

PART A—SIGNS

Division 1

GENERAL ASPECTS OF SIGNS

A1.1 TO A1.10

SIGNS

GENERAL ASPECTS

A1

MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA

A SIGNS

Part A of the Manual deals with signing, and is organized into the following Divisions:

- Division A1 General Aspects of Signs
- Division A2 Regulatory Signs
- Division A3 Warning Signs
- Division A4 Guide and Information Signs
- Division A5 Freeway Guide Signs
- Division A6 Pedestrian Crossing Control
- Division A7 Roundabout Signs and Pavement Markings

A1 GENERAL ASPECTS OF SIGNS

Division A1 deals with general aspects of signs, and is organized as follows:

- Section A1.1 Functions of signs
- Section A1.2 Legal authority
- Section A1.3 Classification of signs
- Section A1.4 Appropriate use of signs
- Section A1.5 Standardization of signs
- Section A1.6 Sign design standards
- Section A1.7 Sign installation and maintenance
- Section A1.8 Overhead signs
- Section A1.9 Part-time signs
- Section A1.10 Development of new signs

A1.1 FUNCTIONS OF SIGNS

The objectives of using traffic signs are stated in the General Introduction to this Manual. Signs inform the driver of traffic regulations, warn of road characteristics and road hazards, and provide information necessary for route selection.

To be effective, all traffic control devices must meet five basic requirements. These are to:

- (a) fulfil a need;
- (b) command attention;
- (c) convey a clear and simple meaning;
- (d) provide adequate time for a proper response; and
- (e) command respect of road users.

Simplicity in design, care in placement and a high standard of maintenance are essential.

A1.2 LEGAL AUTHORITY

Traffic signs are installed only under the authority of the road agency having jurisdiction. Signs should be installed and maintained in accordance with the guidelines and standards set out in this Manual. Signs placed by private organizations without authority are often poorly placed and maintained, and are not legal. All non-essential signs should be removed since they divert attention from official signs. Traffic signs and supports must not bear any unauthorized commercial advertising or labels, logos, etc.

A1.3 CLASSIFICATION OF SIGNS

A1.3.1 Class R, Regulatory Signs

Regulatory signs indicate a traffic regulation that applies at a specific time or place on a road. Disregard of a Regulatory sign constitutes a violation. Regulatory signs and their application are described in Division A2. Pedestrian regulatory signs are described in Division A6 and Roundabout regulatory signs are described in Division A.7.

- RA: Right-of-way control signs indicate the right of way for drivers on the approaches to an intersection, or for pedestrians at a crosswalk.
- RB: Road use control signs indicate the permitted or prohibited use of a road. This sub-class includes signs relating to the control of speed, turns, direction of travel, passing, traffic lane usage, vehicle weights and dimensions, parking, pedestrians and other road users.
- RC: Miscellaneous regulatory signs and Temporary regulatory tab signs indicate regulations that are not otherwise provided for in Class R.

A1.3.2 Class W, Warning Signs

Warning signs provide an advance indication of conditions on or adjacent to a road that are potentially hazardous to drivers. Warning signs and their application are described in Division A3. Pedestrian warning signs are described in Division A6 and Roundabout regulatory signs are described in Division A.7.

- WA: Physical conditions signs indicate features or conditions of the road itself.
- WB: Traffic regulations ahead signs provide an advance warning of a traffic regulation on a road.
- WC: Intermittent or moving hazards signs indicate the possibility of a situation that may require a driver response.

A1.3.3 Class I, Guide and Information Signs

Guide and information signs indicate information for route selection, for locating off-road facilities, or for identifying geographical features or points of interest. Guide and information signs and their application are described in Division A4. Freeway guide signs and their application are described in Division A5. Roundabout guide and information signs and their application are described in Division A7.

- IA: Destination guide signs provide driver orientation by means of destinations, direction, distance and location identification.
- IB: Route marker signs indicate numbers, names or other designations of roads.
- IC: Off-road services signs indicate the availability of, and direction to, off-road services or recreational facilities.
- ID: Miscellaneous information signs indicate information that is not otherwise provided for in Class I.
- IF: Freeway guide signs provide information and guidance on freeways.
- IS: Guide sign supplementary tab signs indicate related information that is additional to the message conveyed by the primary sign.

A1.3.4 Class TC, Temporary Conditions Signs and Devices

Temporary conditions signs and devices indicate construction activities or other temporary and unusual conditions that may require a driver response. Temporary conditions signs and devices and their application are described in Part D of this manual.

A1.3.5 Tab Signs

A tab sign has the same colour as, but is smaller than, the primary sign with which it is associated, and is mounted below the primary sign. In some cases, the colours may be reversed on the tab sign, where deemed appropriate.

Tab signs may be used only with primary signs. Tab signs must not be used alone.

There are two types of tab signs:

- Supplementary Tab Signs (S)

Supplementary tab signs indicate related information that is additional to the message conveyed by the primary sign. Supplementary tab signs may be used where the entire message cannot be conveyed using the standard primary sign. These tab signs have the suffix "S" in the sign number.

- Temporary Tab Signs (T)

Temporary tab signs indicate in words the same message represented by a symbol on the primary sign. Temporary tab signs may be used to convey the meaning of symbols during their introductory period. A temporary tab sign would normally be used for an educational period when a new sign is first introduced and drivers may not yet be familiar with the sign. The tab sign will usually be removed after an introductory period of three to six months. In situations where the primary sign is used at few locations within a geographic area, the tab sign may remain for longer. These tab signs have the suffix "T" in the sign number.

