



Transportation Association of Canada

Guidelines for the Application and Implementation of the School Bus Stop Ahead (WC-9) Sign

November 2009

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Abstract Section A3.7.5 of the Manual of Uniform Traffic Control Devices for Canada (MUTCDC) introduces the School Bus Stop Ahead Sign (WC-9). This sign is meant to warn drivers that they are approaching a school bus stop when the sight distance to the bus stop is limited to less than the minimum stopping sight distance. Other signs also exist that provide regulatory information or warning regarding school bus operations. However, no specific guidelines have been developed for their application and implementation. Various jurisdictions have developed their own practices, which has led to a lack of consistency in application and implementation across Canada. Due to the sensitive nature of school bus transportation, the signs have become overused in some jurisdictions, and the removal of unnecessary warning signs has been a challenge. The objective of this study is to consolidate the best available information to develop national guidelines for the application and installation of warning devices in advance of school bus stops. In particular, guidelines will be presented for the MUTCDC approved WC-9 sign.		Keywords Traffic Control Warning Traffic Sign School Bus Stop (Public Transport) Installation Specifications
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EXECUTIVE SUMMARY

Background

Section A3.7.5 of the *Manual of Uniform Traffic Control Devices for Canada* (MUTCDC) introduces the School Bus Stop Ahead sign (WC-9), shown in FIGURE ES.1. This sign is meant to warn drivers that they are approaching a school bus stop when the sight distance to the bus stop is limited to less than the minimum stopping sight distance.



FIGURE ES.1 MUTCDC APPROVED WC-9 SIGN

The objective of this study is to consolidate the most current information to develop national guidelines for the application and installation of warning devices in advance of school bus stops. In particular, guidelines will be presented for the MUTCDC approved WC-9 sign.

Review of Current Practice

The MUTCDC provides limited guidance regarding the School Bus Stop Ahead sign and the use of flashing beacons. With respect to the sign, the MUTCDC excludes:

- A definition of stopping sight distance;
- Guidance on the assessment of alternatives;
- Protocol for sign installation removal; and
- Specific guidance on the selection of supplementary tabs.

The key findings of the Canadian practices review are as follows:

- All provinces follow the MUTCDC;
- Most provinces acknowledge the importance of limiting the use of the sign to situations where the bus stop cannot be relocated;

- Some provinces have developed specific guidance for the calculation of stopping sight distances;
- No clear distinction is made between urban and rural applications;
- There is a provincial variance in sign size and reflectivity specifications; and
- There is a variance among provinces in the use of and guidance for the educational, distance and “next” tabs.

Guidelines for Application

A specific procedure has been established to assess the need for the WC-9 sign. The procedure involves first establishing the sight distance problem and considering the available alternatives, such as correcting the sight distance problem or relocating the bus stop, prior to providing the warning sign.

The assessment should be conducted every time the site conditions change, and can be conducted at regular intervals, such as at the beginning of each school year. Any signs that are no longer required should be removed as quickly as practically possible. TABLE ES.1 presents a summary of the procedure.

Guidelines for Implementation

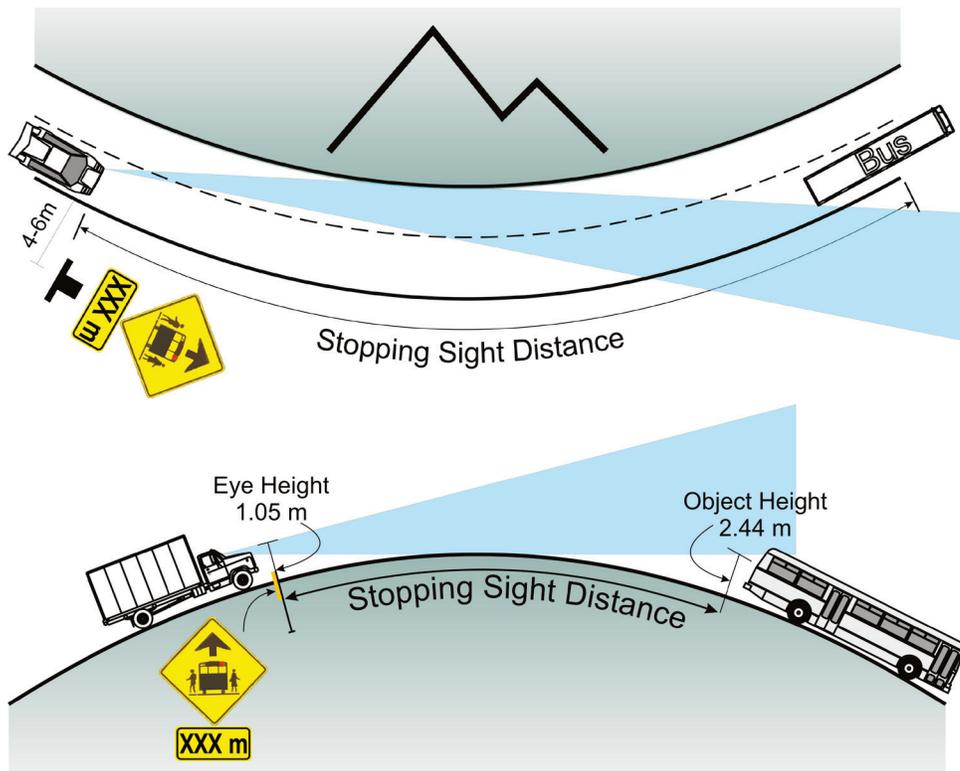
Once it is determined that the WC-9 sign is necessary, it should be implemented in accordance with the following guidelines (details provided in Section 5.0).

