H8 Signs, Supports and Poles

H8.1 Introduction

This section identifies the appropriate roadside safety treatment for signs, supports, poles and related features.

H8.2 Sign Post Selection

Wind loading varies throughout the Province of Alberta with the southern region being characterized by higher wind loading than other areas.

For sign post selection, the province has been divided into two zones based on the prevailing wind loading. **Figure H8.1** illustrates the demarcation of the two zones.

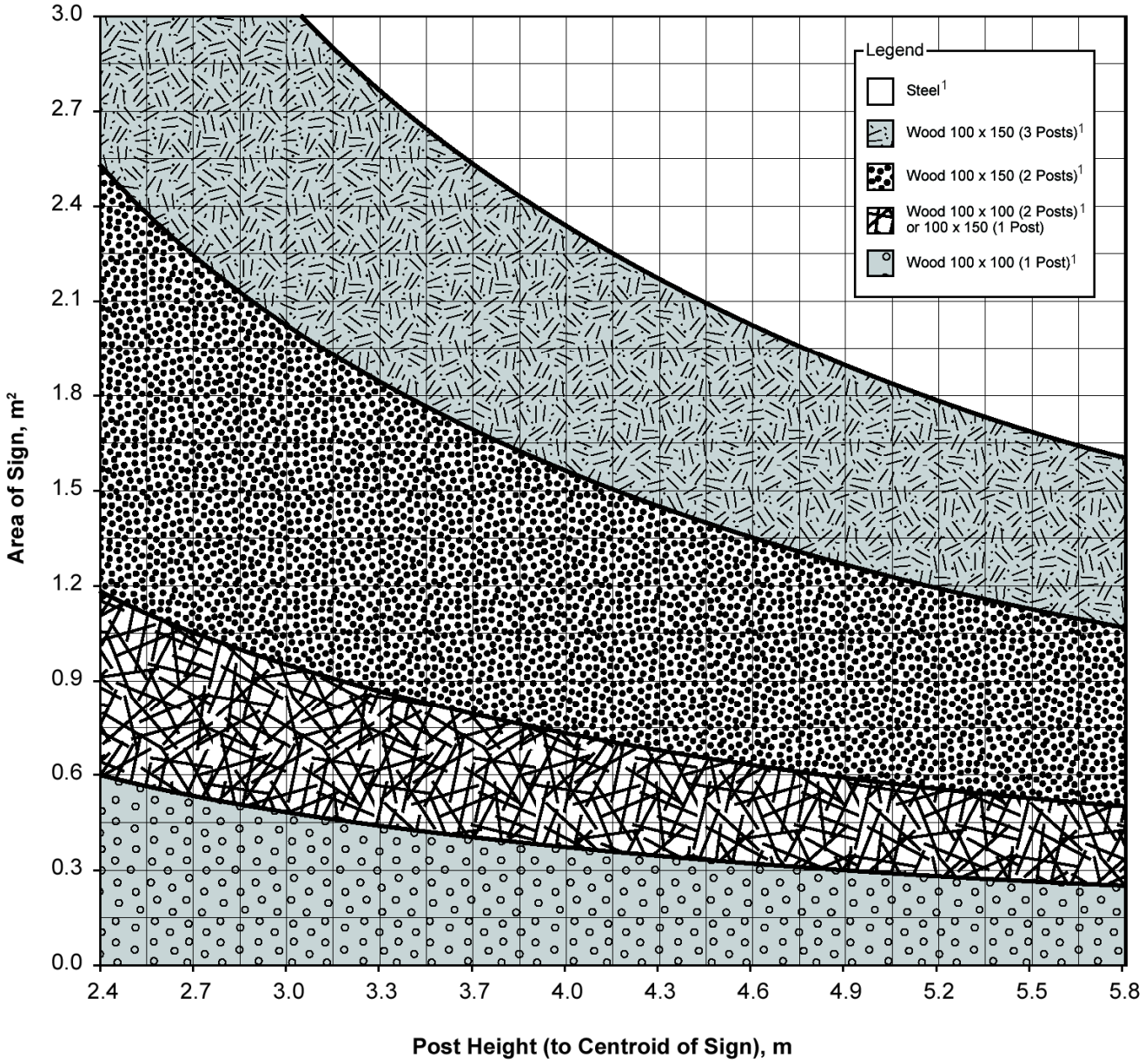
Zone 1 consists of the Peace Region, North Central Region, Central Region, and National Parks, whereas Zone 2 consists of the Southern Region.