A1.3.6 Bilingual Signs

Many jurisdictions in Canada require that signs with word messages be presented in both official languages. Both English and French versions of word signs and supplementary tab signs are shown in the body of the Manual. Temporary tab signs in both languages are shown at the end of each Division of the Manual.

French language signs have numbers with the suffix "F".

A1.4 APPROPRIATE USE OF SIGNS

Well-chosen and well-located information signs will assist drivers in the driving task and route selection. Improper or excessive use of regulatory and warning signs may produce disrespect for signs in general.

A1.5 STANDARDIZATION OF SIGNS

Signs should be designed to be recognizable and comprehensible at a glance. Uniformity and simplicity in design, position and application are of the greatest importance in aiding recognition. All signs installed on any road should conform to the standards in this Manual. Where messages are required other than those provided, the signs should be the same shape and colour as standard signs of the same classification.

A1.6 SIGN DESIGN STANDARDS

A1.6.1 Standardization of Design

Uniformity of design includes shape, colour, dimensions, symbols, wording, lettering and illumination or reflectorization. The designs for both symbols and word messages have been approved by the Traffic Operations and Management Standing Committee (TOMSC) after a thorough review of the varying designs used in Canada, supplemented by test studies. These designs are illustrated in a dimensioned format in the *Sign Pattern Manual* available from the Transportation Association of Canada. Standardization of these designs does not preclude further improvement by minor changes in the proportions of symbols, in the layout of word messages, in border width, or in stroke width and height of letters. All shapes and colours must be as indicated and all symbols must be unmistakably similar to those shown. Where a word message is applicable, the wording must conform to this Manual.

A1.6.2 Sign Shape and Colour

A1.6.2.1 Sign Shapes

The shapes of signs are intended to advise the driver of the class of message. The task of driving can be simplified by enabling the driver to judge in advance the type of message to be expected. To meet this driver requirement, a code of sign shapes has been established that applies to all signs. The shapes and orientations for each sub-class of signs are illustrated in Tables A1-1 to A1-4.

A1.6.2.2 Sign Colours

Standardization of colours also assists the driver to recognize classes of signs. A code of sign colours has been established that applies to all signs.

Colour specifications for retroreflective sign sheeting have been established by the most recent edition of ASTM International specification D4956 entitled *Standard Specification for Retroreflective Sheeting for Traffic Control*. All colours used on signs must conform to this standard.

TABLE A1-1
SHAPE AND COLOUR CODES FOR REGULATORY SIGNS

Class	Sub-Class	Shape Code	Colour Code			Comments
			Back-Ground	Message	Border	
Regulatory	RA Right-of-Way Control		Red	White	White	Shape reserved for Stop sign.
Regulatory	RA Right-of-Way Control		White	Red	White	Shape reserved for Yield sign.
Regulatory	RA Right-of-Way Control		White	Red	Red	Shape reserved for Railway Crossing sign.
Regulatory	RB Road Use Control		White or Black	Black or White	Black or White	A green annular ring indicates a positive message, either permissive or mandatory. A red annular ring with interdictory stroke indicates a prohibitive message.
Regulatory	RB Road Use Control		White or Black	Black or White	Black or White	A green annular ring indicates a positive message, either permissive or mandatory. A red annular ring with interdictory stroke indicates a prohibitive message.
Regulatory	RB Road Use Control		Black	White	White	Shape reserved for One-Way sign.
Regulatory	RC Miscellaneous		White	Black	Black	
Regulatory	RC Miscellaneous		White	Black	Black	

TABLE A1-2
SHAPE AND COLOUR CODES FOR WARNING SIGNS

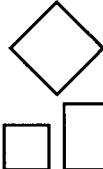
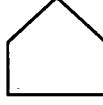
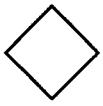
Class	Sub-Class	Shape Code	Colour Code			Comments
			Back- Ground	Message	Border	
Warning	WA Physical Conditions WB Regulation Ahead WC Intermittent Moving Hazards		Yellow	Black	Black	The diamond shape may be used only for warning signs. Some messages contain other colours to adequately represent symbols.
Warning	WC School Area		Fluorescent Yellow-Green	Black	Black	Shape and colour reserved for School Area sign.
Warning	WC School Area		Fluorescent Yellow-Green	Black	Black	

TABLE A1-3
SHAPE AND COLOUR CODES FOR GUIDE AND INFORMATION SIGNS

Class	Sub-Class	Shape Code	Colour Code			Comments
			Back-Ground	Message	Border	
Information	IA Guide		Green Blue	White White	White White	Blue/White/White is used only when signs may be visible to, but not applicable to, drivers on another roadway.
Information	IB Route Markers		White White Green Blue	Green Black White White	White Black White White	Some messages in sub-class IB contain minor elements in other colours.
Information	IB Miscellaneous		White White Green Blue	Green Black White White	White Black White White	
Information	IC Off-Road Facilities		Green Blue	White White	White White	Some messages contain minor elements in other colours.
Information	ID Miscellaneous	 	Green White Black	White Black White	White Black White	
Information	IS Tabs		Colours match related primary sign.			Colours may be reversed where deemed appropriate.

TABLE A1-4
SHAPE AND COLOUR CODES FOR TEMPORARY CONDITIONS SIGNS
AND COLOURS RESERVED FOR FUTURE USE

Class	Sub-Class	Shape Code	Colour Code			Comments
			Back- Ground	Message	Border	
Temporary Conditions	TB Incident Management		Fluorescent Pink	Black, Yellow, Blue	Black	
Temporary Conditions	TC Temporary Conditions		Orange	Black	Black	See Part D of Manual.
			Light Blue			Reserved for future use.
			Purple			Reserved for future use.

