
147		No Blocking Intersection	R47-2	3.2.74
148		Priority Roadway Signs	R48-1	3.2.75
149		Priority Roadway Signs	R48-2	3.2.75

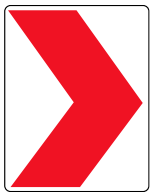
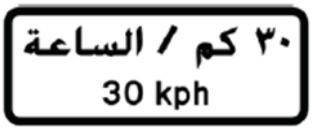
No.	Sign	Name	Sign Code	Section
150		Tram Lane Ahead on Right	R49-1	6.4.1.5
151		Tram Lane Intermediate	R49-2	6.4.1.5
152		End of Tram Lane	R49-3	6.4.1.5
153		Watch for tram supplemental plate	R49-4SP	6.4.1.3

No.	Sign	Name	Sign Code	Section
154		Tramway or LRT line - look both ways	R50-1	6.4.1.6
155		Pedestrian Wayfinding for Tramway or LRT stations	R51-1	6.4.1.7
156		Truck Weight Station a head	R52-1	6.2.1.1
157		Truck Weight Station	R52-2	6.2.1.2
158		Truck Weight Station flag sign	R52-3	6.2.1.3
159		Distance Supplemental	R52-4SP	6.2.6

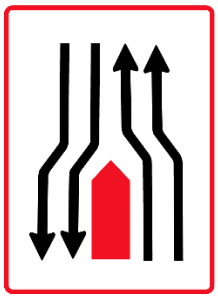
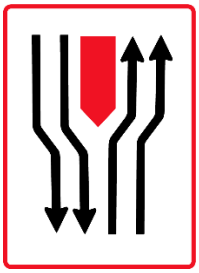
Appendix B - Warning Sign Catalog

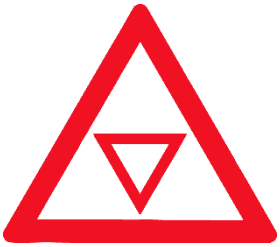
Table B-1 Warning Signs Catalogue

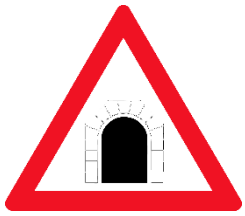
No.	Sign	Name	Sign Code	Section
1		Dangerous Left Curve Ahead	W1-1L	3.3.1
2		Dangerous Right Curve Ahead	W1-1R	3.3.1
3		Dangerous Sharp Left Curve Ahead	W1-2L	3.3.1
4		Dangerous Sharp Right Curve Ahead	W1-2R	3.3.1
5		Dangerous Reverse Curves Ahead (Left to Right)	W1-3L	3.3.1
6		Dangerous Reverse Curves Ahead (Right to Left)	W1-3R	3.3.1
7		Dangerous Sharp Reverse Curves Ahead (Right to Left)	W1-4L	3.3.1

No.	Sign	Name	Sign Code	Section
8		Dangerous Sharp Reverse Curves Ahead (Left to Right)	W1-4R	3.3.1
9		Chevron Alignment (Left)	W2-1L	3.3.2
10		Chevron Alignment (Right)	W2-1R	3.3.2
11		Chevron (Left)	W2-2L	3.3.3
12		Chevron (Right)	W2-2R	3.3.3
13		Chevron (Left/Right)	W2-3	3.3.3
14		Truck Rollover	W3-1	3.3.4
15		Advisory speed (for a condition)	W3-2SP	3.3.4
16		Loop Ramp Warning	W4-1	3.3.5

No.	Sign	Name	Sign Code	Section
17		Steep Descent	W5-1	3.3.6
18		Steep Ascent	W5-2	3.3.6
19		Highway Narrows from Both Sides	W6-1	3.3.7
20		Highway Narrows from the Right	W6-2	3.3.7
21		Highway Narrows from the Left	W6-3	3.3.7
22		One-Lane Narrow Bridge	W7-1	3.3.8
23		Two-Lanes Narrow Bridge	W8-1	3.3.9

No.	Sign	Name	Sign Code	Section
24		Median Ends	W9-1	3.3.10
25		Two-way traffic	W10-1	3.3.10
26		Median Begins	W11-1	3.3.11
27		Two-Way Traffic on Route Crossing Ahead	W12-1	3.3.12
28		Divided Highway Ends	W13-1	3.3.13
29		Divided Highway Begins	W13-2	3.3.13
30		Advance Vehicle Height Restriction	W14-1	3.3.14

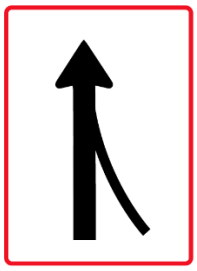
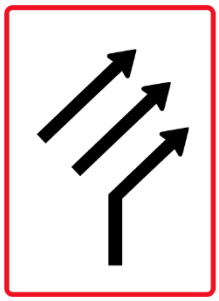
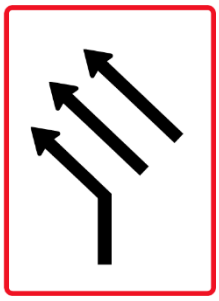
No.	Sign	Name	Sign Code	Section
31		No Through Highway Ahead	W15-1	3.3.15
32		No Through Highway Right	W15-2	3.3.15
33		No Through Highway Left	W15-3	3.3.15
34		Stop Ahead	W16-1	3.3.16
35		Yield Ahead	W17-1	3.3.17
36		Signals Ahead (vertical)	W18-1	3.3.18
37		Signals Ahead (X m)	W18-2	3.3.18

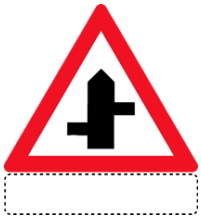
No.	Sign	Name	Sign Code	Section
38		Opening Bridge Ahead	W19-1	3.3.19
39		Tunnel Ahead	W20-1	3.3.20
40		Dip in The Road Ahead	W21-1	3.3.21
41		End of Paved Road	W22-1	3.3.22
42		Dangerous Shoulder	W23-1	3.3.23
43		Slippery Road Ahead	W24-1	3.3.24
44		Loose Gravel Ahead	W25-1	3.3.25

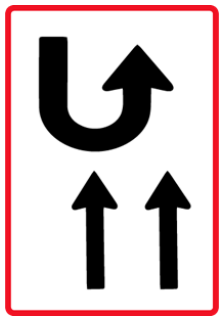
No.	Sign	Name	Sign Code	Section
45		Road Leads to Quay	W26-1	3.3.26
46		Rough Road	W27-1	3.3.26
47		Falling Rocks	W28-1	3.3.27
48		Sand Dunes	W29-1	3.3.28
49		Drifting Sand	W30-1	3.3.29
50		Drifting Sand supplementary plate	W30-2SP	3.3.29
51		Crosswinds Ahead	W31-1	3.3.30
52		Wadi Crossing	W32-1	3.3.31

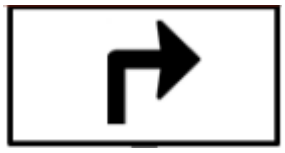
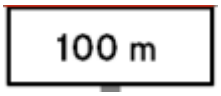
No.	Sign	Name	Sign Code	Section
53		Rumble Strips Ahead	W33-1	3.3.32
54		Speed Hump Ahead	W34-1	3.3.33
55		Hazard	W35-1	3.3.34
56		Fire Station/Civil Defense Installation Ahead	W36-1	3.3.35
57		Overhead Electric Line	W37-1	3.3.36
58		Lane Drop (right lane drops) for speeds less than or equal to 100 km/h	W38-1L	3.3.37
59		Lane Drop (left lane drops) for speeds less than or equal to 100 km/h	W38-1R	3.3.37

No.	Sign	Name	Sign Code	Section
60		Lane Drop (right lane drops) for speed exceeeds 100 km/h	W38-2R	3.3.37
61		Lane Drop (left lane drops) for speed exceeeds 100 km/h	W38-2L	3.3.37
62		Traffic Merging Ahead - current route is the main route, merging with route from the right	W39-1R	3.3.38
63		Traffic Merging Ahead - current route is the main route, merging with route from the left	W39-1L	3.3.38
64		Merge with Main Route (from the left) Traffic Ahead	W39-2L	3.3.38
65		Merge with Main Route (from the right) Traffic Ahead	W39-2R	3.3.38

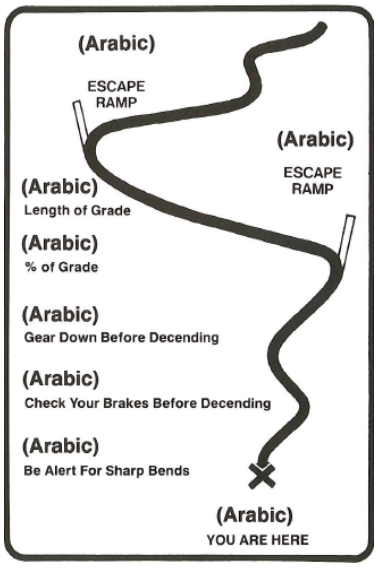
No.	Sign	Name	Sign Code	Section
66		Traffic Merging Ahead (from right) - current route is the main and speed exceeds 100 km/h	W39-3R	3.3.38
67		Traffic Merging Ahead (from left)- current route is the main and speed exceeds 100 km/h	W39-3L	3.3.38
68		Merge with Main Route Traffic Ahead for speed exceeds 100 km/h	W39-4R	3.3.38
69		Merge with Main Route Traffic Ahead for speed exceeds 100 km/h	W39-4L	3.3.38
70		Crossroad Ahead	W 40-1	3.3.39
71		T-intersection Ahead	W 40-2	3.3.39