Post requirements are determined based on sign area and post height (to the centroid of the sign).

Figures H8.2 and **H8.3** provide information on the sign post selection for Zones 1 and 2, respectively.

FIGURE H8.1 Sign Post Selection Zones

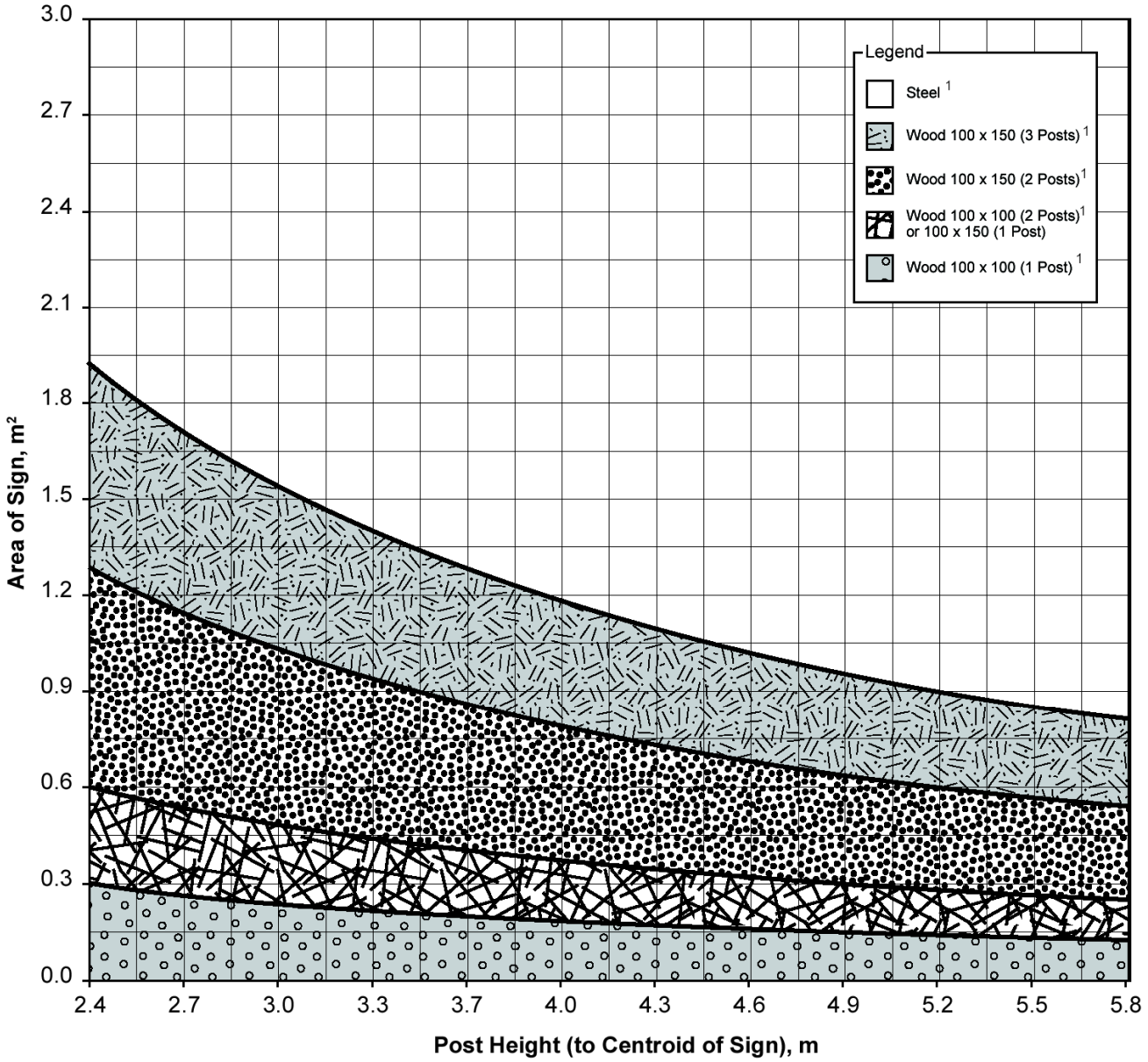
FIGURE H8.2 Sign Post Requirements for Zone 1