A1.6.3 Dimensions

The sign dimensions shown in this Manual are the minimum standard. Proportional increases above this minimum are permissible where investigation has shown that a larger sign is needed for adequate emphasis. The size of any sign depends on the length of the message, and the size and spacing of the letters or symbols required for adequate visual impact.

In determining if the installation of an oversized sign is warranted, consideration should be given to a variety of factors. These include the speed limit, the degree of hazard (as appraised by a field survey of sight limitations, intersection complications, or as revealed by collision records), and the competition offered by other signs, lighting or advertising. Generally, the use of oversized signs cannot be prescribed on the basis of arbitrary warrants. Each installation is a special case for an engineering study and decision. It is suggested, however, that every effort be made to incorporate standard-size signs, since the excessive use of oversized signs, particularly of the regulatory and warning types, will serve only to de-emphasize the importance of the standard-size signs.

Standard shapes and colours must be used for oversized signs, and standard proportions retained whenever practicable. The overall dimensions of the sign plates should be increased in 150 mm increments.

The horizontal dimension of a tab sign should not exceed the corresponding dimension of the primary sign to which it is attached. Its area should not exceed 50% of the area of the primary sign. In the case of bilingual tab signs, the area should not exceed 100% of the area of the primary sign. The minimum horizontal dimension of a tab sign associated with a sign partly or primarily for motorized vehicle use is 450 mm and the minimum vertical dimension is 225 mm. These minimum dimensions should be increased in increments of 150 mm for the horizontal dimension and 75 mm for the vertical dimension.

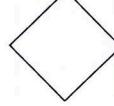
Reduced-size signs and tabs may be used where the use is solely to control the movement of cyclists and/or pedestrians. Care should be taken to ensure that these signs are not readily visible to drivers.

The minimum dimensions for various sign shapes solely for active transportation users are provided in Table A1-5.

A1.6.4 Symbols

Where practical, standard signs use symbols rather than words to convey the message. A simple conventional symbol like the curve arrow or the intersection diagram is instantly recognized. In all cases, symbol designs must be those shown in this Manual.

TABLE A1-5
MINIMUM DIMENSIONS OF SIGNS FOR
ACTIVE TRANSPORTATION FACILITIES

Shape Code	Standard Motorized Vehicle Sign Minimum Size	Active Transportation Facility Sign Minimum Size	Comments
	600 mm x 600 mm	300 mm x 300 mm	
	450 mm x 450 mm	300 mm x 300 mm	detours
	900 mm x 300 mm	450 mm x 150 mm	one way
	600 mm x 300 mm	300 mm x 150 mm	tab
	450 mm x 300 mm	300 mm x 225 mm	arrow tabs and cardinal direction tabs
	750 mm x 750 mm	450 mm x 450 mm	
	600 mm x 600 mm	450 mm x 450 mm	
	450 mm x 450 mm	450 mm x 450 mm	steep grade, slippery
	450 mm x 600 mm	300 mm x 450 mm	chevron
	900 mm x 600 mm	450 mm x 300 mm	clearance
	450 mm x 900 mm	300 mm x 600 mm	object marker
	300 mm x 900 mm	225 mm x 600 mm	object marker

Some sign messages, particularly on information signs, cannot be conveyed adequately by symbols. Word messages should be as brief as possible. Where applicable, standard wordings as shown in this Manual must be used.

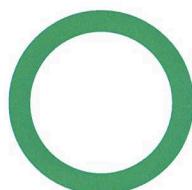
A1.6.4.1 Arrows

Arrows are extensively used as symbols on traffic signs for the basic purposes shown in Table A1-7.



A1.6.4.2 Interdictory Symbol

The interdictory symbol consists of an annular red ring and diagonal red bar. The bar is normally oriented from top left to bottom right at 45 degrees. The symbol indicates that what is depicted within the red ring is prohibited.



A1.6.4.3 Mandatory/Permissive Symbol

The mandatory/permisive symbol is an annular green ring. The symbol indicates that whatever is depicted within the green ring is mandatory, or that what is depicted within the green ring is permitted.

A1.6.5 Lettering

Sign lettering must be in letters of the type approved by the Traffic Operations and Management Standing Committee. Detailed drawings are contained in the most recent edition of the US Department of Transportation publication entitled *Metric Edition Standard Alphabets for Highway Signs and Pavement Markings*.

Lower case letters with initial upper case letters are used for the names of places and geographical features on guide and information signs. Capital letters are used for all other words. In cases where metric unit symbols are used, lower case letters are mandatory (e.g., 10 kilometres = 10 km).

For guide and information signs only, the Clearview font may be used in positive contrast applications. The Clearview font should not be used for negative contrast signs. Table A1-6 contains information on the conversion of standard fonts to Clearview font:

TABLE A1-6
CONVERSIONS FROM STANDARD TO CLEARVIEW FONTS*

Standard Font	Clearview Font
Series B	ClearviewHwy 1-W
Series C	ClearviewHwy 2-W
Series D	ClearviewHwy 3-W
Series E	ClearviewHwy 4-W
Series E - modified	ClearviewHwy 5-W or ClearviewHwy 5-W-R
Series F	ClearviewHwy 6-F

*For positive contrast guide and information signs only

It is advised to interchange the standard Series E-modified font with:

- (a) ClearviewHwy 5-W font where the size of the sign allows an increase to the length of the inscription without affecting the required sign margins; or
- (b) ClearviewHwy 5-W-R font where the size of the sign will not allow a length increase without infringing on the required sign margins.

The height of the font need not be modified.