No.	Sign	Name	Sign Code	Section
72		Side Roadway Ahead (Left)	W 40-3L	3.3.39
73		Side Roadway Ahead (Right)	W 40-3R	3.3.39
74		Side Roadways Ahead (Left and Right Staggered)	W 40-4L	3.3.39
75		Side Roadways Ahead (Right and Left Staggered)	W 40-4R	3.3.39
76		Roundabout Ahead	W 41-1	3.3.40
77		U-Turn Ahead	W 42-1	3.3.41

No.	Sign	Name	Sign Code	Section
78		Opposing U-Turn Ahead	W 43-1	3.3.42
79		Cyclists Crossing Ahead	W 44-1	3.3.43
80		Slow Moving Vehicles (trucks)	W 45-1	3.3.44
81		Slow Moving Vehicles (military vehicles)	W 45-2	3.3.44
82		Slow Moving Vehicles (Queue of traffic)	W 45-3	3.3.44
83		Pedestrian Crossing	W 46-1	3.3.45

No.	Sign	Name	Sign Code	Section
84		Children	W 47-1	3.3.46
85		School	W47-2SP	6.2.1.1
86		End of the school zone	W47-2SP	6.2.1.3
87		Left or right advance arrow	W47-3SP	6.2.4.1
88		Distance Supplemental	W47-4SP	6.2.6
89		Camels Crossing Ahead	W48-1	3.3.47
90		Countdown Marker (100 m from exit / intersection)	W49-1SP	3.3.50
91		Countdown Marker (200 m from exit / intersection)	W49-2SP	3.3.50

No.	Sign	Name	Sign Code	Section
92		Countdown Marker (300 m from exit / intersection)	W49-3SP	3.3.50
93		Intersection on a Curve Ahead	W50-1	3.3.51
94		Advance Truck/Goods Vehicle Escape Ramp (with supplementary plate at the bottom)	W51-1	3.3.52
95		Truck/Goods Vehicle Escape Ramp (with supplementary plate at the bottom)	W51-2	3.3.52

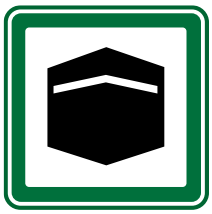
No.	Sign	Name	Sign Code	Section
96		Truck/Goods Vehicle Escape Ramp	W51-3	3.3.52
97		Railway Crossing	W52-1	6.4.1.1
98		Number of tracks crossed (if two or more)	W52-2SP	6.4.1.1
99		Flashing Signal Assembly	W52-3SP	6.4.1.1
100		Railway Crossing Warning	W53-1	6.4.1.3
101		Tram Advanced warning	W54-1	6.4.1.3

No.	Sign	Name	Sign Code	Section
102		Hazard Warning Markers	OM1-1	3.3.48
103		Hazard Warning Markers	OM1-2	3.3.48
104		Hazard Warning Markers	OM1-3	3.3.48
105		End of Roadway Object Markers	OM2-1	3.3.49
106		End of Roadway Object Markers	OM2-2	3.3.49
107		End of Roadway Object Markers	OM2-3	3.3.49

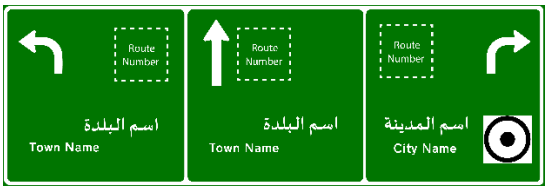
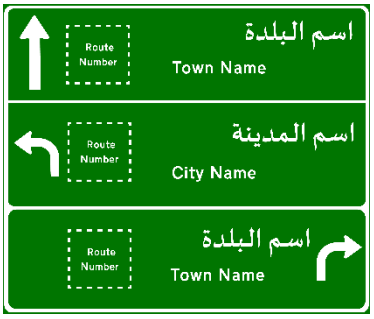
Appendix C - Informative / Guide Sign Catalog

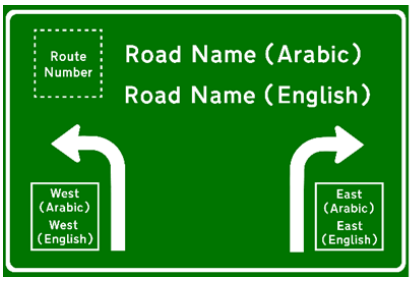
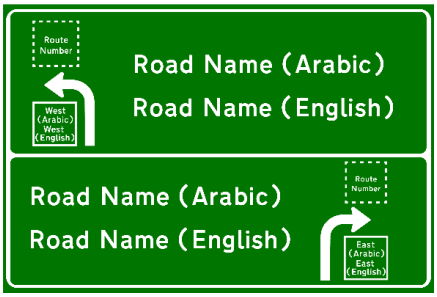
Table C-1 Informative / Guide Signs Catalogue

No.	Sign	Name	Sign Code	Section
1		International / Mashreq Routes	I1-1	3.4.4.1
2		National / Primary Network Routes Numbering (Freeways-Expressways)	I1-2	3.4.4.2
3		Secondary Network Routes Numbering (Arterials)	I1-3	3.4.4.3
4		Secondary Network Routes Numbering (Collectors and Local Highways)	I1-4	3.4.4.4
5		Secondary network routes numbering (urban arterials)	I1-5	

No.	Sign	Name	Sign Code	Section
6		Makkah Route Trail Marker	I2-1	3.4.5
7		Al Madinah Route Trail Marker	I2-2	3.4.5
8		Cardinal Direction Marker (North)	I3-1	3.4.6
9		Cardinal Direction Marker (East)	I3-2	3.4.6
10		Cardinal Direction Marker (South)	I3-3	3.4.6
11		Cardinal Direction Marker (West)	I3-4	3.4.6
12		Advance Curve Arrow - 90-degree angle	I4-1R	3.4.7
13		Advance Curve Arrow - 90-degree angle	I4-1L	3.4.7
14		Advance Curve Arrow - 45-degree angle	I4-2R	3.4.7

No.	Sign	Name	Sign Code	Section
15		Advance Curve Arrow - 45-degree angle	I4-2L	3.4.7
16		Advance Curve Arrow - 45-degree angle	I4-3R/L	3.4.7
17		Directional Arrow – Single-headed arrow	I 4-1R	3.4.8
18		Directional Arrow - Single-headed arrow	I5-2R	3.4.8
19		Directional Arrow – Single-headed arrow	I5-3	3.4.8
20		Directional Arrow -Double-headed arrow	I5-4	3.4.8
21		Directional Arrow - Double-headed arrow	I5-5	3.4.8
22		Directional Arrow - Double-headed arrow	I5-6	3.4.8
23		Directional Arrow -	I5-7	3.4.8

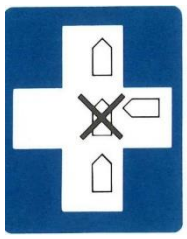
No.	Sign	Name	Sign Code	Section
		Double-headed arrow		
24		Advance Horizontal Stack	G1-1	3.5.3.1
25		Advance Vertical Stack	G2-1	3.5.3.2
26		Advance Vertical Stack	G3-1	3.5.3.2
27		Advance Map	G4-1	3.5.3.3
28		Chevron Direction	G5-1	3.5.3.4
29		Chevron Direction	G5-2	3.5.3.4
30		Dual-Chevron Street Name	G6-1	3.5.3.5

No.	Sign	Name	Sign Code	Section
31		Single-Chevron Street Name	G6-2	3.5.3.5
32		Single Panel Street Name	G6-3	3.5.3.5
33		Overhead Cantilever-Arm Street Name	G6-4	3.5.3.5
34		Overhead Cantilever-Arm Street Name	G6-5	3.5.3.5
35		Place Identification (crossing national boundaries or entering larger communities)	G7-1	3.5.4
36		Place Identification (tourist or natural landmarks)	G7-2	3.5.4

No.	Sign	Name	Sign Code	Section
37		Place Identification (entering localities, e.g. neighborhoods or communities)	G7-3	3.5.4
38		Confirmatory (Distance)	G8-1	3.5.5.1
39		No Through Road	G9-1	3.5.6
40		Turn on Lights	G10-1	3.5.6
41		Petrol Station	G11-1	3.5.7

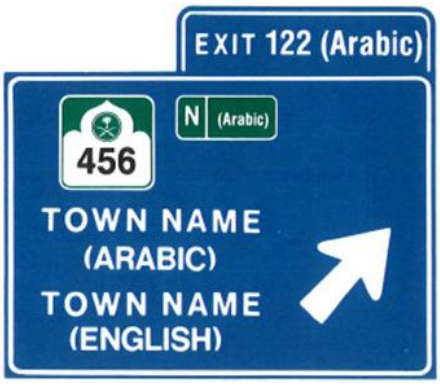
No.	Sign	Name	Sign Code	Section
42		Mechanic	G11-2	3.5.7
43		Restaurant	G11-3	3.5.7
44		Hotel	G11-4	3.5.7
45		Refreshments	G11-5	3.5.7
46		Telephone	G11-6	3.5.7