- Size: Guidance for sign size selection is provided in TABLE 5.1 of this report.
- Supplementary Tabs: The WA-30S distance tab is to be used. The educational tab is permitted only where the WC-9 sign has never or rarely been used.
- Advance Placement: Based on TAC *Geometric Design Guide for Canadian Roads* (1999) (referred to as GDGCR), Table 1.2.5.4.
- Lateral and Vertical Placement: Based on TAC *Guide for Lateral and Vertical Roadside Sign Placement* (2007).

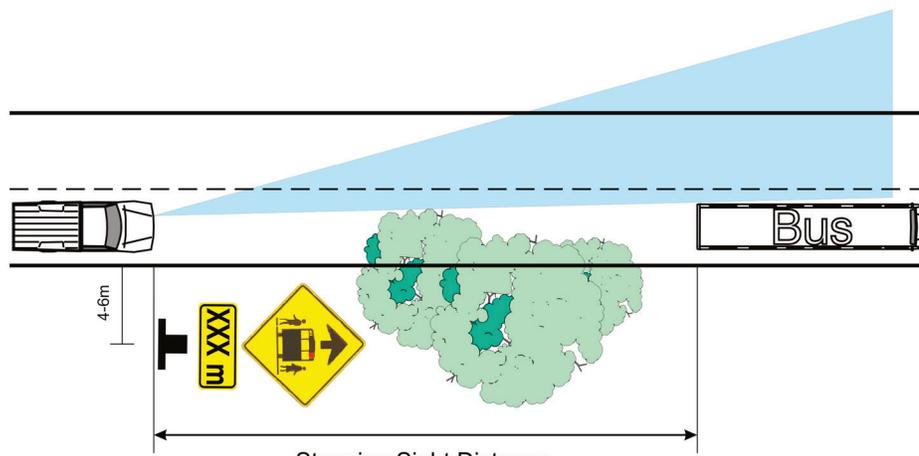
FIGURE ES.2 shows typical layouts illustrating the sign placement.

**TABLE 4.1 SCHOOL BUS STOP AHEAD (WC-9) SIGN
– NEED ASSESSMENT FORM**

STEP	DESCRIPTION	RESPONSE / VALUE
1.	School district to verify that the candidate location is actively in use for the pick-up and drop-off of students by school buses.	Active? _____
2.	Calculate minimum required Stopping Sight Distance (SSD). Refer to the GDGCR Table 1.2.5.4.	Minimum Required SSD: _____ metres
3.	At the candidate location, identify the cause(s) of the sight obstruction. It should be one (or a combination) of: <ul style="list-style-type: none"> • Horizontal curvature (i.e. roadside objects) • Vertical curvature • Foliage • Fog • Glare • Darkness 	Sight Obstruction(s): _____ _____
4.	At the candidate location, measure the available SSD. Refer to FIGURES 5.3(a) to (c) for the relevant condition. If fog, glare or darkness is relevant, conduct the measurement or estimate based on these conditions, where practical. Use the eye and object height specified in Section 4.5 of this Guide.	Available SSD: _____ metres
If the Available SSD is greater than the Minimum Required SSD, then do not provide the sign. Otherwise, proceed to Steps 5 through 8.		
5.	Is it possible and practical to eliminate the sight obstruction? (for example, to realign the roadway, flatten the crest or trim the trees). If so, do not provide the sign. Otherwise, proceed to Step 6.	Possible to eliminate? _____
6.	Consult with school district. Discuss whether it is possible to: (a) Relocate the bus stop (further from the constraint, including on the opposite side of the roadway). (b) Allow the bus operator to enter a nearby driveway (and provide the Bus Entrance sign if necessary).	Possible to: Relocate?: _____ Use driveway? _____
7.	Provide the School Bus Stop Ahead sign, in accordance with the Guidelines for Implementation (Section 5.0 of this Guide)	
<i>Then, at subsequent intervals in the future, when site conditions change or at the start of each school year, conduct this assessment again. Set a target date for the next assessment.</i>		
Date of next assessment: _____		



(b) Vertical Curve



(c) Foliage



FIGURE ES.2 STANDARD LAYOUTS FOR WC-9 SIGN PLACEMENT

1.0 INTRODUCTION

1.1 Background

Section A3.7.5 of the *Manual of Uniform Traffic Control Devices for Canada* (MUTCDC) introduces the School Bus Stop Ahead sign (WC-9), shown in FIGURE 0.1. This sign is meant to warn drivers that they are approaching a school bus stop when the sight distance to the bus stop is limited to less than the minimum stopping sight distance.



FIGURE 0.1 MUTCDC APPROVED WC-9 SIGN

Other signs also exist that provide regulatory information or warning regarding school bus operations. However, no specific guidelines have been developed for their application and implementation. Various jurisdictions have developed their own practices, which has led to a lack of consistency in application and implementation across Canada. Due to the sensitive nature of school bus transportation, the signs have become overused in some jurisdictions, and the removal of unnecessary warning signs has been a challenge.

1.2 Objective

The objective of this study is to consolidate the most current information to develop national guidelines for the application and installation of warning devices in advance of school bus stops. In particular, guidelines will be presented for the MUTCDC approved WC-9 sign.

1.3 Report Content

This report contains:

- A review of the MUTCDC and current practices across Canada;
- An overview of international experience;
- Alternatives to the application of static warning devices in advance of school bus stops;
- Guidelines for the application of the WC-9 sign in advance of school bus stops;
- Guidelines for the implementation of the WC-9 sign in advance of school bus stops; and
- Guidance for the maintenance and removal of the WC-9 sign.