A1.6.6 Numbering

Numbers on signs should be shown according to the following guidelines:

- (a) Speeds are indicated in multiples of 10 km/h;
- (b) Distances are indicated in kilometres (km). When a distance is less than 1 km, it is shown in metres (m), not in decimals or fractions of a kilometre (i.e., 500 m, not 0.5 km and not $\frac{1}{2}$ km);
- (c) Other dimensions such as clearances are shown in metres (i.e., 4.3 m); and
- (d) When necessary, decimals are used, not fractions (i.e., 3.25 m, not $3\frac{1}{4}$; 4.5 km, not $4\frac{1}{2}$ km).

TABLE A1-7
ARROWS FOR SIGNS

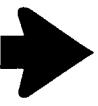
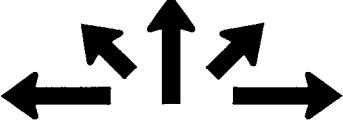
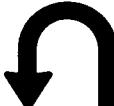
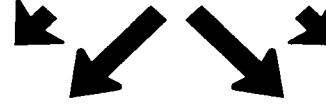
Type	Shape and Orientation	Interpretation
I (i)	 Horizontal with short shaft.	Indicates that the parking regulation applies in the direction of the arrow.
I (ii)	 Vertical downward with short shaft.	Indicates the dimension under an above-road structure or indicates that an above-road sign applies to a traffic lane.
I (iii)	 Vertical upward with short shaft.	Indicates that the sign message applies ahead.
II	 Horizontal or angled with full shaft.	Indicates the direction and path of travel at or beyond the location of the sign.

TABLE A1-7 (CONT'D)
ARROWS FOR SIGNS

Type	Shape and Orientation	Interpretation
III (i)	 Vertical upward with full curvilinear shaft.	Indicates direction and path of travel for some distance beyond the location of the sign.
III (ii)	 Vertical downward with full curvilinear shaft.	Indicates a path resulting in the opposite direction of travel at the location of the sign (U-turn).
IV	 Angled downward with full or short shaft.	Indicates where the sign message applies.
V	 Angled upward with full tapered shaft.	Indicates direction of travel at sign location (for use on large guide signs).

A1.6.7 Retroreflectivity

Retroreflectivity is one of several factors associated with maintaining night-time visibility for signs and delineators. Table A1-8 describes minimum levels of retroreflectivity for signs under the following three conditions:

- (a) Dark roads – i.e., no glare from surrounding lights and no roadway lighting;
- (b) Roads with street lights – i.e., any glare from surrounding light sources is offset by street lights; and
- (c) Roads with glare from other light sources and no street lights – i.e., glare from surrounding light sources is not offset by street lights.

Additional information on sign retroreflectivity is provided in the TAC *Guidelines for Selecting Sign Sheeting to Meet Minimum Retroreflectivity Levels*.

The minimum level of retroreflectivity for yellow and white sheeting on delineation markers (WA-37) is 15 cd/lx/m².

TABLE A1-8
MINIMUM LEVELS OF RETROREFLECTIVITY

Sign Colour	Additional Criteria	Sheeting Type (ASTM D4956)								
		Beaded Sheeting			Prismatic Sheeting					
		I	II	III	IV, VIII, IX, XI					
Dark Roads										
White on Green	Overhead	W*; G ≥ 7	W*; G ≥ 15	W*; G ≥ 25	W ≥ 250; G ≥ 25					
	Post-mounted	W*; G ≥ 7	W ≥ 120; G ≥ 15							
White on Blue	Overhead	W*; B ≥ 3	W*; B ≥ 5	W*; B ≥ 12	W ≥ 250; B ≥ 12					
	Post-mounted	W*; B ≥ 3	W ≥ 120; B ≥ 7							
White on Brown	None	W*; B*	W*; B ≥ 5	W ≥ 150; Br ≥ 5						
Black on Yellow or Black on Orange	None	Y*; O*	Y ≥ 75; O ≥ 75							
White on Red	See Note 2	W ≥ 35; R ≥ 7								
Black and White	None	W ≥ 50								
Roads with Street Lighting										
White on Green	Overhead	W*; G ≥ 7	W*; G ≥ 15	W*; G ≥ 25	W ≥ 300; G ≥ 25					
	Post-mounted	W*; G ≥ 7	W ≥ 150; G ≥ 15							
White on Blue	Overhead	W*; B ≥ 3	W*; B ≥ 5	W*; B ≥ 12	W ≥ 300; B ≥ 15					
	Post-mounted	W*; B ≥ 3	W ≥ 150; B ≥ 7							
White on Brown	None	W*; B*	W*; B*	W ≥ 180; Br ≥ 6						
Black on Yellow or Black on Orange	None	Y*; O*	Y ≥ 90; O ≥ 90							
White on Red	See Note 2	W ≥ 40; R ≥ 8								
Black and White	None	W ≥ 60								
Roads with Glare (from other light sources) and No Street Lighting										
White on Green	Overhead & Post-mounted	beaded sheeting should not be used			W ≥ 360; G ≥ 50					
White on Blue	Overhead & Post-mounted	beaded sheeting should not be used			W ≥ 360; B ≥ 15					
White on Brown	None	beaded sheeting should not be used			W ≥ 360; Br ≥ 18					
Black on Yellow or Black on Orange	None	beaded sheeting should not be used			Y ≥ 270; O ≥ 145					
White on Red	See Note 2	beaded sheeting should not be used			W ≥ 360; R ≥ 65					
Black and White	None	beaded sheeting should not be used			W ≥ 360					
Notes										
<ul style="list-style-type: none"> * This sheeting type should not be used for this colour for this application 1. The minimum maintained retroreflectivity levels shown in this table are in units of cd/lx/m² measured at an observation angle of 0.2° and an entrance angle of -4.0°. 2. Minimum sign contrast ratio ≥ 3:1 (white retroreflectivity ÷ red retroreflectivity) 										
Special Cases										
<ul style="list-style-type: none"> • WB-1 – Stop Ahead: Red retroreflectivity ≥ 7 • WB-2 – Yield Ahead: Red retroreflectivity ≥ 7; White retroreflectivity ≥ 35 • WB-4 – Signal Ahead: Red retroreflectivity ≥ 7; Green retroreflectivity ≥ 7 • WB-9 – Speed Reduction: White retroreflectivity ≥ 50 										
Exclusions to Minimum Maintained Retroreflectivity Levels										
<ul style="list-style-type: none"> • Parking, Standing, and Stopping Prohibited signs • Walking/Hitchhiking/Crossing signs • Acknowledgment signs • Signs that are not intended for use by motorists 										