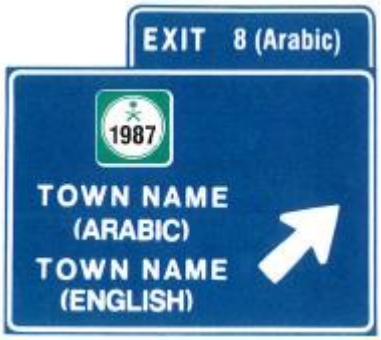
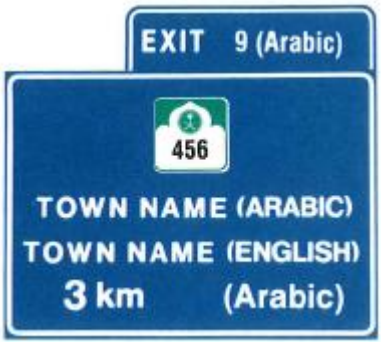
No.	Sign	Name	Sign Code	Section
47		Hospital	G11-7	3.5.7
48		First Aid	G11-8	3.5.7
49		WiFi	G11-9	3.5.7
50		Mosque	G11-10	3.5.7
51		Toilet	G11-11	3.5.7
52		Rest Area and Other Roadside Services – Advance Informative	G11-12	3.5.7

No.	Sign	Name	Sign Code	Section
53		Rest Area and Other Roadside Services – Informative at the Destination	G11-13	3.5.7
54		Designated Parking Area (Chevron)	G12-1	3.5.8
55		Designated Parking Area (Trailblazer)	G12-2	3.5.8
56		Stop here on Red	G13-1	3.5.9
57		Do Not Block Intersection	G13-2	3.5.9
58		Pedestrian Push Button	G13-3	3.5.9

No.	Sign	Name	Sign Code	Section
59		Airport Symbol (direction to the airport: left)	G14-1A	3.5.10
60		Airport Symbol (direction to the airport: straight)	G14-1B	3.5.10
61		Airport Symbol (direction to the airport: right)	G14-1C	3.5.10
62		Airport Symbol (direction to the airport as shown)	G14-1D	3.5.10
63		City Center Symbol	G14-2	3.5.10
64		Industrial Area Symbol	G14-3	3.5.10
65		Stadium Symbol	G14-4	3.5.10
66		Pedestrian Underpass / Overpass Sign	G15-1	3.5.11
67		Exit Number Panels	G16-1	3.6.9

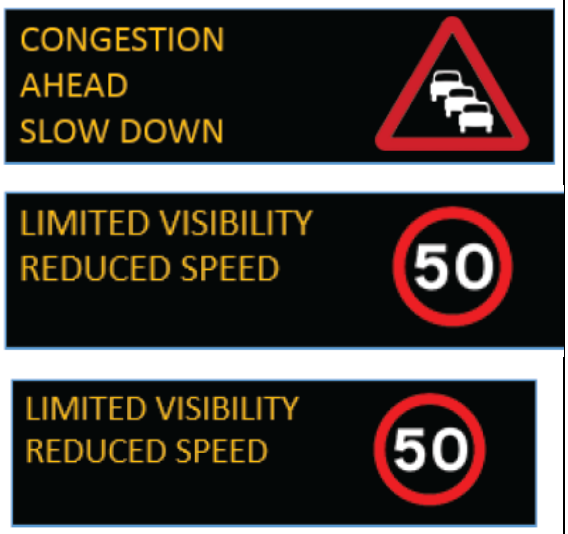
No.	Sign	Name	Sign Code	Section
68		Kilometer Posting	G17-1	3.6.10
69		Freeway / Expressway Begins	G18-1	3.6.11
70		Freeway / Expressway Ends	G18-2	3.6.11
71		Freeway / Expressway Ends (distance included)	G18-3	3.6.11
72		All Traffic Must Exit Sign	G18-4	3.6.11
73		Advance Direction Sign	G19-1	3.6.12.1

No.	Sign	Name	Sign Code	Section
74		Exit Direction Sign	G19-2	3.6.12.2
75		Gore Exit Sign	G19-3	3.6.12.3
76		Exit Only Panel	G20-1	3.6.13
77		Exit Only Panel	G20-2	3.6.13

No.	Sign	Name	Sign Code	Section
78		Advance Direction	G21-1	3.6.13
79		Exit Direction	G21-2	3.6.13
80		Sign Spreading and Pull Thru Signs	G22-1	3.6.14
81		Sign Spreading and Pull Thru Signs	G22-2	3.6.13

No.	Sign	Name	Sign Code	Section
82		Overhead	G 23-1	
83		Overhead	G 23-2	3.6.14
84		Diagrammatic Signs	G 24-1	3.6.14
85		Toll Rate	T25-1	3.7.1.3
86		Typical Pay Toll	T25-2	3.7.2

No.	Sign	Name	Sign Code	Section
87		Stop Ahead Pay Toll Sign	T25-3	3.7.2.1
88		Last Exit Before Toll	T25-4	3.7.2.2
89		Typical Express Lane Sign	P26-1	3.8.1
90		Typical Bus Lane Sign	P27-1	3.8.1

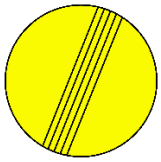
No.	Sign	Name	Sign Code	Section
91		Express Lane and HOV-x Sign	P28-1	3.8.1
92		Dynamic Message	D29-1	3.11
93		Supplemental Trailblazer	G30-1	3.12.1
94		Supplemental Chevron	G30-2	3.12.1

No.	Sign	Name	Sign Code	Section
95		Supplemental Insert	G30-3	3.12.1
96		Advance Supplemental - Example for Tourist Attractions Sites	G31-1	3.12.2
97		Advance Supplemental - Example for Tourist Attractions Sites	G31-2	3.12.2
98		Advance Supplemental - Example for Government Facility	G31-3	3.12.2
99		Supplemental Direction	G32-1	3.12.3

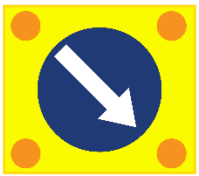
Appendix D - Regulatory Signs within Work Zones

Table D-1 Regulatory Signs for use within Work Zones

No.	Sign	Name	Sign Number
1		Stop	R 1-1
2		Entry Prohibited	R 12-1
3		Yield	TR 2-1
4		Speed Limit	TR 3-1
5		No Left Turn	TR 4-1L
6		No Right Turn	TR 4-1R
7		No U Turn	TR 4-2
8		Overtaking Prohibited	TR 8-1

No.	Sign	Name	Sign Number
9		Overtaking by Trucks Prohibited	TR 8-2
10		Priority for Oncoming Traffic	TR 9-1
11		Priority Over Oncoming Traffic	TR 9-2
12		Closed Both Directions	TR 12-1
13		Restricted Clearance (Width)	TR 28-1
14		Restricted Clearance (Height)	TR 29-1
15		End All Prohibitions	TR 35-1
16		End of Overtaking Prohibited	TR 35-2
17		Mandatory Movement (Forward)	R 5-1

No.	Sign	Name	Sign Number
18		Mandatory Movement	R 5-1L
19		Mandatory Movement	R 5-1R
20		Mandatory Movement (U Turn)	R 5-2
21		Mandatory Movement	R 5-3
22		Mandatory Movement	R 5-4
23		Mandatory Movement (Left)	R 5-5L
24		Mandatory Movement (Right)	R 5-5R
25		Mandatory Movement	R 5-6L
26		Mandatory Movement	R 5-6R

No.	Sign	Name	Sign Number
27		Pass This Side (Left)	R 11-1
28		Pass This Side (Right)	R 11-2
29		Pass Either Side	R 11-3
30		Mandatory Movement (Roundabout)	R 19-1
31		Cycle Lane or Path	R 40-1
32		Common Foot and Bike Path	R 44-1
33		Separate Foot and Bike Path	R 44-2
34		Pass This Side (Sign on Rear of vehicle)	TR 5-7

Appendix E - Warning Signs within Work Zones

Table E-1 Warning Signs for use within Work Zones

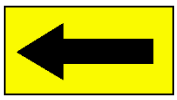
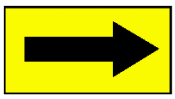
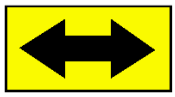
No.	Sign	Name	Sign Number
1		Left Curve	TW 1-1L
2		Right Curve	TW 1-1R
3		Sharp Curve	TW 1-2L
4		Sharp Curve	TW 1-2R
5		Reverse Curve L-R	TW 1-3L
6		Reverse Curve R-L	TW 1-3R
7		Dangerous Curves L-R	TW 1-4L
8		Dangerous Curves R-L	TW 1-4R

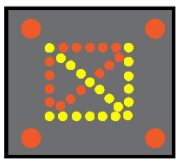
No.	Sign	Name	Sign Number
9		Chevron Alignment (Left)	TW 2-1L
10		Chevron Alignment (Right)	TW 2-1R
11		Chevron board (variable numbers of chevrons and formats)	TW 2-2L
12		Chevron board (variable numbers of chevrons and formats)	TW 2-2R
13		Descent	TW 5-1
14		Ascent	TW 5-2
15		Road Narrows	TW 6-1
16		Road Narrows-Keep Left	TW 6-2
17		Road Narrows-Keep Right	TW 6-3

No.	Sign	Name	Sign Number
18		Divided Road Ends	TW 9-1
19		Divided Road Begins	TW 9-2
20		Two-Way Traffic	TW 11-1
21		Low Clearance	TW 12-1
22		Stop Ahead	TW 16-1
23		Yield Ahead	TW 17-1
24		Signals Ahead	TW 19-1
25		Signals Ahead	TW 19-2
26		Dip	TW 23-1