Further details and background research on activated warning devices are contained in a separate document entitled: *Guidelines for Application and Implementation of Active Warning Devices in Advance of School Bus Stops: Technical Memorandum #1: Research.*

2.0 REVIEW OF CURRENT PRACTICE

2.1 Manual of Uniform Traffic Control Devices for Canada

Limited guidance is provided in the *Manual of Uniform Traffic Control Devices for Canada* (MUTCDC) regarding the School Bus Stop Ahead sign (shown in FIGURE 2.1. Section A3.7.5, which presents the WC-9 sign, reads as follows:

The School Bus Stop Ahead Sign indicates to drivers that they are approaching a school bus stop. The sign is installed where horizontal curves, vertical curves or foliage limit sight distance to less than the minimum stopping sight distance. Relocation of the bus stop to a location with adequate visibility of the stopped bus should first be assessed. The supplementary tab sign (WA-30S) may be used to indicate the distance to the school bus stop.



FIGURE 2.1 MUTCDC SECTION A3.7.5

The MUTCDC also states that “flashing beacons can be used as a supplementary warning device to draw attention of approaching drivers to an important warning sign or hazard marker”. However, it makes no specific reference to the use of flashing beacons in conjunction with the WC-9 sign.

The optional distance tab and the optional temporary educational tab are shown in FIGURE 2.2.



WA-30S



WC-9T



WC-9TF

FIGURE 2.2 OPTIONAL TABS TO SUPPLEMENT WC-9 SIGN

The MUTCDC excludes:

- A definition of stopping sight distance;
- Guidance on the assessment of alternatives;
- Protocol for sign installation and removal;
- Specific guidance on the selection of supplementary tabs.

2.2 Canadian Practices

A. Application

To supplement the MUTCDC, several provinces in Canada have developed more specific guidance for the application of the School Bus Stop Ahead sign. A review of practices was conducted for six Provinces:

- British Columbia
- Alberta
- Saskatchewan
- Ontario
- Quebec and
- New Brunswick

Key features of the application guidelines are summarized in TABLE 2.1. Other Provinces indicated that they follow the MUTCDC but have not prepared more specific guidelines. Relevant excerpts of the Provincial traffic control manuals containing additional details are included in APPENDIX A.

In addition to the guidance for the WC-9 sign, British Columbia and Alberta permit the use of the educational Stop When School Bus Lights Flashing sign, shown in FIGURE 2.3 (not contained in the MUTCDC). The sign is installed at vehicle entry points to the province, on the outskirts of communities and at locations along school routes and other locations with unusual situations, but in British Columbia no new signs are being installed. New Brunswick had also previously used the sign, but discontinued it after 1996.

TABLE 2.1 PROVINCIAL APPLICATION GUIDELINES

Province Agency, <i>Reference</i>	APPLICATION CRITERIA	SIGHT DISTANCE CRITERIA	ALTERNATIVES	APPLICATION/ REMOVAL PROTOCOLS
British Columbia Ministry of Transportation and Infrastructure <i>Manual of Standard Traffic Signs and Pavement Markings (2000), Ch 5</i>	<ul style="list-style-type: none"> At unanticipated or poorly located school bus stops where hazards may exist 	<ul style="list-style-type: none"> Unspecified. (Not restricted to locations with sight distance problems). 	<ul style="list-style-type: none"> Relocation of bus stop, walking path and distance to new stop must be considered 	<ul style="list-style-type: none"> Installation requires Senior Traffic Engineer approval
Alberta Transportation <i>Traffic Control Recommended Practices (2006)</i>	<ul style="list-style-type: none"> Where restricted sight distance of bus stop or pedestrian crossing Rarely required in urban or semi-urban areas 	<ul style="list-style-type: none"> generally needed only when bus stop cannot be seen within 300 m Refer to Highway Geometric Design Guide Section B.2 for sight distance 	<ul style="list-style-type: none"> Planning of bus route Design of safe bus stops 	<ul style="list-style-type: none"> None specified
Saskatchewan Highways and Transportation <i>Saskatchewan Traffic Control Device Manual (2002)</i>	<ul style="list-style-type: none"> Where school bus stop does not meet minimum stopping sight distance Other particular circumstances or needs 	<ul style="list-style-type: none"> Minimum SSD ranges from 60 m to 190 m for varying posted speed limits Eye height = 1.05 m to brake lights on van-type school buses (1 m) Object height = 1 m (brake light) 	<ul style="list-style-type: none"> Relocation of bus stop(s) 	<ul style="list-style-type: none"> Request made to the local School Division Signs removed if no longer required in the opinion of the Province
Ministry of Transportation Ontario <i>Ontario Traffic Manual Book 6 (2001)</i>	<ul style="list-style-type: none"> Where horizontal/vertical curves or foliage limit sight distance to less than the object height minimum 	<ul style="list-style-type: none"> Minimum SSD ranges from 65 m to 245 m for varying speed limits For crest curves, minimum SSD is provided for varying K-factors & object heights Eye height = 1.05m to flashers: 2.7 m for buses, 2.0 m for vans, 1.3 m for wagons 	<ul style="list-style-type: none"> Relocation of bus stop to provide adequate visibility 	<ul style="list-style-type: none"> Requests made to local road agency Need to apply annually for the sign Signs for stops not in use must be removed
Ministère des transports du Québec <i>Traffic Control Standard (2004)</i>	<ul style="list-style-type: none"> Where the sight distance is less than the stopping sight distance 	<ul style="list-style-type: none"> Minimum SSD ranges from 45 m to 240 m for varying speed limits Object height = 2.5 m 	<ul style="list-style-type: none"> Take every measure to move bus stop up to 150 m 	<ul style="list-style-type: none"> None specified
New Brunswick Department of Transportation <i>NB DOT Sign Manual (1996)</i>	<ul style="list-style-type: none"> Where an unusual degree of hazard exists Where the stopping sight distance for school bus stops is lacking 	<ul style="list-style-type: none"> Minimum SSD ranges from 45 m to 260 m for varying speed limits Eye height=1.05 m Object height =1.2 m (located at the edge of travel way on critical side) 	<ul style="list-style-type: none"> Review location following investigation guidelines provided in Chapter 6 of Sign Manual 	<ul style="list-style-type: none"> Requires properly completed investigation form and requisition form