A1.6.8 Sign Borders

All signs must have a narrow border of the same colour as the message or symbol, unless otherwise illustrated. All sign dimensions, including borders, are shown in the *Sign Pattern Manual*.

A1.6.9 Alternative Technology Signs

If a sign using a new technology, such as fibre optics, is to be used, the road authority must determine whether the new sign provides a reasonable representation of the shape, colour, and message of the approved sign in the Manual.

A1.6.9.1 Light Emitting Diode Embedded Signs

The conspicuity of a static traffic sign may be increased by embedding light emitting diodes (LEDs) on the sign border. LEDs on the sign border may also serve to increase the legibility distance of the sign by highlighting the sign message or the outline of a uniquely shaped static sign. LED-embedded signs are distinguished from changeable message signs in that changeable message signs use LEDs to convey the entire message, while LED-embedded traffic signs are used to highlight an existing static sign.

LEDs shall only be embedded on Stop signs (RA-1), Yield signs (RA-2), and the stop side of the Traffic Control Paddle (TC-65) and shall be placed on the border of these signs to highlight their unique shapes during conditions of low light.

The colour of the LEDs embedded in these signs shall be red.

a) Installation Guidelines

LED-embedded traffic signs may be used to increase the conspicuity of a Stop or Yield sign with a high frequency of reportable collisions resulting from a failure to recognize the Stop/Yield sign (e.g., two or more reportable crashes per year over a period of three years, or if a longer review period is desired three or more crashes per year over a period of five years). LED-embedded traffic signs may also be used in visually complex environments where the Stop or Yield sign is not easily detected, or other components of the visual scene are competing for the driver's attention.

LED-embedded traffic signs shall not be used in situations where the flashing LEDs create a distraction that compromises the safety of drivers. Furthermore, LED-embedded traffic signs shall not be used on approaches that are equipped with a flashing beacon.

The number and placement of LEDs shall present a reasonable likeness of the static sign shape. It is permissible to cluster more than one LED to form a single pixel. The pixels shall be placed only on the border of the sign, and the centre-to-centre pixel spacing shall be a maximum of 8% of the sign size (see Table A1-9).

**TABLE A1-9
MAXIMUM PIXEL SPACING**

Sign Size (mm)	Maximum Pixel Spacing (mm)
450	36
600	48
750	61
900	72

LED-embedded traffic sign installations should use a flash rate of 50 or 60 flashes per minute that may be increased up to 120 flashes per minute if an engineering study indicates that the initial flash rate is not providing the intended effect either in terms of sign detection times, or driver reaction times. All LEDs in the sign face shall flash simultaneously. If two signs are used at the same site, then both signs shall be synchronized to flash at the same time and rate.

The minimum maintained luminous intensity and viewing angles of the LEDs should be in accordance with industry practice to ensure adequate external luminance contrast. The luminous intensity of the LEDs shall be such that they do not create disability glare, reduce sign legibility, or create an undue distraction for motorists.

LED-embedded traffic signs that operate under different ambient light conditions should adjust the intensity of the LEDs according to the ambient light condition. LED-embedded traffic signs may operate at all times, but are generally more effective if they are time-limited and/or traffic actuated.

(b) Placement

LED-embedded traffic signs should only be used on signs that are posted in their usual locations as described in Sections A2.2.1.1 and A2.2.2.1 or according to local policy.

A1.7 SIGN INSTALLATION AND MAINTENANCE

This manual sets out criteria for the application of all types of signs. Specifications have been developed which cover most situations, with the intent to strive for uniformity in sign design, application, placement, and maintenance throughout Canada. Drivers should be able to encounter similar conditions with similar advance warning and similar placement wherever they see a particular sign.

A1.7.1 Standard Sign Application

The proper signing of roads depends to a great extent on the experience and judgement of the traffic official responsible for the placement and maintenance of signs. This manual establishes standards and guidelines to be followed to achieve uniformity.

Uniformity of application is equally important as standardization with respect to design and placement. Identical conditions must be marked with the same type of sign without regard to the location of the condition. Each sign must be displayed for one specific purpose only.

Similar conditions in urban and rural areas should be treated in the same manner. It is recognized that urban conditions differ from rural conditions with respect to speeds, frequency of intersections, traffic congestion, parking, competing lights and displays. This Manual outlines separate specifications for rural and urban areas, where appropriate.

Before any new road, detour, or temporary route is opened to traffic, all essential signs must be in place.

Changes in the traffic characteristics of a road may require a review of local sign requirements. Signs required by road conditions or traffic restrictions must be removed when those conditions cease to exist or the restrictions are withdrawn. Guide signs directing traffic to and along temporary routes or detours must be immediately removed when no longer applicable.