No.	Sign	Name	Sign Number
27		Slippery Road	TW 26-1
28		Loose Gravel	TW 27-1
29		Rough Road	TW 29-1
30		Falling Rocks	TW 30-1
31		Hump	TW 36-1
32		Other hazard ahead	TW 37-1
33		Merge	TW 41-1L
34		Merge	TW 41-1R
35		Side Road	TW 43-2L

No.	Sign	Name	Sign Number
36		Side Road	TW 43-2R
37		Cross Road	TW 43-6
38		Traffic Rotary	TW 44-1
39		Cyclists Crossing Ahead	TW 44-2
40		U-turn Ahead	TW 45-1
41		Pedestrian Crossing	TW 47-1
42		Pedestrian Crossing	TW 47-2
43		Children	TW 48-1
44		Children Crossing	TW 48-2

No.	Sign	Name	Sign Number
45		Animal Crossing	TW 49-1
46		Road Work	TW 50-1
47		Lane Closed	TW 50-2
48		Flagger Ahead	TW 50-3
49		Left Arrow	TW 51-1
50		Right Arrow	TW 51-2
51		Double Arrow	TW 51-3
52		Chevron board (various chevrons and formats available)	TW 52-1
53		Electronic Arrow Board	TW 53-1

No.	Sign	Name	Sign Number
54		Vehicle mounted “Pass to right or left” arrow sign	TW 54-1
55		Road Work	TW 55-1
56		Safety First	TW 56-1

Appendix F - Information Signs within Work Zones

Table F-1 Traffic Signs for use within Work Zones

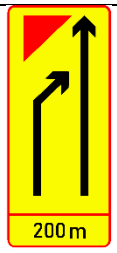
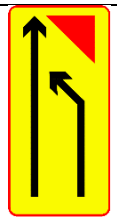
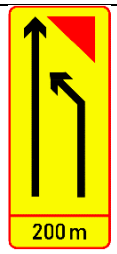
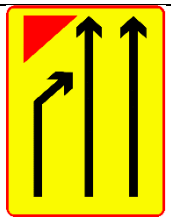
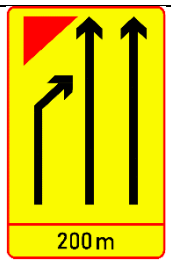
No.	Sign	Name	Sign Number
1		Work Zone Ahead	TI 1-1
2		End Road Work	TI 1-2
3		Detour 2 km	TI 2-1
4		Detour Ahead (It will be placed with signs TDI 25-1, e.g., 500 m, 1,000 m, 1,500 m)	TI 2-2
5		Detour Arrow	TI 2-3
6		Detour Arrow	TI 2-4
7		On red stop here	TI 3-1
8		Traveled way closed	TI 4-1

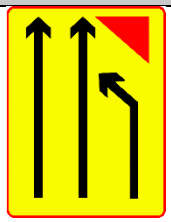
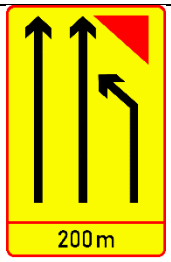
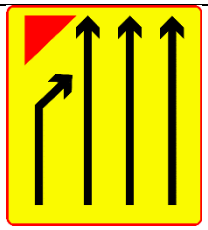
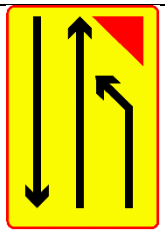
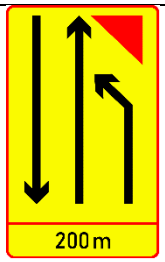
No.	Sign	Name	Sign Number
9		Traffic control ahead	TI 5-1
10		Pedestrian Detour	TI 6-1
11		Pedestrian Detour	TI 6-2
12		Cyclist Detour	TI 7-1
13		Cyclist Detour	TI 7-2
14		Detour (Arrow Ahead)	TI 8-1
15		Detour (Arrow Right)	TI 8-2
16		Detour (Arrow Left)	TI 8-3
17		Construction Site Entrance - Exit	TI 9-1

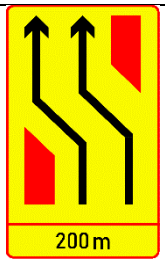
No.	Sign	Name	Sign Number
18		No Through Road	TI 10-1

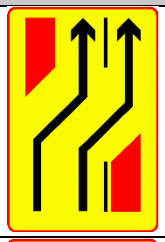
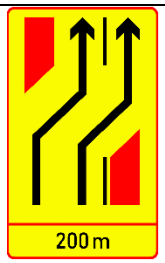
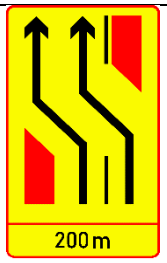
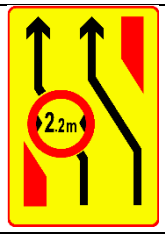
Appendix G - Diagrammatic Information Signs within Work Zones

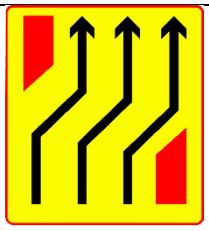
Table G-1 Diagrammatic Information Signs for use within Work Zones

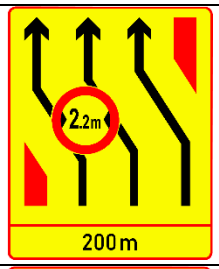
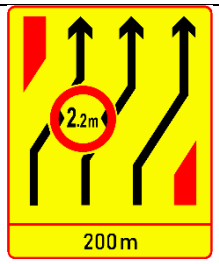
No.	Sign	Name	Sign Number
1		Reduction in traffic lanes from the left	TDI 1-1L
2		Reduction in traffic lanes from the left – including distance plate	TDI 1-1La
3		Reduction in traffic lanes from the right	TDI 1-1R
4		Reduction in traffic lanes from the right – including distance plate	TDI 1-1Ra
5		Reduction in traffic lanes from the left	TDI 1-2L
6		Reduction in traffic lanes from the left – including distance plate	TDI 1-2La

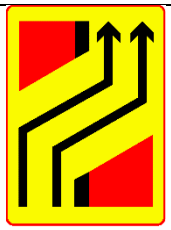
No.	Sign	Name	Sign Number
7		Reduction in traffic lanes from the right	TDI 1-2R
8		Reduction in traffic lanes from the right – including distance plate	TDI 1-2Ra
9		Reduction in traffic lanes from the left	TDI 1-3L
10		Reduction in traffic lanes from the left – including distance plate	TDI 1-3La
11		Reduction in traffic lanes from the right	TDI 1-4
12		Reduction in traffic lanes from the right – including distance plate	TDI 1-4a
13		One lane deviation to the left	TDI 2-1

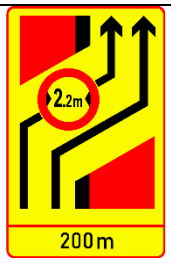
No.	Sign	Name	Sign Number
14		One lane deviation to the left – including distance plate	TDI 2-1a
15		One lane deviation to the right	TDI 2-2
16		One lane deviation to the right – including distance plate	TDI 2-2a
17		Two lanes deviation to the left	TDI 3-1
18		Two lanes deviation to the left – including distance plate	TDI 3-1a
19		Two lanes deviation to the right	TDI 3-2
20		Two lanes deviation to the right – including distance plate	TDI 3-2a

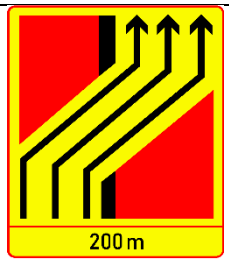
No.	Sign	Name	Sign Number
21		Divert to emergency lane (number of arrows varies)	TDI 4-1
22		Divert to emergency lane (number of arrows varies) – including distance plate	TDI 4-1a
23		Rejoin main traveled way (number of arrows varies)	TDI 4-2
24		Rejoin main traveled way (number of arrows varies) – including distance plate	TDI 4-2a
25		Right lane deviation to the right (number of arrows varies)	TDI 5-1
26		Right lane deviation to the right (number of arrows varies) – including distance plate	TDI 5-1a
27		Lanes deviation to the left (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 6-1

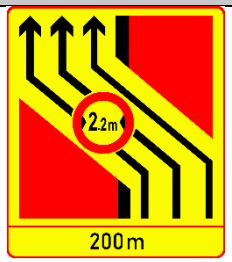
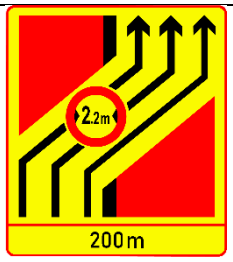
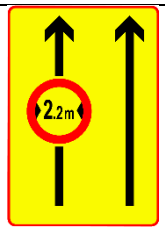
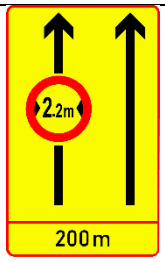
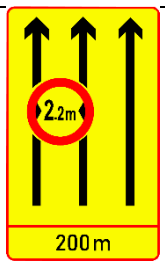
No.	Sign	Name	Sign Number
28		Lanes deviation to the left (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 6-1a
29		Lanes deviation to the right (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 6-2
30		Lanes deviation to the right (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 6-2a
31		Three lanes deviation to the left	TDI 7-1
32		Three lanes deviation to the left – including distance plate	TDI 7-1a
33		Three lanes deviation to the right	TDI 7-2
34		Three lanes deviation to the right – including distance plate	TDI 7-2a