Alberta Version



British Columbia Version

FIGURE 2.3 “STOP WHEN LIGHTS FLASHING SIGN” (NOT IN MUTCDC)

The use of beacons was not discussed specifically for the WC-9 sign in any of the Provincial guides. It is known that activated flashing beacons are being used on an experimental basis in Alberta in conjunction with the WC-9 sign. Ontario has at least one location (shown in FIGURE 2.4) where the sign is supplemented by flashing beacons, but this application is not for one specific bus stop. It is unknown whether this device flashes constantly or is programmed to flash during a specific period of the day. Most provinces do not encourage but may permit the use of flashing beacons in conjunction with warning signs where certain circumstances exist. The MUTCDC states that the beacons may be used as a supplementary warning device to draw attention of approaching drivers to an important warning sign.



FIGURE 2.4 PRE-TIMED SCHOOL BUS WARNING SIGN IN ONTARIO

B. Implementation

Implementation details for the same provinces are summarized in TABLE 2.2.

TABLE 2.2 PROVINCIAL IMPLEMENTATION GUIDELINES

LOCATION	SIZE (cm)	COLOUR / REFLECTIVITY	USE OF TABS	PLACEMENT
British Columbia	75 X 75	Unspecified.	Unspecified.	Ranges from 105 m to 305 m, depending on speed limit.*
Alberta	Standard: 75 x 75 Oversize (90 x 90) for special situations.	Black on yellow. ASTM Sheeting Type III or IV	WC-9-T (educational tab) may be used.	300 to 350 m in advance of stop. In urban areas, this may be reduced to 50 or 150 m. Usually both directions. On divided/one-way roads, should also be installed on the left.
Saskatchewan	90 x 90	Black on yellow. Manufacturing Spec: 245S	Distance tab (WA-28) will supplement when length being signed exceeds 1 km.	Per stopping sight distance chart. If installed due to other circumstances, then 150 m in advance. Can be provided in only one direction if necessary. If several closely spaced stops, one set of signs
Ontario	75 x 75	Black on reflective yellow. Minimum sheeting: Type I	Wc-26t (text) normally used when new sign first introduced. W-23t (distance tab) may be used.	Per location criteria and distance specified in Section 1.5 of Ontario Traffic Manual. Ranges from 70 m to 465 m for coming to a complete stop, depending on the speed limit.
Quebec	variable	Black on yellow. Minimum ASTM Type I.	Distance tab is posted under the sign.	Per Table 3.4-1 of MTQ Standard. Ranges from 55 m to 290 m, depending on the speed limit and the grade.
New Brunswick	120 x 120	Black on yellow.	Distance tab (Cat# 2724) may be posted under warning sign.	150 m to 200 m in advance of site. Where several "stops" occur within a short distance where hills and curves are abundant, a sign may be added to indicate the length of the zone.

Where details are unspecified, in most cases they default to general guidelines that apply to all warning signs.

*Based on condition where driver is required to exercise judgement.

The key findings of the Canadian practices review are as follows:

- All provinces follow the MUTCDC;
- Most provinces acknowledge the importance of limiting the use of the sign to situations where the bus stop cannot be relocated;
- Some provinces have developed more specific guidance for application and implementation in their jurisdictions;
- Some provinces have developed specific guidance for the calculation of stopping sight distances;
- No clear distinction is made between urban and rural applications;
- There is a variance among provinces in the sign size and reflectivity specifications; and
- There is a variance among provinces in the use of and guidance for the educational, distance and “next” tabs.

2.3 United States Practices

A. Manual of Uniform Traffic Control Devices

The 2003 US *Manual of Uniform Traffic Control Devices* (MUTCD) contains the School Bus Stop Ahead sign (S3-1). It is currently a text-based sign, as shown in FIGURE 2.5. Consultation with members of the U.S. National Committee on Uniform Traffic Control (NCUTC) indicated that the next edition of the MUTCD will include the symbolic version of this sign, similar to the WC-9 sign in Canada.

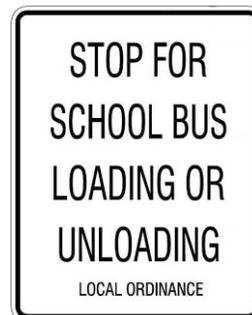


FIGURE 2.5 US MUTCD APPROVED S3-1 SIGN

Regarding the application of the device, the MUTCD indicates that the S3-1 sign can be used near bus stops which are not visible for a distance of 500 ft (150 m), and which cannot be relocated. This is more specific than the MUTCDC.

B. State Departments of Transportation

Consultation with the Wisconsin and Michigan Departments of Transportation indicated that they follow the US MUTCD in practice. Some States prefer to use the regulatory sign shown in FIGURE 2.6 along rural high speed corridors with school bus stops, as an alternative to a large abundance of warning signs.



**FIGURE 2.6
U.S. MUTCD STOP
FOR SCHOOL BUS
SIGN**

2.4 Overseas Practices

A review of overseas practices indicated that warning signs exist for school bus stops that are obscured, but that large variations exist in school bus loading and unloading procedures and practices at bus stops, and in the laws pertaining to traffic manoeuvres. For example, in Australia, pullouts and wide shoulders are provided at bus stops, and shelters at some locations.