A1.7.2 Standard Sign Placement

Standardization of position is a key objective of this Manual. Figure A1-1 illustrates guidelines for sign placement. Generally, signs are installed on the right side of the road. In some circumstances, signs may be placed on channelizing islands, overhead or (as in sharp curves to the right) on the left shoulder of the road, directly in the line of sight of approaching vehicles. Sign placement may vary in certain situations where the most advantageous sign location must accommodate highway design and alignment.

(a) Location

Warning signs are generally placed in advance of the condition to which they apply. Stop and other regulatory signs should be as near as practicable to the point where the regulation is in effect. Intersection guide signs are placed as in Figures A4-1 and A4-2 in Division A4. Individual requirements for certain signs are outlined in the specific sections of this Manual dealing with individual signs or classes of signs.

(b) Orientation

All signs should be installed to face approaching traffic at approximately right angles to the direction of the traffic that they are intended to serve. The only exception is for Parking Control and Stopping Prohibited signs. More information on the orientation of standard signs can be found in the TAC *Guide for Lateral and Vertical Roadside Sign Placement*.

(c) Number of Signs

There are cases where it is advisable to place a second sign on the left side of the road to supplement the primary sign normally placed on the right side. Examples are multi-lane one-way streets, divided highways, and locations where collision experience has shown that drivers are failing to see the primary sign. Signs on the left should not be installed directly opposite another sign.

(d) Lateral Placement

Signs should be placed so that the distance from the near edge of the nearest traffic lane to the near sign edge is not less than a minimum distance (D_{min}) and not more than a maximum distance (D_{max}) in order for the sign to remain in the drivers' cone of vision.

D_{min} and D_{max} apply to both sides of the road. If a sign is placed closer than D_{min} , then it should have breakaway supports, or be protected with barriers.

Engineering judgement should be used to ensure consistency in the lateral placement of signs along a corridor or across the network.

Increased lateral separation between a sign and the lane edge reduces the potential for maintenance operations to obstruct or damage the sign. However, the issue of accommodating maintenance operations is more critical on lower speed roads or when the signs are not large. Engineering judgement should be used to consider the implications of moving the sign further away from the edge of the travel lane than needed for clear zone requirements.

The size of the sign and the type of roadway affect the placement criteria.

For signs smaller than 5m² in area Table A1-10 shall be used.

TABLE A1-10
PLACEMENT GUIDANCE FOR SIGNS SMALLER THAN 5m²

Posted Speed (km/h)/Conditions	Lateral Placement (m)		
60 or lower, with curb	D_{min} D_{max}	0.3 2.0 in urban	4.5 in rural
60 or lower, without curb, infrequent or no snow	D_{min} D_{max}	2.0 4.5	
60 or lower, without curb, regular snow conditions	D_{min} D_{max}	2.0 6.0**	
70 or higher, infrequent or no snow conditions	D_{min} D_{max}	4.0* 4.5 in urban	6.0** in rural
70 or higher, regular snow conditions	D_{min} D_{max}	4.0* 6.0**	

*For speeds of 70 km/h, 4.0 metres is the recommended minimum for maintenance reasons.

**6.0 metres is the recommended maximum to accommodate maintenance operations.

Signs larger than 5m² are more likely to contain complex messages that require longer reading time, and are more likely to constitute a fixed object hazard.

- For roads with a single lane in each direction, Table A1-11 shall be used.
- For roads with two or more lanes in each direction Table A1-12 shall be used.

TABLE A1-11
LATERAL PLACEMENT GUIDANCE FOR
SIGNS 5m² OR LARGER ON A ONE-LANE APPROACH

Posted Speed (km/h) & Conditions	D _{min} (m)		D _{max} (m)					
	With Breakaway Supports or Barrier Protection*	Without Breakaway Supports or Barrier Protection**	Simple Sign Complexity			Moderate Sign Complexity		High Sign Complexity
			Basic Legibility	Improved Legibility	Best Legibility	Improved Legibility	Best Legibility	Best Legibility
<60 with curb	0.3	0.3	6.0	6.0	6.0	6.0	6.0	6.0
<60 no curb	2.0	4.5	9.0			11.0		14.0
70	4.0 - 6.0	7.5	8.0		14.0		9.5	14.0
80	4.0 - 6.0	7.5				8.0		11.5
90	4.0 - 6.0	8.0		13.0			13.0	
100	4.0 - 6.0	11.0		12.0			11.5	
110 +	4.0 - 6.0	11.5			Improve sign legibility or reduce sign complexity			Reduce sign complexity

*For speeds of 70 kilometres per hour or higher, 4.0 metres is the recommended minimum for maintenance reasons. A D_{min} value of 5.0 metres may be considered at locations where maintenance is not routine or where occurrence of a large amount of snow is not expected. A D_{min} value of 6.0 metres may be considered where regular snow clearing operation area required. Signs could be placed closer, at an absolute minimum of 2.0 metres if there are special circumstances such as limited space in an urban environment.

**Values shown represent minimum lateral clearance for a fill section. For a cut section, D_{min} may be reduced by 1.5 metres. If D_{min} cannot be satisfied, breakaway supports should be used, or the sign should be placed behind barrier protection.