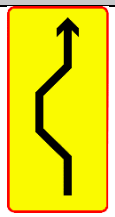
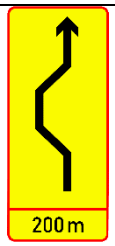
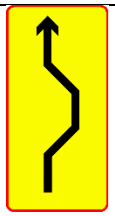
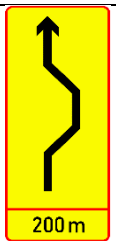
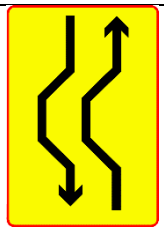
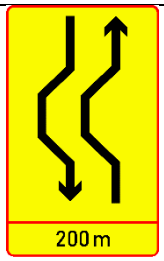
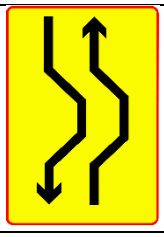
No.	Sign	Name	Sign Number
35		Lanes deviation to the left (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 8-1
36		Lanes deviation to the left (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 8-1a
37		Lanes deviation to the right (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 8-2
38		Lanes deviation to the right (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 8-2a
39		One lane deviation to the opposite traveled way	TDI 9-1
40		One lane deviation to the opposite traveled way – including distance plate	TDI 9-1a
41		One lane deviation to the opposite traveled way	TDI 9-2

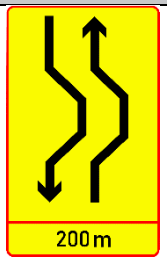
No.	Sign	Name	Sign Number
42		One lane deviation to the opposite traveled way – including distance plate	TDI 9-2a
43		Two lanes deviation to the opposite traveled way	TDI 10-1
44		Two lanes deviation to the opposite traveled way – including distance plate	TDI 10-1a
45		Two lanes deviation to the opposite traveled way	TDI 10-2
46		Two lanes deviation to the opposite traveled way – including distance plate	TDI 10-2a
47		Two lanes deviation to the opposite traveled way Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 11-1
48		Two lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes. – including distance plate	TDI 11-1a

No.	Sign	Name	Sign Number
49		Two lanes deviation to the opposite traveled way Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 11-2
50		Two lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes. – including distance plate	TDI 11-2a
51		From straight-ahead moving traffic, lanes are splitting towards the left of the median. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 12-1
52		From straight-ahead moving traffic, lanes are splitting towards the left of the median. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 12-1a
53		Lanes are splitting towards the left of the median, one or two lanes must crossover. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 13-1
54		Lanes are splitting towards the left of the median, one or two lanes must crossover. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 13-1a

No.	Sign	Name	Sign Number
55		Lanes are splitting towards the left of the median, one or two lanes must crossover. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 14-1
56		Lanes are splitting towards the left of the median, one or two lanes must crossover. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 14-1a
57		Three lanes deviation to the opposite traveled way	TDI 15-1
58		Three lanes deviation to the opposite traveled way – including distance plate	TDI 15-1a
59		Three lanes deviation to the opposite traveled way	TDI 15-2
60		Three lanes deviation to the opposite traveled way – including distance plate	TDI 15-2a
61		Three lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 16-1

No.	Sign	Name	Sign Number
62		Three lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes. – including distance plate.	TDI 16-1a
63		Three lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 16-2
64		Three lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes. – including distance plate	TDI 16-2a
65		Number of lanes (Number of arrows varies) Vehicles over mentioned width are not allowed in the specific lanes. Variant	TDI 17-1
66		Number of lanes (Number of arrows varies) Vehicles over mentioned width are not allowed in the specific lanes. Variant – including distance plate	TDI17-1a
67		Number of lanes (Number of arrows varies) Vehicles over mentioned width are not allowed in the specific lanes. Variant	TDI 18-1
68		Number of lanes (Number of arrows varies) Vehicles over mentioned width are not allowed in the specific lanes. Variant – including distance plate	TDI18-1a

No.	Sign	Name	Sign Number
69		A short detour (left) of one direction.	TDI 19-1
70		A short detour (left) of one direction – including distance plate	TDI 19-1a
71		A short detour (right) of one direction.	TDI 20-1
72		A short detour (right) of one direction – including distance plate	TDI 20-1a
73		A short detour of both directions.	TDI 21-1
74		A short detour of both directions – including distance plate	TDI 21-1a
75		A short detour of both directions.	TDI 22-1

No.	Sign	Name	Sign Number
76		A short detour of both directions – including distance plate	TDI 22-1a
77		Mobile Speed Limit Reduction in traffic lanes (Distance, number of traffic lanes, direction, and lanes closed may be varied) (Sign on Rear of vehicle)	TDI 23-1 new
78		Mobile Speed Limit Reduction in traffic lanes (Distance, number of traffic lanes, direction, and lanes closed may be varied) Variant – including distance plate (Sign on Rear of vehicle)	TDI 23-2 new
79		Mobile Speed Limit Divert to paved shoulder (Sign on Rear of vehicle)	TDI 24-1 new
80		Distance ahead	TDI 25-1
81		Only buses, cars with trailers and motor vehicles with a maximum authorized mass of exceeding 3.5 tons, including their trailers	TDI 26 -1

"Private Entrance "signboard in both Arabic and English languages should be provided in work zone, particularly for the long-term work zone.

"Bus Station" Signboard in both Arabic and English languages should be provided for pick and drop service of labor from a designated and fixed point to avoid trespassing and prohibited road crossing.

Appendix H - Additional Signs

The signs presented in Appendix H are recommended to be used by the practitioners.

- **Safety first sign (TW 56-1)**

This sign is recommended to be used in the beginning of the work zones to promote safety awareness for road users in order for them to be cautious when passing through work zones.

Figure H-1 Safety First Sign (TW 56-1)

Appendix I - Glossary of Terms

Accessible Pedestrian Signal - A device that communicates information about pedestrian signal timing in non-visual format such as audible tones, speech messages, and/or vibrating surfaces.

Accessible Pedestrian Signal Detector - A device designated to assist the pedestrian who has visual or physical disabilities in activating the pedestrian phase.

Actuation - A detection of a roadway user that is forwarded to the controller by a detector.

Advisory Speed - A recommended speed for all vehicles operating on a section of highway and based on the highway design, operating characteristics, and conditions.

Annual Average Daily Traffic (AADT) - Annual average daily traffic is the total volume of traffic observed on a point or segment of a highway in both directions over a period of one year divided by the number of days in a year.

Approach - A set of lanes at an intersection that accommodates all left-turn, through, and right-turn movements from a given direction.

Arterial Rural - A rural arterial highway refers to roadways consisting of two lanes in the cross-section, one for each direction of travel. Occasionally, passing lanes may be added to one or two sides of the highway extending the cross-section to three or four lanes at those locations. In this entry, two-lane highways strictly refer to roadways in rural areas meeting the previous definition and do not include urban and suburban streets. For higher traffic volumes multilane rural highways could be designed with two or more traffic lanes per direction, to upgrade the provided level of service. A central median could be placed in between two directions, while leveled intersections are usually applied in connections with other roads. The average running speed for off-peak conditions is between 60 and 110 km/h.

Average Daily Traffic (ADT) - The total volume of traffic during a given time period (greater than one day and less than a year) divided by the number of days.

Average Day - A day representing traffic volumes normally and repeatedly found at a location, typically a weekday when volumes are influenced by employment or a weekend day when volumes are influenced by entertainment or recreation.

Backplate - See Signal Backplate.

Beacon - A highway traffic signal with one or more signal sections that operates in a flashing mode.

Bicycle - Vehicle with two wheels in tandem that is propelled by human power and is usually ridden by one person.

Bicycle Facilities - A general term denoting improvements and provisions that accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically defined for bicycle use.

Bicycle Lane - A portion of a roadway that has been designated for preferential or exclusive use by bicyclists by pavement markings and, if used, signs.

Bikeway - Any road, street, path, or way that is specifically designated as being open to bicycle travel, regardless of whether such facilities are designed for the exclusive use of bicycles or are to be shared with other transportation modes.

Carriageway - That portion of a road or bridge devoted particularly to the use of vehicles, inclusive of shoulders and auxiliary lanes.

Center Line Markings - The white pavement marking line(s) that delineates the separation of traffic lanes that have opposite directions of travel on a roadway. These markings need not be at the geometrical center of the pavement.

Circular Intersection - An intersection that has an island, generally circular in design, located in the center of the intersection where traffic passes to the right of the island. Circular intersections include roundabouts, rotaries, and traffic circles.

Circulatory Roadway - The roadway within a circular intersection on which traffic travels in a counterclockwise direction around an island in the center of the circular intersection.

Clear Zone - The total roadside border area, starting at the edge of the traveled way, that is available for an errant driver to stop or regain control of a vehicle. This area might consist of a shoulder, a recoverable slope, and/or a non-recoverable, traversable slope with a clear run-out area at its toe.

Collector Highway - A term denoting a highway that in rural areas connects small towns and local highways to arterial highways, and in urban areas provides land access and traffic circulation within residential, commercial, and business areas and connects local highways to the arterial highways.

Concurrent Flow Preferential Lane - A preferential lane that is operated in the same direction as the adjacent mixed flow lanes, separated from the adjacent general-purpose freeway lanes by a standard lane stripe, painted buffer, or barrier.