In New Zealand, drivers are required to slow to 20 km/h when passing a school bus stopped to pick up or discharge school children. There are numerous school bus stops in locations where topography and/or alignment limits sight distance. The signs shown in FIGURE 2.7 are used in New Zealand. At terminals on the bus route, "turns" can be substituted for "route" on the tab.



**FIGURE 2.7
NEW ZEALAND
SCHOOL BUS
STOP SIGNS**



3.0 ALTERNATIVES TO WARNING DEVICES

Prior to providing a warning sign at a candidate locations, all possible alternatives should be exhausted by the road agency to ensure that the underlying causes to sight obstruction are addressed. These alternatives are described as follows:

3.1 Eliminate Sight Obstruction

For example, where practical:

- If the sight obstruction is a horizontal curve, then consider realigning the curve to improve the sight distance.
- If the sight obstruction is a vertical crest curve, then consider flattening the crest curve.
- If the sight obstruction is vegetation, then consider trimming, relocating or controlling the growth of the vegetation.

3.2 Relocate the School Bus Stop

If it is feasible to relocate the bus stop, the following options exist. These would have to be arranged for by the School District and in some cases agreed-upon with the property owner and parents of the child.

- Relocate the bus stop further from the sight constraint. This might require the child to walk along the road. Therefore, this should only be considered if a safe connection between the property and the bus stop location could be provided. An opportunity may exist to relocate the driveway itself further away from the curve.
- Relocate the bus stop to the opposite side of the road. The trade-offs of improving the sight distance but requiring the child to cross the street would need to be reviewed closely.

3.3 Encourage Bus Operator to Enter the Driveway

At locations where there is only one property at which a child is being picked up or dropped off, an agreement might be reached to enter the driveway. In such a case, a school bus entrance warning sign might be provided to warn traffic of this movement.

4.0 GUIDELINES FOR APPLICATION

The following guidelines for application are provided to determine the need for the WC-9 sign at locations where the sight distance is inadequate and the alternatives described in Section 3.0 have been considered. The need should be evaluated separately for each stop location along a route with multiple stops.

4.1 Land Use Context

The sign is applicable in both urban and rural areas. However, it is primarily intended for rural, higher-speed roads (including fringe areas), where buses are typically required to activate their flashers prior to stopping for loading or unloading, and where motorists may not be expecting to have to stop. In areas where school bus operators may be prohibited from activating their flashers (such as within several municipalities across Canada), the sign is not to be used.

4.2 Bus Manoeuvre

If school buses, instead of stopping in the roadway:

- i) pull over onto the roadside;
- ii) turn into the driveway; or
- iii) turn around at the location,

the School Bus Stop Ahead sign is not to be used. Instead, the need for other signs contained in the MUTCDC, such as the School Bus Entrance Sign (WC-12) or the Concealed Road Signs (WA-11 or WA-13), can be reviewed.

4.3 Vehicle Direction

The need for the WC-9 sign is to be determined independently for each direction, since the sight obstruction between the motorist and the bus stop may be present in one direction only.

4.4 Sight Obstructions

The WC-9 sign is to be considered where part or all of a school bus that is stopped to load or unload passengers may be obscured.

The sign should not be used to provide warning of students standing at the roadside or crossing the roadway; the need for other signs can be evaluated for such purposes.

The majority of sight obstructions that are severe enough to limit the sight distance to below the minimum required involved changes in the roadway alignment, i.e. horizontal and vertical curves. In addition, along sections with a straight and flat alignment, trees or foliage may partially obscure a bus.

A. Horizontal Curves

Horizontal curvature can cause sight obstructions where roadside objects, located on the inside of the curve, limit the available sight distance. Examples of fixed roadside objects include: rock faces, fencing, barriers, utility poles and trees. Other objects that may temporarily restrict sight lines along a curve include snow banks and temporarily parked vehicles or equipment. Sometimes the presence of several objects acting in combination can block the view of a stopped bus (for example, utility poles and fences).



B. Vertical Curves



Vertical crest curves can impose significant sight constraints. Along routes through rolling terrain, there may be several locations where stops are located in the vicinity of crest curves, with insufficient sight distance. Sag curves may also create sight obstructions during dark conditions.

C. Trees / Foliage

Trees or foliage may obscure the presence of a stopped bus where the horizontal or vertical sight distance is otherwise adequate. Trees and foliage should be trimmed, removed or the growth regularly controlled to avoid obscuring buses.

D. Other Factors

In addition to sight line obstructions, visibility between motorists and a stopped bus can vary depending on weather and other changing conditions. For example:

Fog or Glare: Some areas may be prone to fog or sun glare, particularly during certain times of the day. Areas susceptible to fog may include (but are not restricted to) river valleys, coastlines or near water treatment plants. Sun glare may be an issue where the roadway takes a relatively sharp turn towards the sun or the sun appears above the horizon or mountains during pick-up / drop-off times.



Darkness: At locations where lighting is absent and in northern areas, the majority of school bus loading and unloading activities may occur during dark conditions. Sight distance should also be measured for night-time conditions.

Therefore, the need for the WC-9 warning sign (similar to other warning signs) should take into consideration these most common dynamic conditions.

4.5 Sight Distance Calculation

A. Sight Distance Definition

The sight distance criterion that will be used is **Stopping Sight Distance**, as defined in the TAC *Geometric Design Guide for Canadian Roads* (GDGCR), Section 1.2.5.2.