TABLE A1-12
LATERAL PLACEMENT GUIDANCE FOR
SIGNS 5m² OR LARGER ON A TWO-OR-MORE-LANE APPROACH

Posted Speed (km/h) & Conditions	D _{min} (m)		D _{max} (m)					
	With Breakaway Supports or Barrier Protection*	Without Breakaway Supports or Barrier Protection**	Simple Sign Complexity		Moderate Sign Complexity		High Sign Complexity	
			Improved Legibility	Best Legibility	Improved Legibility	Best Legibility	Best Legibility	
<60 with curb	0.3	0.3	6.0	6.0	6.0	6.0	6.0	6.0
<60 no curb	2.0	4.5	12.0		8.0	14.0		10.0
70	4.0 - 6.0	7.5	11.0			13.0		8.0
80	4.0 - 6.0	7.5	10.0			11.0		
90	4.0 - 6.0	8.0	9.0			9.5		
100	4.0 - 6.0	11.0			Improve legibility or reduce sign complexity			
110 +	4.0 - 6.0	11.5				Reduce sign complexity		

*For speeds of 70 kilometres per hour or higher, 4.0 metres is the recommended minimum for maintenance reasons. A D_{min} value of 5.0 metres may be considered at locations where maintenance is not routine or where occurrence of a large amount of snow is not expected. A D_{min} value of 6.0 metres may be considered where regular snow clearing operation area required. Signs could be placed closer, at an absolute minimum of 2.0 metres if there are special circumstances such as limited space in an urban environment.

**Values shown represent minimum lateral clearance for a fill section. For a cut section, D_{min} may be reduced by 1.5 metres. If D_{min} cannot be satisfied, breakaway supports should be used, or the sign should be placed behind barrier protection.

Sign complexity and legibility affect the maximum distance D_{max} .

Sign complexity is a measure of the amount of information, and its presentation, and therefore defines the time the drivers need to read the sign. The following values were used:

- Simple signs require up to 3.5 seconds to read.
- Moderate signs require between 3.5 and 5.0 seconds to read.
- Complex signs require more than 5.0 seconds to read.

Table A1-13 shall be used to determine values.

Sign legibility is a measure of the conspicuity of the sign, and therefore the distance from which it can be seen. In general, sign legibility is a function of sheeting technology, and the font type, and retroreflectivity. Sign legibility can be improved by using Clearview font and/or better sheeting.

Table A1-14 shall be used to determine values.

Sign complexity can be determined using formulas provided in Section 4.1.2 of the *Supplemental Guide for Guide and Information Signage in Canada* (Transportation Association of Canada, 2003). For example, the Guide suggests the reading time required is equivalent to one second for every two words or one symbol, with an additional 0.75 seconds after each group of 4 words for the driver to glance back at the roadway.

Sign complexity can be reduced by simplifying the message by using fewer words or symbols. If this cannot be done, consideration should be given to splitting the message and using two consecutive signs with appropriate longitudinal spacing.

Drivers have varying sign-reading abilities, and the time required to read a sign also depends on context and familiarity.

TABLE A1-13
SIGN COMPLEXITY – EXAMPLES OF TYPICAL SIGNS

Simple (reading time up to 3.5s)	Moderate (reading time between 3.5 and 5.0s)	High (reading time greater than 5.0s)
		<p>VANCOUVER ISLAND FERRIES AIRPORT DELTA RICHMOND VICTORIA NANAIMO GULF ISLANDS VANCOUVER INTERNATIONAL FOLLOW 10 USE EXIT 66</p>

TABLE A1-14
SIGN LEGIBILITY

Background Sheeting Type (ASTM D4956)	Text Font and Retroreflectivity					
	Highway Font			Clearview Font		
	II or lower	III to VII	VIII or higher	II or lower	III to VII	VIII or higher
II or lower	Basic	Basic	Improved	Improved	Improved	Improved
III to VII		Improved	Best		Best	Best
VIII or higher			Best			Best

(e) Vertical Placement

As illustrated in Figure A1-1, signs in rural areas should be mounted at a height of 1.5 m above the near edge of the nearest traffic lane to the bottom of the sign. This height may be as much as 2.5 m for special conditions. Signs in urban and suburban areas should be mounted at a height of 2.0 m to 3.0 m. At locations where pedestrian traffic is likely, the sign should be mounted at a minimum height of 2.0 m.

Overhead signs on freeways must not be less than 5.1 m above the road surface and preferably centred over the traffic lanes to which they apply. On all other roads, overhead signs must not be less than 4.5 m above the road surface.

A1.7.3 Installation

Normally, signs should be installed on separate posts except where the signs supplement each other as outlined in subsection A1.7.2, or where route or directional signs must be grouped. Closely spaced signs are difficult to read at high speed; therefore, two signs for different purposes should be spaced at least 50 m apart along a high speed road, except where space is limited.

In the case of a French-language sign accompanying an English-language sign, both for the same purpose, the signs should be placed not more than 30 m apart. Signs in both languages normally are placed on the same post.

Where a sign is used to the left of traffic, it is desirable that the sign be located so that it is not directly opposite another sign on the right side, in order to minimize driver distraction.

A1.7.4 Sign Materials

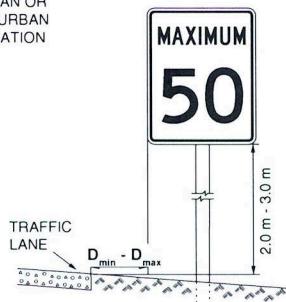
Treated ferrous and non-ferrous metal or waterproof resin bonded plywood are suitable for use in permanent signs. Where plywood is used, it must be capable of passing the waterproof bond requirements of the Canadian Standards Association specifications. Certain fibrous materials, when properly fabricated, have also demonstrated satisfactory qualities for use under certain conditions. Wooden boards may be used for large signs and for temporary and seasonal signs. Heavy cardboard is adequate for temporary signs for special occasions or emergencies.

New materials for highway signs may be developed and consideration of other suitable materials available now or in the future is not precluded by these recommendations.

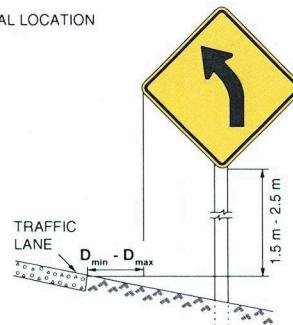
Non-corrosive fasteners should be used for attaching permanent signs to their supports to avoid discolouration.