Constant Warning Time Detection - A means of detecting rail traffic that provides relatively uniform warning time for the approach of trains or light rail transit traffic that are not accelerating or decelerating after being detected.

Controller Assembly - A complete electrical device mounted in a cabinet for controlling the operation of a highway traffic signal.

Crosswalk - (a) That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or in the absence of curbs, from the edges of the traversable roadway, and in the absence of a sidewalk on one side of the roadway, the part of a roadway included within the extension of the lateral lines of the sidewalk at right angles to the center line; (b) any portion of a roadway at an intersection or elsewhere distinctly indicated as a pedestrian crossing by pavement marking lines on the surface, which might be supplemented by contrasting pavement texture, style, or color.

Crosswalk Lines - White pavement marking lines that identify a crosswalk.

Dark Mode - The lack of all signal indications at a signalized location. (The dark mode is most commonly associated with power failures, ramp meters, hybrid beacons, beacons, and some movable bridge signals).

Delineator - A retroreflective device mounted on the roadway surface or at the side of the roadway in a series to indicate the alignment of the roadway, especially at night or in adverse weather.

Design Vehicle - The longest vehicle permitted by statute of the road authority on that roadway.

Detector (Or Detection) - A device used to count and/or determine the presence of a motorized vehicle, bicycle, or pedestrian.

Downstream - A term that refers to a location that is encountered by traffic subsequent to an upstream location as it flows in an "upstream to downstream" direction. For example, "the downstream end of a lane line separating the turn lane from a through lane on the approach to an intersection" is the end of the lane line that is closest to the intersection.

Dropped Lane - A through lane that becomes a mandatory turn lane on a conventional roadway, or a through lane that becomes a mandatory exit lane on a freeway or expressway. The end of an acceleration lane and reductions in the number of through lanes that do not involve a mandatory turn or exit are not considered dropped lanes.

Dynamic Exit Gate Operating Mode - A mode of operation where the exit gate operation is based on the presence of vehicles within the minimum track clearance distance.

Dynamic Message Sign (DMS) - An electronic sign deployed on roadways to inform travelers of specific warnings including but not limited to congestion, special events, traffic incidents, and other emergency alerts.

Edge Line Markings - White or yellow pavement marking lines that delineate the right or left edge(s) of a traveled way.

Electronic Toll Collection (ETC) - A system for automated collection of tolls from moving or stopped vehicles through wireless technologies such as radio-frequency communication or optical scanning. ETC systems are classified as one of the following: (1) systems that require users to have registered toll accounts, with the use of equipment inside or on the exterior of vehicles, such as a transponder or barcode decal, that communicates with or is detected by roadside or overhead receiving equipment, or with the use of license plate optical scanning, to automatically deduct the toll from the registered user account, or (2) systems that do not require users to have registered toll accounts because vehicle license plates are optically scanned and invoices for the toll amount are sent through postal mail to the address of the vehicle owner.

Electronic Toll Collection (ETC) Account-Only Lane - A non-attended toll lane that is restricted to use only by vehicles with a registered toll payment account.

Emergency-Vehicle Hybrid Beacon - A special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist authorized emergency vehicles in entering or crossing a street or highway.

Emergency-Vehicle Traffic Control Signal - A special traffic control signal that assigns the right-of-way to an authorized emergency vehicle.

End-of-Roadway Marker - A device used to warn and alert road users of the end of a roadway in other than temporary traffic control zones.

Engineering Judgment - The evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment shall be exercised by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. Documentation of engineering judgment is not required.

Engineering Study - The comprehensive analysis and evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. An engineering study shall be performed by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. An engineering study shall be documented.

Entrance Gate - An automatic gate that can be lowered across the lanes approaching a grade crossing to block road users from entering the grade crossing.

Exit Gate - An automatic gate that can be lowered across the lanes departing a grade crossing to block road users from entering the grade crossing by driving in the opposing traffic lanes.

Exit Gate Clearance Time - For Four-Quadrant Gate systems at grade crossings, the amount of time provided to delay the descent of the exit gate arm(s) after entrance gate arm(s) begin to descend.

Exit Gate Operating Mode - For Four-Quadrant Gate systems at grade crossings, the mode of control used to govern the operation of the exit gate arms.

Expressway - A high-speed divided arterial highway for through traffic with limited points of access or exit and grade separations at major intersection.

Flagger - A person who actively controls the flow of vehicular traffic into and/or through a temporary traffic control zone using hand-signaling devices or an Automated Flagger Assistance Device (AFAD).

Flasher - A device used to turn highway traffic signal indications on and off at a repetitive rate of approximately once per second.

Flashing - An operation in which a light source, such as a traffic signal indication, is turned on and off repetitively.

Flashing Mode - A mode of operation in which at least one traffic signal indication in each vehicular signal face of a highway traffic signal is turned on and off repetitively.

Flashing-Light Signals - A warning device consisting of two red signal indications arranged horizontally that are activated to flash alternately when rail traffic is approaching or present at a grade crossing.

Freeway - A fully access-controlled, divided highway with a minimum of two lanes (and frequently more) in each direction.

Gate - An automatically operated or manually operated traffic control device that is used to physically obstruct road users such that they are discouraged from proceeding past a particular

point on a roadway or pathway, or such that they are discouraged from entering a particular grade crossing, ramp, lane, roadway, or facility.

Grade Crossing - The general area where a highway and a railroad and/or light rail transit route cross at the same level, within which are included the tracks, highway, and traffic control devices for traffic traversing that area.

Guide Sign - A sign that shows route designations, destinations, directions, distances, services, points of interest, or other geographical, recreational, or cultural information.

Hazardous Materials - Any substance or material that when released in sufficient quantities, can negatively affect the safety of people, handlers or carriers during transportation, and/or property.

High Occupancy Vehicle (HOV) - A motor vehicle carrying more than one person, including carpools, vanpools and buses.

Highway - A general term for denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

Highway Traffic Signal - A power-operated traffic control device by which traffic is warned or directed to take some specific action. These devices do not include power-operated signs, steadily illuminated pavement markers, warning lights, or steady burning electric lamps.

Highway-Rail Grade Crossing - The general area where a highway and a railroad cross at the same level, within which are included the railroad tracks, highway, and traffic control devices for highway traffic traversing that area.

Hybrid Beacon - A special type of beacon that is intentionally placed in a dark mode (no indications displayed) between periods of operation and, when operated, displays both steady and flashing traffic control signal indications.

Interchange - A system of interconnecting highways providing for traffic movement between two or more highways that do not intersect at grade.

Intersection - A point where two or more highways cross or meet at grade, where vehicular travel between the highways is accomplished via turning movements, and where right-of-way is typically regulated through the use of traffic control devices.

Interval - The duration of time during which traffic signal indications (e.g., red, yellow, green, and flashing don't walk) do not change state (i.e., red interval, yellow interval, green interval, and flashing don't walk interval).

Island - A defined area between traffic lanes for control of vehicular movements, for toll collection, or for pedestrian refuge. It includes all end protection and approach treatments. Within an intersection area, a median or an outer separation is considered to be an island.

Lane Drop - See Dropped Lane.

Lane Line Markings - White pavement marking lines that delineate the separation of traffic lanes that have the same direction of travel on a roadway.

Light Rail Transit Traffic (Light Rail Transit Equipment) - Every device in, upon, or by which any person or property can be transported on light rail transit tracks, including single-unit light rail transit cars (such at streetcars and trolleys) and assemblies of multiple light rail transit cars coupled together.

Locomotive Horn - An air horn, steam whistle, or similar audible warning device mounted on a locomotive or control cab car. The terms "locomotive horn," "train whistle," "locomotive whistle," and "train horn" are used interchangeably in the railroad industry.

Logo - A distinctive emblem or trademark that identifies a commercial business and/or the product or service offered by the business.

Longitudinal Markings - Pavement markings that are generally placed parallel and adjacent to the flow of traffic such as lane lines, center lines, edge lines, channelizing lines, and others.

Major Interchange - An interchange with another freeway or expressway, or an interchange with a high-volume multi-lane highway, principal urban arterial, or major rural route where the interchanging traffic is heavy or includes many road users unfamiliar with the area.

Major Street - The street normally carrying the higher volume of vehicular traffic. The street not controlled by STOP signs at a two-way STOP-controlled intersection (HCM).

Managed Lane - A highway lane or set of lanes, or a highway facility, for which variable operational strategies such as direction of travel, tolling, pricing, and/or vehicle type or occupancy requirements are implemented and managed in real-time in response to changing conditions. Managed lanes are typically buffer- or barrier-separated lanes parallel to the general-purpose lanes of a highway in which access is restricted to designated locations. There are also some highways on which all lanes are managed.

Median - A divider or island placed usually at the centerline of a highway which is meant to separate opposite directions of travel.

Minimum Track Clearance Distance - For standard two-quadrant warning devices, the minimum track clearance distance is the length along a highway at one or more railroad or light rail transit tracks, measured from the highway stop line, warning device, or 3.65 m perpendicular to the track center line, to 1.82 m beyond the track(s) measured perpendicular to the far rail, along the center line or edge line of the highway, as appropriate, to obtain the longer distance. For Four-Quadrant Gate systems, the minimum track clearance distance is the length along a highway at one or more railroad or light rail transit tracks, measured either from the highway stop line or entrance warning device, to the point where the rear of the vehicle would be clear of the exit gate arm. In cases where the exit gate arm is parallel to the track(s) and is not perpendicular to the highway, the distance is measured either along the center line or edge line of the highway, as appropriate, to obtain the longer distance.