B. Sight Distance Equations

Sight Distance equations are provided in the GDGCR for horizontal curves (GDGCR Equations 1.2.4 and 1.2.5), crest curves (GDGCR Equations 2.1.24 and 2.1.25) and sag curves (GDGCR Equations 2.1.26 and 2.1.27).

C. Vehicle Operating Speed

The vehicle operating speed to be used in the sight distance calculation will be the ***Posted Speed Limit***.

D. Perception Reaction Time

The perception-reaction time will be taken to be ***2.5 seconds***.

E. Eye Height, Object Height and Object Location

Eye height will be taken to be ***1.05 metres***.

Object height will be taken to be equal to the height at which the bus flashers are mounted on the bus. Transport Canada requires school bus flashers to be installed at a height of at least 2.44 metres from the ground. Therefore, it is recommended that ***the minimum object height be taken as 2.44 metres***. A greater object height may be used in jurisdictions where it is policy or common practice to install flashers higher than this minimum.

Different object height criteria can be used when assessing the sight distance for other objects such as crosswalks or pedestrians; however, for the purpose of assessing the need for the WC-9 sign, the height of the flashers is to be used.

Object location will be taken as the edge of the roadway (i.e. the roadway edge on the inside of the curve, where sight distance is limited by a horizontal curve).

F. Adjustment for Grades

The effect of grade will be calculated as per the TAC GDGCR Equation 1.2.6.

G. Sight Distance Calculation Values

The required stopping sight distance for various design speeds is summarized in TABLE 1.2.5.4 of the GDGCR.

4.6 Sign Removal

Due to the temporary nature of school bus stops, regular review of the need for the School Bus Stop Ahead signs is recommended to identify bus stop locations where existing signs are no longer necessary. Examples of situations in which a sign may no longer be necessary include:

- Site conditions have changed;
- Student(s) have graduated or moved away; or
- Bus stop has been relocated.

Determining this information will require cooperation between the local road authority and the school district. It is recommended that each year, prior to the start of the next school year, this information be collected and the procedure described in this document be conducted for bus stop warning sign locations that have experienced changes in site conditions. If the sign is found to no longer be required, it should be removed as quickly and as practically as possible.

4.7 Worksheet

TABLE 4.1 provides a worksheet that can be used by road agencies to assess the need for the WC-9 sign. It is recommended that a site investigation be conducted to confirm the presence of sight obstructions and determine the available sight distance and to review the alternatives to providing the WC-9 sign, in consultation with the School District.

**TABLE 4.1 SCHOOL BUS STOP AHEAD (WC-9) SIGN
– NEED ASSESSMENT FORM**

STEP	DESCRIPTION	RESPONSE / VALUE
1.	School district to verify that the candidate location is actively in use for the pick-up and drop-off of students by school buses.	Active? _____
2.	Calculate minimum required Stopping Sight Distance (SSD). Refer to the GDGCR Table 1.2.5.4.	Minimum Required SSD: _____ metres
3.	At the candidate location, identify the cause(s) of the sight obstruction. It should be one (or a combination) of: <ul style="list-style-type: none"> • Horizontal curvature (i.e. roadside objects) • Vertical curvature • Foliage • Fog • Glare • Darkness 	Sight Obstruction(s): _____ _____
4.	At the candidate location, measure the available SSD. Refer to FIGURES 5.3(a) to (c) for the relevant condition. If fog, glare or darkness is relevant, conduct the measurement or estimate based on these conditions, where practical. Use the eye and object height specified in Section 4.5 of this Guide.	Available SSD: _____ metres
If the Available SSD is greater than the Minimum Required SSD, then do not provide the sign. Otherwise, proceed to Steps 5 through 8.		
5.	Is it possible and practical to eliminate the sight obstruction? (for example, to realign the roadway, flatten the crest or trim the trees). If so, do not provide the sign. Otherwise, proceed to Step 6.	Possible to eliminate? _____
6.	Consult with school district. Discuss whether it is possible to: (a) Relocate the bus stop (further from the constraint, including on the opposite side of the roadway). (b) Allow the bus operator to enter a nearby driveway (and provide the Bus Entrance sign if necessary).	Possible to: Relocate?: _____ Use driveway? _____
7.	Provide the School Bus Stop Ahead sign, in accordance with the Guidelines for Implementation (Section 5.0 of this Guide)	
<i>Then, at subsequent intervals in the future, when site conditions change or at the start of each school year, conduct this assessment again. Set a target date for the next assessment.</i>		
Date of next assessment: _____		

5.0 GUIDELINES FOR IMPLEMENTATION

5.1 Sign Specifications

A. Size



FIGURE 5.1 WC-9 SIGN

The three sizes available for the WC-9 sign are:

- *750 mm x 750 mm*
- *900 mm x 900 mm*
- *1200 mm x 1200 mm*

While the 750 x 750 sign is permitted, larger signs may be applicable in situations where the land use is more rural and where speeds are higher. TABLE 5.1 provides further guidance.

TABLE 5.1 SELECTION OF WC-9 SIGN SIZE

CHARACTERISTIC OF BUS STOP LOCATION	SUGGESTED SIGN SIZE (mm)		
	750 x 750	↔	900 x 900 ↔ 1200 x 1200
Land Use	Urban	↔	Rural
Speed Limit	Lower	↔	Higher

Larger signs (900 x 900 or 1200 x 1200) may also be considered where conditions require increased visibility, or where smaller signs have proven ineffective based on field testing, compliance rates or collision experience.

B. Colour

The colour of the WC-9 sign will be **black on yellow**, with red for the school bus flashing light.

C. Reflective Sheeting

Section A.1.6.7 of the MUTCDC provides the standards for retro-reflective sheeting. The standards identified as being appropriate for warning signs should be applied to the WC-9 sign.