Note:

1. Refer to Drawing Nos. TCS-A4-300 and TCS-A4-310 in the *Highway Guide and Information Sign Manual* for details on wood posts and steel posts, respectively.

FIGURE H8.3 Sign Post Requirements for Zone 2



Note:

1. Refer to Drawing Nos. TCS-A4-300 and TCS-A4-310 in the *Highway Guide and Information Sign Manual* for details on wood posts and steel posts, respectively.

H8.3 Signs and Sign Supports

Signs placed within the Clear Zone of a roadway have the potential to cause injury or property damage if struck by an errant vehicle. To minimize injury and/or property damage, sign posts within the Clear Zone should be equipped with a breakaway feature.

There are four types of sign posts available for larger signs:

- Multiple wood posts
- Steel I-beam
- Steel S-Shaped
- Steel Wide Flange.

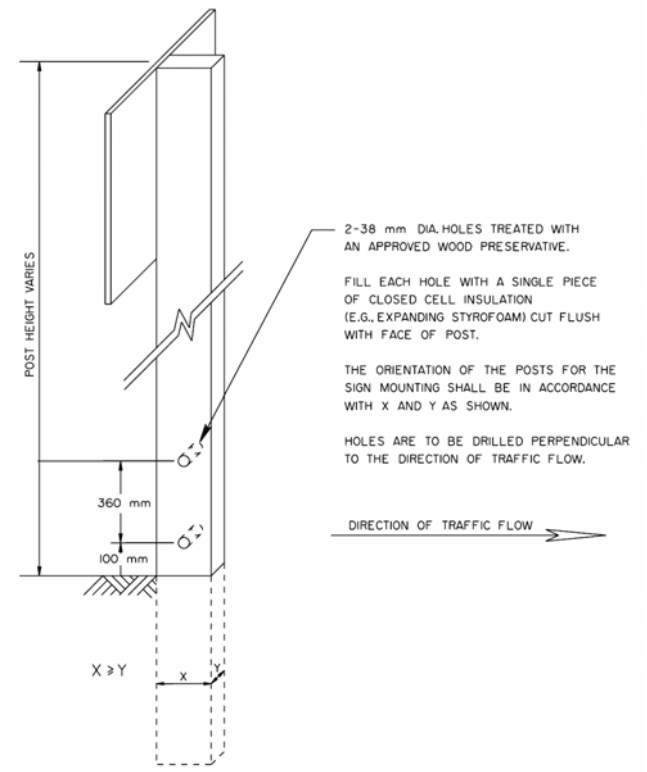
Wood posts with dimensions of 100 mm x 100 mm are considered frangible and do not require breakaway modifications.

The breakaway feature for wood posts with dimensions greater than 100 mm x 100 mm is required for posts located within the Clear Zone and desirable for posts located outside the Clear Zone within the roadway right of way. In order to satisfy the breakaway requirements, the breakaway feature can be achieved through the process of drilling two 38 mm diameter holes near the ground level perpendicular to the flow of traffic, and filled with expanding Styrofoam to prevent post deterioration. **Figure H8.4** illustrates the recommended placement of holes.

Signs located within the Clear Zone and requiring steel posts should include a breakaway feature or shielding by an approved longitudinal traffic barrier system. For steel I-beam, S-shaped, and wide flange posts, break-safe kits are used to achieve the breakaway feature for sign posts.