Guidelines on sign retroreflectivity are found in Section A1.6.7.

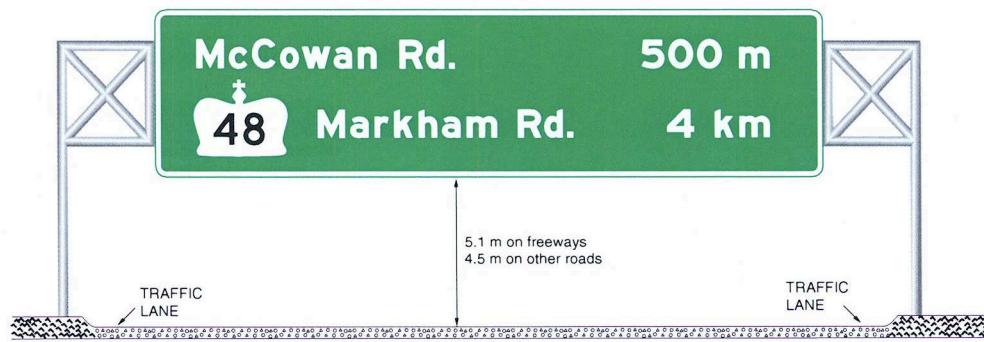
VERTICAL AND LATERAL PLACEMENT OF SIGNS TYPICAL INSTALLATIONS

URBAN OR
SUBURBAN
LOCATION

RURAL LOCATION



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**FIGURE A1-1**

A1.7.5 Sign Posts and Foundations

Sign posts and their foundations should be constructed to hold signs rigidly in their proper and permanent position. This will prevent them from swaying in the wind and from being turned or otherwise displaced.

In some cases, especially in business or residential districts, signs may be placed on existing supports used for other purposes, such as traffic signal or street light poles, thereby saving expense and minimizing sidewalk obstruction. The location of the sign or shared sign post, however, should meet requirements.

Wood or metal sign posts are generally used for independent mounting of signs. Each province and municipality should adopt the material and design dictated by local resources and past practice as the most satisfactory and economical. Posts having holes spaced on 50 mm centres will fit the bolt holes of most of the standard regulatory and warning signs.

A portable or removable type of mounting is desirable for some temporary condition signs which are used temporarily or intermittently. These mountings should be heavy enough to avoid overturning in the wind, and their bases should be no wider than the sign.

A1.7.6 Maintenance

All traffic signs should be kept clean and legible and in proper position at all times. Damaged signs should be repaired or replaced as soon as possible. Well maintained signs have more credibility as traffic control devices. Damaged, defaced or dirty signs are less effective, discredit the agency responsible for them, and may increase exposure to litigation.

To ensure adequate maintenance, a suitable schedule for inspection, cleaning and replacement of signs should be established, including inspection at night to determine the effectiveness of sign reflectivity. Special care should be taken to remove weeds, shrubbery, construction materials or piled snow that may obscure the face of a sign.

In the case of a group of signs that are similar in appearance and operate as a single device (such as Chevron Alignment signs), the signs should be maintained as a group. Should any of the signs be damaged or if the expected sign life has been exceeded, signs should be replaced as appropriate to retain appearance consistency.

In the case of illuminated signs, a regular schedule of bulb replacement should be maintained. Care should be taken to replace bulbs that burn out before scheduled replacement.

A1.8 OVERHEAD SIGNS

Sign standards in this Manual are generally applicable to standard roadside-mounted signs. Where overhead signs are needed on multi-lane facilities, the signs shown in Division A5, should be used.

A1.9 PART-TIME SIGNS

Regulations or warnings may apply only part of the time. This may be indicated by the standard sign with a tab sign specifying the time(s), in units of the 24-hour clock, when the message applies. Alternatively, the standard sign may be controlled in a variety of ways so that it is only displayed or illuminated when in effect.

A1.9.1 Time of Day, Day of Week

The time period is the period of consecutive hours during which the regulation is in effect. In the case where no time period is specified on the sign, the regulation is in effect for the full 24 hours of the day.

Time of day is indicated based on the 24-hour clock (e.g. 07:00, 16:30), with midnight indicated by 24:00. Time limits should be specified in numerals, for example, “15 min, 30 min, 1-h, or 2-h” and not in words. Time limits are specified in minutes for periods of less than one hour, such as “15 min”. This avoids the use of fractional numbers such as “ $\frac{1}{4}$ h”.

The days of the week are shown in the standard abbreviations specified below in the appropriate languages. Where no days are specified on the sign, the regulation is in effect on all days.

**TABLE A1-15
STANDARD ABBREVIATIONS**

English		French	
Saturday	SAT	SAM	Samedi
Sunday	SUN	DIM	Dimanche
Monday	MON	LUN	Lundi
Tuesday	TUE	MAR	Mardi
Wednesday	WED	MER	Mercredi
Thursday	THU	JEU	Jeudi
Friday	FRI	VEN	Vendredi

A1.10 DEVELOPMENT OF NEW SIGNS

All signs shown in this Manual are considered as Canadian standards. However, experimentation should not be discouraged. In a situation where a device that is not shown in the Manual, or that departs from the specifications contained in the Manual, is installed for an extended period of time and found satisfactory, it is recommended that information concerning the device be forwarded to the Transportation Association of Canada for submission to the Traffic Operations and Management Standing Committee. If adopted, the sign will be included in a subsequent revision of this Manual.

When no device exists for a specific situation, the recommended practice is to request that the Traffic Operations and Management Standing Committee initiate a project to develop an appropriate device.