D. Use of Supplementary Tabs

Two types of tabs may be used to supplement the WC-9 sign: the (i) distance tab and the (ii) educational tab.



FIGURE 5.2 OPTIONAL SUPPLEMENTARY TABS

The WA-30S distance tab is to be used to indicate the distance to the hidden bus stop. It is to be placed upstream of the sight obstruction closest to the bus stop. The use of the WA-28S distance tab (not shown), referring to a longer distance covering multiple stops along a route, is not permitted.

The use of the educational tab is permitted but discouraged, with the exception of special circumstances where the symbolic WC-9 sign has never or rarely been used. The educational tab should be replaced with the distance tab following the educational period.

Tabs are to be placed directly below the WC-9 sign, on the same post. The width of the tab signs should match the width of the warning sign. For example, the 900 x 900 sign should be appended by a **900 mm x 360 mm** tab. Smaller or larger tabs are to be provided in similar proportions.

The colour and reflectivity characteristics of the tabs should match that of the WC-9 sign.

5.2 Sign Placement

A. Advance Placement

The School Bus Stop Ahead warning sign should be placed so as to provide the required stopping sight distance, based on the condition that a vehicle would need to come to a complete stop.

TABLE 1.2.5.4 of the TAC *Geometric Design Guide for Canadian Roads* provides minimum stopping sight distances, based on conventional truck braking systems and a perception-reaction time of 2.5 seconds. These values are summarized in TABLE 5.2. The placement should be selected towards the higher end of the range in the presence of grades, lower friction factors, and higher percentages of trucks.

B. Lateral and Vertical Placement

Along divided highways and one-way roads, the sign can be placed on both sides of the roadway for enhanced conspicuity.

The need for the sign is evaluated separately for each direction. In most cases, it will only be required in one direction.

TABLE 5.2 SUGGESTED ADVANCE PLACEMENT OF WC-9 SIGN

SPEED LIMIT (km/h)	SUGGESTED ADVANCE PLACEMENT (m)
50	85 – 110
60	105 – 130
70	135 – 180
80	155 – 210
90	190 – 265
100	235 – 330
110	260 – 360

The lateral and vertical placement will be determined in accordance with the TAC *Guide for Lateral and Vertical Roadside Sign Placement* (2007). The key dimensions are summarized as follows:

Lateral Placement

Similar to other warning signs, the WC-9 sign is classified as being less than 5m² in total area, the TAC *Guide for Lateral and Vertical Roadside Sign Placement* provides ranges for the lateral offset, based on the land use context, the posted speed limit and the prevalence of snow. For most rural high speed locations where the WC-9 sign is provided, the sign should be placed between 4 and 6 metres from the edge of the nearest travel lane.

Vertical Placement

As per the *Guide for Lateral and Vertical Roadside Sign Placement*, for rural conditions with limited pedestrian volumes, the sign should be mounted a minimum of 1.5 metres from the ground, and up to 2.5 metres as special circumstances dictate.

Standard layout drawings are provided in FIGURE 5.3, showing the sign placement for each of the three static conditions: (a) horizontal curve, (b) vertical curve, and (c) foliage.