FIGURE H8.4 Breakaway Wood Post

Excerpt from Standard Drawing TEB 1.81



Longitudinal traffic barrier systems used to shield signs and sign posts located within the Clear Zone from errant vehicles should be located at a sufficient offset from the sign to accommodate the design deflection of the system. The Zone of Intrusion should also be considered for rigid systems.

Information on Zone of Intrusion is provided in **Section H5.4.4**.

H8.4 Overhead Signs

Supports for overhead sign structures may act as hazards to motorists and require careful planning at the design stage to ensure that the severity and probability of potential collisions are minimized, and should take into consideration the potential of the sign structure falling onto the roadway and resulting in secondary collisions.

One option is to locate the supports at or outside the Clear Zone. This generally increases the capital cost required for the overhead sign structure as a result of increasing the span length. The advantage of placing the supports at or outside the Clear Zone will be a decrease in collision probability.

An alternative option is to place the supports inside the Clear Zone and protect them with a barrier system. This will reduce the capital cost of the overhead sign structure but will increase costs due to the additional capital and maintenance required for the barrier system. A disadvantage of the barrier system is that it will act as a hazard itself and will result in an increased collision probability due to the proximity to the roadway and the increased length of hazard.

Analysis of each option to reach an economic balance between the capital costs of the overhead sign structure, the proposed barrier system (if provided), and collision costs associated with the design life of each option is desirable.

To standardize the offset of overhead sign supports relative to the roadway and to identify situations that require barrier systems, consider the following guidelines:

- Cantilever sign structures are typically more economical than bridge sign structures, based on life cycle costs over a period of 20 years or less.
- There are two general scenarios for positioning supports of overhead cantilever sign structures with or without barriers. These are represented on the standard drawings RDG-B7.4 and RDG-B7.5 in **Appendix B7**.
- Regardless of the roadway cross section, locate overhead sign supports on the right hand side of the driving lane (in the direction of travel) at or beyond the Clear Zone.
- The requirement of barrier protection of overhead sign supports in the median is dependent on the roadway cross section, slopes, offset, traffic volumes, speed and other factors.
- Where barrier protection is required, locate the barriers at or beyond the shy line offset.
- Where applicable, locate the overhead sign support, as a minimum, the design deflection distance from the outside face of the barrier. For rigid barriers, this minimum must also include the Zone of Intrusion distance (see **Section H5.4.4**).
- The Thrie Beam Bullnose barrier system is generally more economical than other barrier systems due to its relatively shorter Length of Need.

It should be noted that the placement of overhead sign structures is important for driver safety. Consider sight lines, decision distance, and road alignment to provide the motorists with sufficient time to read, interpret, and safely execute any manoeuvres required.

Additional Information on overhead sign structures may be found in Section 24 of the *Bridge Construction Specifications* on the INFTRA website.

H8.5 Illumination

This section provides basic information regarding the roadside design requirements associated with illumination. Review INFTRA's *Highway Lighting Guide* to ensure that the illumination design is in accordance with the requirements in that document.

H8.5.1 Conventional Lighting

Conventional lighting must be properly designed and carefully located to minimize hazards to the travelling public, whenever possible. If conventional lighting is needed, then locate it where it is least likely to be hit by an errant vehicle. Consider the pole locations to ensure that an errant vehicle will not be guided towards the poles.