Minimum Warning Time - The least amount of time active warning devices **shall** operate prior to the arrival of rail traffic at a grade crossing.

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

Minor Street - The street normally carrying the lower volume of vehicular traffic. The street controlled by STOP signs at a two-way STOP-controlled intersection (HCM).

Multi-Lane - More than one lane moving in the same direction. A multi-lane street, highway, or roadway has a basic cross-section comprised of two or more through lanes in one or both directions. A multi-lane approach has two or more lanes moving toward the intersection, including turning lanes.

Neutral Area - The paved area between the channelizing lines separating an entrance or exit ramp or a channelized turn lane or channelized entering lane from the adjacent through lane(s).

Object Marker - A device used to mark obstructions within or adjacent to the roadway.

Occupancy Requirement - Any restriction that regulates the use of a facility or one or more lanes of a facility for any period of the day based on a specified number of persons in a vehicle.

Occupant - A person driving or riding in a car, truck, bus, or other vehicle.

Opposing Traffic - Vehicles that are traveling in the opposite direction. At an intersection, vehicles entering from an approach that is approximately straight ahead would be considered to be opposing traffic, but vehicles entering from approaches on the left or right would not be considered to be opposing traffic.

Overhead Sign - A sign that is placed such that a portion or the entirety of the sign or its support is directly above the roadway or shoulder such that vehicles travel below it. Typical installations include signs placed on cantilever arms that extend over the roadway or shoulder, on sign support structures that span the entire width of the pavement, on mast arms or span wires that also support traffic control signals, and on highway bridges that cross over the roadway.

Parking Area - A parking lot or parking garage that is separated from a roadway. Parallel or angle parking spaces along a roadway are not considered a parking area.

Pathway - A general term denoting a public way for purposes of travel by authorized users outside the traveled way and physically separated from the roadway by an open space or barrier and either within the highway right-of-way or within an independent alignment. Pathways include shared-use paths, but do not include sidewalks.

Pathway Grade Crossing - The general area where a pathway and railroad or light rail transit tracks cross at the same level, within which are included the tracks, pathway, and traffic control devices for pathway traffic traversing that area.

Paved - A bituminous surface treatment, mixed bituminous concrete, or Portland cement concrete roadway surface that has both a structural (weight bearing) and a sealing purpose for the roadway.

Pedestrian - Any person on foot or who is using a powered wheelchair or mobility scooter or a wheeled means of conveyance propelled by human power, other than a cycle.

Pedestrian Change Interval - An interval during which the flashing UPRAISED HAND (symbolizing DONT WALK) signal indication is displayed.

Pedestrian Clearance Time - The time provided for a pedestrian crossing in a crosswalk, after leaving the curb or shoulder, to travel to the far side of the traveled way or to a median.

Pedestrian Facilities - A general term denoting improvements and provisions made to accommodate or encourage walking.

Pedestrian Hybrid Beacon - A special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.

Pedestrian Signal Head - A signal head, which contains the symbols WALKING PERSON (symbolizing WALK) and UPRAISED HAND (symbolizing DONT WALK), that is installed to direct pedestrian traffic at a traffic control signal.

Pictograph - A pictorial representation used to identify a governmental jurisdiction, an area of jurisdiction, a governmental agency, a military base or branch of service, a governmental-approved university or college, a toll payment system, or a government-approved institution.

Plaque - A traffic control device intended to communicate specific information to road users through a word, symbol, or arrow legend that is placed immediately adjacent to a sign to supplement the message on the sign. The difference between a plaque and a sign is that a plaque cannot be used alone. The designation for a plaque includes a "P" suffix.

Platoon - A group of vehicles or pedestrians traveling together as a group, either voluntarily or involuntarily, because of traffic signal controls, geometrics, or other factors.

Portable Traffic Control Signal - A temporary traffic control signal that is designed so that it can be easily transported and reused at different locations.

Posted Speed Limit - A speed limit determined by law or regulation and displayed on Speed Limit signs.

Post-Mounted Sign - A sign that is placed to the side of the roadway such that no portion of the sign or its support is directly above the roadway or shoulder.

Preemption - The transfer of normal operation of a traffic control signal to a special control mode of operation.

Preferential Lane - A highway lane reserved for the exclusive use of one or more specific types of vehicles or vehicles with at least a specific number of occupants.

Principal Legend - Place names, street names, and route numbers placed on guide signs.

Priority Control - A means by which the assignment of right-of-way is obtained or modified.

Private Road Open to Public Travel - Private toll roads and roads (including any adjacent sidewalks that generally run parallel to the road) within shopping centers, airports, sports arenas, and other similar business and/or recreation facilities that are privately owned, but where the public is allowed to travel without access restrictions. Roads within private gated properties (except for gated toll roads) where access is restricted at all times, parking areas, driving aisles within parking areas, and private grade crossings shall not be included in this definition.

Pushbutton - A button to activate a device or signal timing for pedestrians, bicyclists, or other road users.

Pushbutton Information Message - A recorded message that can be actuated by pressing a pushbutton when the walk interval is not timing and that provides the name of the street that the crosswalk associated with that particular pushbutton crosses and can also provide other information about the intersection signalization or geometry.

Pushbutton Locator Tone - A repeating sound that informs approaching pedestrians that a pushbutton exists to actuate pedestrian timing or receive additional information and that enables pedestrians who have visual disabilities to locate the pushbutton.

Rail Traffic - Every device in, upon, or by which any person or property can be transported on rails or tracks and to which all other traffic must yield the right-of-way by law at grade crossings, including trains, one or more locomotives coupled (with or without cars), other railroad equipment, and light rail transit operating in exclusive or semi-exclusive alignments. Light rail transit operating in a mixed-use alignment, to which other traffic is not required to yield the right-of-way by law, is a vehicle and is not considered to be rail traffic.

Raised Pavement Marker - A device mounted on or in a road surface that has a height generally not exceeding approximately 25 mm above the road surface for a permanent marker, or not exceeding approximately 50 mm above the road surface for a temporary flexible marker, and that is intended to be used as a positioning guide and/or to supplement or substitute for pavement markings.

Red Clearance Interval - An interval that follows a yellow change interval and precedes the next conflicting green interval.

Regulatory Sign - A sign that gives notice to road users of traffic laws or regulations.

Retroreflectivity - A property of a surface that allows a large portion of the light coming from a point source to be returned directly back to a point near its origin.

Right-of-Way (ROW) - The legal right, established by grant from a landowner or long usage (i.e., by prescription), to pass along a specific route through property belonging to another.

Right-of-Way Transfer Time - The maximum amount of time needed for the worst case condition, prior to display of the track clearance green interval. This includes any railroad or light rail transit or highway traffic signal control equipment time to react to a preemption call, and any traffic control signal green, pedestrian walk and clearance, yellow change, and red clearance intervals for conflicting traffic.

Road - See Roadway.

Road Users - Any person who uses any part of a road, including pedestrians, cyclists and drivers of vehicles.

Road-Rail Grade Crossing - The general area where a road and a railroad cross at the same level, within which are included the railroad tracks, highway, and traffic control devices for road traffic traversing that area.

Roadway - That portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the sidewalk, berm, or shoulder even though such sidewalk, berm, or shoulder is used by persons riding bicycles or other human-powered vehicles. In the event a highway includes two or more separate roadways, the term roadway as used in this Code shall refer to any such roadway separately, but not to all such roadways collectively.

Roundabout - An intersection with a generally circular shape, characterized by yield on entry and circulation around a central island.

Rumble Strip - A series of intermittent, narrow, transverse areas of rough-textured, slightly raised, or depressed road surface that extend across the travel lane to alert road users to unusual traffic conditions or are located along the shoulder, along the roadway center line, or within islands formed by pavement markings to alert road users that they are leaving the travel lanes.

Rural Highway - A type of roadway normally characterized by lower volumes, higher speeds, fewer turning conflicts, and less conflict with pedestrians.

School - A public or private educational institution recognized by the Ministry of Education (MOE) for one or more grades K through 12 or as otherwise defined.

School Zone - A designated roadway segment approaching, adjacent to, and beyond school buildings or grounds, or along which school related activities occur.

Shared-Use Path - A bikeway outside the traveled way and physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Shared-use paths are also used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers) and other authorized motorized and nonmotorized users.

Sidewalk - That portion of a street between the curb line, or the lateral line of a roadway, and the adjacent property line or on easements of private property that is paved or improved and intended for use by pedestrians.

Sign - Any traffic control device that is intended to communicate specific information to road users through a word, symbol, and/or arrow legend. Signs do not include highway traffic signals, pavement markings, delineators, or channelization devices.

Sign Illumination - Either internal or external lighting that shows similar color by day or night. Street or highway lighting shall not be considered as meeting this definition.

Sign Legend - All word messages, logos, pictographs, and symbol and arrow designs that are intended to convey specific meanings. The border, if any, on a sign is not considered to be a part of the legend.

Sign Panel - A separate panel or piece of material containing a word, symbol, and/or arrow legend that is affixed to the face of a sign.

Signal Backplate - A thin strip of material that extends outward from and parallel to a signal face on all sides of a signal housing to provide a background for improved visibility of the signal indications.

Signal Face - An assembly of one or more signal sections that is provided for controlling one or more traffic movements on a single approach.