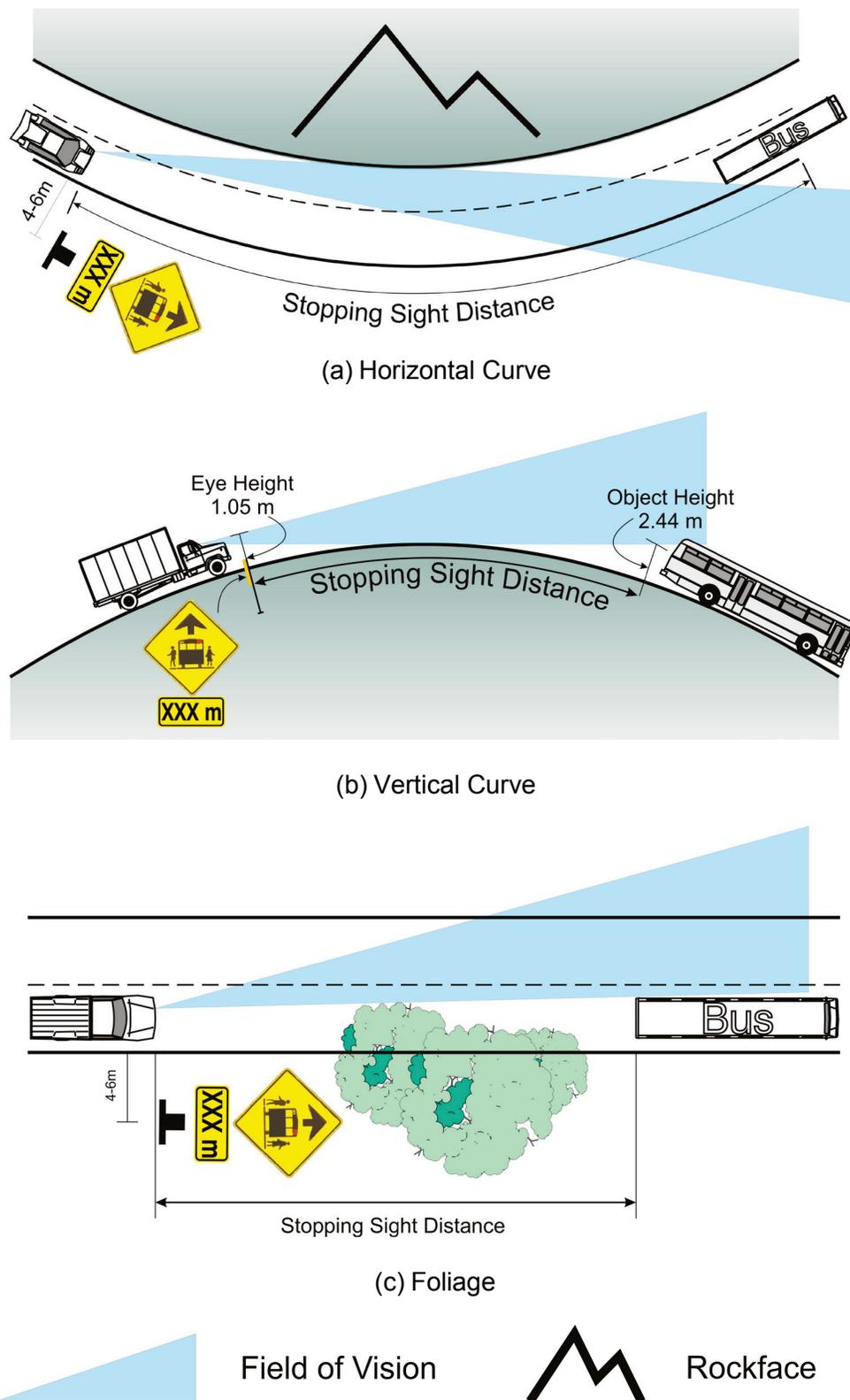


FIGURE 5.3 STANDARD LAYOUTS FOR WC-9 SIGN PLACEMENT



APPENDIX A

CURRENT PROVINCIAL GUIDELINES



TABLE A.1 SUMMARY OF CURRENT PROVINCIAL GUIDELINES

PROVINCE / REFERENCE	GUIDELINES
<p>British Columbia Ministry of Transportation & Infrastructure <i>Manual of Standard Traffic Signs and Pavement Markings (2000)</i></p>	<p>The SP-20 sign shall be used at unanticipated or poorly located school bus stops, where potential hazards may exist. Relocation of such bus stops should be considered, but this must be weighed against the fact that children may be required to walk farther along the roadway to reach the relocated bus stop. Use of this sign requires Senior Traffic Engineer approval.</p>
<p>Alberta Transportation <i>Traffic Control Recommended Practices (2006)</i></p>	<p>May be installed in advance of a school bus stop which has sight distance restrictions and where motorists approaching the site have poor visibility of a stopped bus and pedestrians crossing the highway. Usually, no sign is required if a bus stop can be seen from a distance of greater than 300 m, since it is assumed that the driver can see the potential hazard and have enough time to stop. In urban or semi-urban areas where posted speeds are 60 km/h or less and street and ambient lighting is often present, an advance warning sign is seldom required. Refer to Highway Geometric Design Guide Section B.2 for Sight Distance.</p>
<p>Saskatchewan Highways and Transportation <i>Saskatchewan Traffic Control Device Manual (2002)</i></p>	<p>May be used in advance of locations where: (1) the school bus stop is obscured in such a manner that a school bus cannot be seen (ranging from 60 m to 190 m, as per the SSD chart provided for different posted speed limits). Stopping sight distances will be measured from an eye height of 1.05 m to the height of the brake lights on a van-type school bus (1 m) (2) there are particular circumstances or needs (including a transfer point where two or more buses stop to load or unload on a highway). Does not include locations where buses are crossing or turning on to the highway. Requests for the sign are made through the local School Division, who will review the request, complete an application and apply to the Department.</p>
<p>Ministry of Transportation Ontario <i>Ontario Traffic Manual Book 6 (2001)</i></p>	<p>The Wc-26 sign should be installed where horizontal curves, vertical curves or foliage limit sight distance to less than the minimum stopping sight distance, ranging from 65 m to 245 m, as specified in the tables provided. Sight distance should be measured from the eye height (1.05 m) to the overhead flashing lights (2.7 m for large buses, 2.0 m for vans and 1.3 m for station wagons). For crest curves, the minimum SSD is provided for various K-factors and object heights. Relocation of the bus stop to a location with adequate visibility should first be assessed prior to considering sign installation. Request is made to the local road authority by the school board or transportation company. Signs must be reviewed and applied for annually due to changing nature of school bus stops and routes. Signing no longer in use must be removed.</p>
<p>Ministère des Transports du Quebec <i>Traffic Control Standard (2004)</i></p>	<p>The School Bus Stop Ahead sign (D-260) must be erected on a public highway whose pavement is kept clear in winter conditions, where the sight distance to an object with a height of 2.5 m is less than the stopping sight distance; or where the sight distance to an object with a height of 2.5 m located at the school bus stop is less than 1.3 times a vehicles stopping sight distance. In such cases the sign must be erected at 1.3 times the stopping sight distance, up to 500 m. Every measure must be taken to achieve the sight distance by moving the school bus stop closer or further over a distance of 150 m.</p>
<p>New Brunswick Department of Transportation <i>NB DOT Sign Manual (1996)</i></p>	<p>In general, follow MUTCDC. Use should be approved by District personnel. To be used where an "unusual degree of hazard" exists. Primary criteria are the lack of stopping sight distance which may exist at a location where the bus unloads children. Min. stopping sight distance is given in the table provided for school bus entrance sign, ranging from 45 m to 260 m, depending on the speed limit (or prevailing speeds if considerably higher), based on eye height of 1.05 m and target height of 1.2 m, located at the edge of travelway on critical side. Investigative guidelines are provided in Ch.6 which the location is reviewed, including the nature of the manoeuvre, speed, sight distance, grade and cause of reduced sight distance, and a recommendation is made.</p>