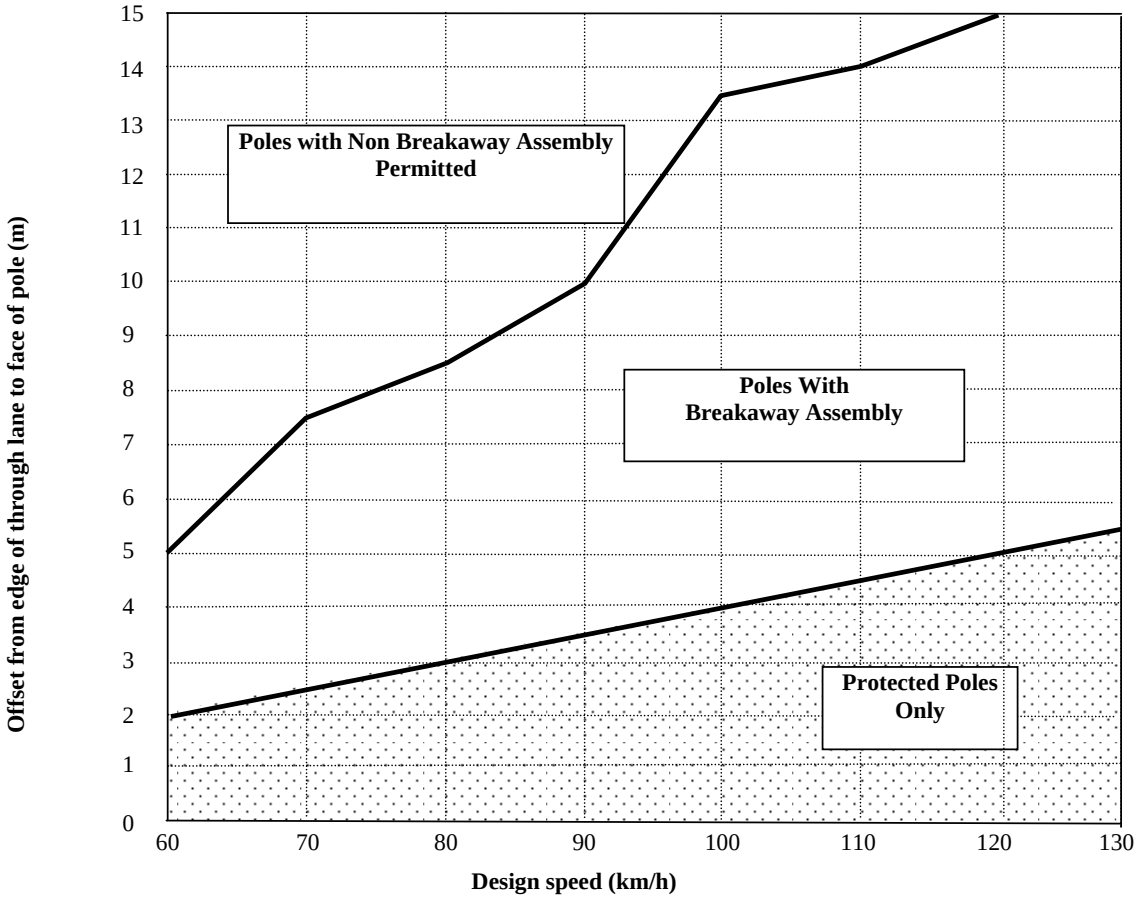
As a general guide, lighting should not be placed in the gore area of an interchange, immediately adjacent to or within the end treatment of a barrier system, or on top of a concrete barrier as they may be struck by commercial vehicles.

When providing illumination on horizontal curves, it is preferred that the light poles be placed on the inside of the curve where practical to minimize conflicts with run-off-road vehicles.

Light poles may either be breakaway or non-breakaway (rigid) types. The selection of the appropriate type depends on offset, application, presence of pedestrians, and design speed of the roadway.

Figure H8.5 provides the pole selection chart based on offset and design speed.

FIGURE H8.5 Conventional Lighting Pole Selection Chart



For more information on the selection of the appropriate pole type, refer to INFTRA's *Highway Lighting Guide*.

Breakaway poles are generally used on roadways with design speeds greater than 80 km/h and where pedestrians are not present.

Non-breakaway poles shall be located outside the Clear Zone or behind barrier systems.