Signal Head - An assembly of one or more signal faces that is provided for controlling traffic movements on one or more approaches.

Signal Housing - That part of a signal section that protects the light source and other required components.

Signal Indication - The illumination of a signal lens or equivalent device.

Signal Lens - That part of the signal section that redirects the light coming directly from the light source and its reflector, if any.

Signal Phase - A period of time that allows one or more nonconflicting movements to proceed into a signalized intersection. It is also the term used to describe the associated signal timing parameters.

Signal Section - The assembly of a signal housing, signal lens, if any, and light source with necessary components to be used for displaying one signal indication.

Signal System - Two or more traffic control signals operating in signal coordination.

Signal Timing - The amount of time allocated for the display of a signal indication.

Signing - Individual signs or a group of signs, not necessarily on the same support(s), that supplement one another in conveying information to road users.

Speed - The rate of travel of a motorized or nonmotorized unit, which is defined as the distance traveled over a unit of time, typically expressed in km/h or meters per second (m/s).

Speed Limit - The maximum (or minimum) speed allowable on a section of highway as established by law. Speed limits must be posted, as well as established by law to be legal.

Speed Limit Sign Beacon - A beacon used to supplement a SPEED LIMIT sign.

Speed Measurement Markings - A white transverse pavement marking placed on the roadway to assist the enforcement of speed regulations.

Speed Zone - A section of highway with a speed limit that is established by law or regulation, but which might be different from a legislatively specified statutory speed limit.

Splitter Island - A median island used to separate opposing directions of traffic entering and exiting a roundabout.

Statutory Speed Limit - A speed limit established by legislative action that typically is applicable for a particular class of highways with specified design, functional, jurisdictional and/or location characteristics and that is not necessarily displayed on Speed Limit signs.

Steady (Steady Mode) - The continuous display of a signal indication for the duration of an interval, signal phase, or consecutive signal phases.

Stop Beacon - A beacon used to supplement a STOP sign, a DO NOT ENTER sign, or a WRONG WAY sign.

Stop Line/Bar - A solid line marked across all or part of a road, behind which vehicles should stand when required to stop by traffic signals or regulatory signs.

Street - See Highway.

Symbol - The approved design of a pictorial representation of a specific traffic control message for signs, pavement markings, traffic control signals, or other traffic control devices, as shown in the Manual.

Temporary Traffic Control Zone - An area of a highway where road user conditions are changed because of a work zone or incident by the use of temporary traffic control devices, flaggers, uniformed law enforcement officers, or other authorized personnel.

Theoretical Gore - A longitudinal point at the upstream end of a neutral area at an exit ramp or channelized turn lane where the channelizing lines that separate the ramp or channelized turn lane from the adjacent through lane(s) begin to diverge, or a longitudinal point at the downstream end of a neutral area at an entrance ramp or channelized entering lane where the channelizing lines that separate the ramp or channelized entering lane from the adjacent through lane(s) intersect each other.

Timed Exit Gate Operating Mode - A mode of operation where the exit gate descent at a grade crossing is based on a predetermined time interval.

Toll Booth - A shelter where a toll attendant is stationed to collect tolls or issue toll tickets. A toll booth is located adjacent to a toll lane and is typically set on a toll island.

Toll Island - A raised island on which a toll booth or other toll collection and related equipment are located.

Toll Lane - An individual lane located within a toll plaza in which a toll payment is collected, or, for toll-ticket systems, a toll ticket is issued.

Toll Plaza - The location at which tolls are collected consisting of a grouping of toll booths, toll islands, toll lanes, and, typically, a canopy. Toll plazas might be located on highway mainlines or on interchange ramps. A mainline toll plaza is sometimes referred to as a barrier toll plaza because it interrupts the traffic flow.

Traffic - Pedestrians, bicyclists, ridden or herded animals, vehicles, streetcars, and other conveyances either singularly or together while using for purposes of travel any highway or private road open to public travel.

Traffic Control Device - A sign, signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, private road open to public travel, pedestrian facility, or shared-use path by authority of a public agency or official having jurisdiction, or, in the case of a private road open to public travel, by authority of the private owner or private official having jurisdiction.

Traffic Control Signal (Traffic Signal) - Any highway traffic signal by which traffic is alternately directed to stop and permitted to proceed.

Train - One or more locomotives coupled, with or without cars, that operates on rails or tracks and to which all other traffic must yield the right-of-way by law at highway-rail grade crossings.

Transverse Markings - Pavement markings that are generally placed perpendicular and across the flow of traffic such as shoulder markings; word, symbol, and arrow markings; stop lines; crosswalk lines; speed measurement markings; parking space markings; and others.

Traveled Way - The portion of the roadway for the movement of vehicles, exclusive of the shoulders, berms, sidewalks, and parking lanes.

Upstream - A term that refers to a location that is encountered by traffic prior to a downstream location as it flows in an "upstream to downstream" direction. For example, "the upstream end of a lane line separating the turn lane from a through lane on the approach to an intersection" is the end of the line that is furthest from the intersection.

Urban Street - A street with a relatively high density of driveway and cross-street access, located in an urban area, with traffic signals or interrupting STOP or YIELD signs.

Vehicle - Every device in, upon, or by which any person or property can be transported or drawn upon a highway, except trains and light rail transit operating in exclusive or semi-exclusive alignments. Light rail transit equipment operating in a mixed-use alignment, to which other traffic is not required to yield the right-of-way by law, is a vehicle.

Visibility - Limited Signal Face or Visibility-Limited Signal Section—a type of signal face or signal section designed (or shielded, hooded, or louvered) to restrict the visibility of a signal indication from the side to a certain lane or lanes, or to a certain distance from the stop line.

Walk Interval - An interval during which the WALKING PERSON (symbolizing WALK) signal indication is displayed.

Warning Beacon - A beacon used only to supplement an appropriate warning or regulatory sign or marker.

Warning Light - A portable, powered, yellow, lens-directed, enclosed light that is used in a temporary traffic control zone in either a steady burn or a flashing mode.

Warning Sign - A sign that gives notice to road users of a situation that might not be readily apparent.

Warrant - A warrant describes a threshold condition based upon average or normal conditions that, if found to be satisfied as part of an engineering study, shall result in analysis of other traffic conditions or factors to determine whether a traffic control device or other improvement is justified. Warrants are not a substitute for engineering judgment. The fact that a warrant for a particular traffic control device is met is not conclusive justification for the installation of the device.

Wayside Horn System - A stationary horn (or series of horns) located at a grade crossing that is used in conjunction with train-activated or light rail transit-activated warning systems to provide audible warning of approaching rail traffic to road users on the highway or pathway approaches to a grade crossing, either as a supplement or alternative to the sounding of a locomotive horn.

Worker - A person on foot whose duties place him or her within the right-of-way of a street, highway, or pathway, such as street, highway, or pathway construction and maintenance forces, survey crews, utility crews, responders to incidents within the street, highway, or pathway right-of-way, and law enforcement personnel when directing traffic, investigating crashes, and handling lane closures, obstructed roadways, and disasters within the right-of-way of a street, highway, or pathway.

Yellow Change Interval (Y) - This interval follows the green interval. It is used to warn drivers of the impending red indication. A yellow indication is displayed for this duration. Measured in seconds.

Yield Line - A row of solid white isosceles triangles pointing toward approaching vehicles extending across approach lanes to indicate the point at which the yield is intended or required to be made.

Zebra Marking - A pedestrian crossing marked with white stripes.

Appendix J - Abbreviations, Acronyms

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic
AFAD	Automated Flagger Assistance Device
ASTM	American Society for Testing and Materials
CIE	International Commission on Illumination
CMS	Changeable Message Sign
DMS	Dynamic Message Signs
E	East
ETC	Electronic Toll Collection
GRP	Glass-Reinforced Plastic
GVW	Gross Vehicle Weight
HCM	Highway Capacity Manual
HOV	High-Occupancy Vehicle
HOVT	High-Occupancy Vehicle Toll
ITS	Intelligent Transportation Systems
LRT	Light Rail Transit
MoTLS	Ministry of Transport and Logistic Services
MUTCD	Manual on Uniform Traffic Control Devices
N	North
ORPT	On Road Public Transport
ORT	Open-Road Tolling

PCMSs	Portable Changeable Message Signs
P.E.	Professional Engineer
PIEV	Perception, Identification, Emotion, Volition
PTOE	Professional Traffic Operations Engineer
RPM	Raised Pavement Marker
RGA	Roads General Authority
S	South
SASO	Saudi Standards Metrology and Quality Organization
SHC	Saudi Highway Code
SI	International System of Units
TMA	Truck or Trailer Mounted Attenuator
UNESCWA	United Nations Economic Commission for Western Asia
VPH	Vehicles Per Hour
W	West

Appendix K - Units

SI Units		Imperial Units	
Length			
mm	Millimeter		
cm	Centimeter		
m	Meter		
km	Kilometer		
Area			
cm^2	Square centimeter		
m^2	Square meter		
Weight			
kg	Kilogram		
t	Tonne		
Time			
s	Second		
min	Minute		
h	Hour		
week	Week		
month	Month		
Angular			
°	Degree		
Other			
km/h	Kilometer per hour		
m/s	Meters per second		
V	Volt		
lm	Lumen		
lx	Lux		
dB	Decibel		

SI Units		Imperial Units	
cd/lx/m²	Candela per lux square meter		
Other			
veh		Vehicle	
veh/h		Vehicles per hour	
SAR		Saudi riyal	

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