Breakaway support mechanisms are designed to function primarily in shear condition when impacted at bumper height, typically about 500 mm above the ground. If impacted at a significantly higher location, the breakaway device may not be activated or provide the expected performance. For this reason, it is critical that breakaway supports are not located near ditches, on steep slopes, on rigid barriers, or at similar locations where a vehicle is likely to be partially airborne at the time of impact. In addition, soil type can also affect the performance of fracture type breakaway supports. If the support is placed in a weak soil (loose or saturated soil), the support may push into the soil and adversely affect the performance of the fracture mechanism. The use of fracture type breakaway supports in this soil condition may not be ideal.

Concrete pole bases should not protrude more than 100 mm above the ground.

If the appropriate strategy is to shield the supports or place the signs behind an existing barrier system, place the pole location beyond the design deflection of the barrier system and not immediately adjacent to the end treatment. If the pole cannot be placed beyond the design deflection of the barrier system, then provide localized stiffening of the system.

The Zone of Intrusion should be considered when placing light poles behind a rigid barrier system.

H8.5.2 High Mast Lighting

High mast lighting should either be:

- located outside of the Desirable Clear Zone width
- shielded by an appropriate barrier system. (The most forgiving barrier system that will serve the purpose is preferred)
- mounted behind concrete barriers and preferably be outside the Zone of Intrusion.

If the strategy is to shield high mast poles, place the pole location beyond the design deflection of the barrier system. If the pole cannot be placed beyond the design deflection of the barrier system, then provide localized stiffening of the system.

Consider the potential Zone of Intrusion behind any rigid systems by commercial vehicles in your design.

H8.6 Signal Poles

Supports for traffic signal poles are generally not the breakaway type because of the potential consequences of the loss of a signal at the intersection as well as the potential of the pole falling and causing additional damage. It is generally impractical to provide barrier protection around signal poles and therefore these obstacles must be accepted as unprotected hazards in close proximity to the roadway.

Place traffic signal poles on high speed roadways (greater than 80 km/h) as far away from the high speed travel lanes as practical.

H8.7 Utility Poles

The most desirable alternative is to bury the utility lines, whenever possible. However, given that utilities are generally privately-owned and cannot be directly controlled, and the relatively higher cost associated with providing buried utilities, the implementation of this strategy may not be possible.

As a result, the following strategies, listed in order of preference, should be used:

- place utility underground
- place utility outside of the Desirable Clear Zone width, typically at or near the right-of-way limit
- place utility behind existing barrier system
- use breakaway supports
- shield pole.

The use of breakaway supports may not be appropriate in urban areas or area with high pedestrian traffic where the falling sign or support may cause serious injuries to others. For operating speeds of 60 km/h or lower, barrier curb and gutter may provide adequate shielding for utility poles.

If the strategy is to shield the utility poles, place the pole location beyond the design deflection of the system and not immediately adjacent to the end treatment. If the pole cannot be placed beyond the design deflection limit of the system, then provide localized stiffening of the barrier system.

Consider the potential Zone of Intrusion behind any rigid systems by commercial vehicles in the design.

H8.8 References

The following documents were used during the development of this section:

Alberta Infrastructure and Transportation's *Highway Geometric Design Guide*, Edmonton, AB, 1999

Alberta Infrastructure and Transportation's *Highway Geometric Design Guide – Urban Supplement (Draft)*, Edmonton, AB, 2003

Alberta Infrastructure and Transportation's *Highway Guide Information Sign Manual*, October 2006

Alberta Infrastructure and Transportation's *Traffic Accommodation in Work Zones*, Edmonton, AB, 2001

Alberta Infrastructure and Transportation's *Traffic Accommodation in Work Zones – Urban Areas*, Edmonton, AB, 2003

Alberta Infrastructure and Transportation's *Traffic Control Standards Manual*, Edmonton, AB, 1995

American Association of State Highway and Transportation Officials, *Roadside Design Guide 2002*, Washington, DC, 2002.

Canadian Highway Bridge Design Code (CSA-S6-06)

Joint Cooperative Committee of the American Association of State Highway and Transportation Officials, American Road and Transportation Builders Association, and Associated General Contractors of America, *A Guide to Standardized Highway Barrier Hardware 1995*