

**DESIGN BULLETIN #7/2002****Guidelines for Establishment of No Passing Zones**

**Summary:** This technical bulletin is being issued to clarify some points in regard to Alberta Transportation's current policy on establishment of no passing zones on two-lane or three-lane undivided highways. The bulletin is effective immediately. The department's practices are due to be reviewed some time in the near future and a new document may be issued at the conclusion of the review. The subjects covered by this bulletin are as follows:

1. No Passing Zones on Undivided Highways
2. Design Considerations Regarding No Passing Zones
3. Establishment of Beginning and End of Solid Lines in the Field
4. Responsibilities of Engineering Consultants
  - a. During Design Stage
  - b. During Construction Stage
5. Reference Documents
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**1. No Passing Zones on Undivided Highways**

Alberta Transportation's current practice is to establish no passing zones on two-lane or three-lane undivided highways where passing must be prohibited because of restricted sight distance or other hazardous conditions on horizontal and vertical curves.

On a two-lane highway, a no passing zone is indicated by a solid yellow line for the direction in which passing is not permitted. The directional dividing line may be a double solid yellow line where no-passing zones apply in both directions, or a simultaneous solid and broken yellow line where no passing applies in only one direction.

On a three-lane highway where there are two lanes in one direction and one lane in the other direction, the department's practice is to use double solid yellow lines as the directional dividing line if the existing AADT exceeds 4000. If the existing AADT is less than 4000, a simultaneous solid and broken yellow line may be used to allow passing in the single lane direction if sufficient sight distance is available. (For further details, please refer to Design Bulletin # 3/2001)

An illustration of these no passing pavement markings on a two-lane highway (or, sometimes referred to as, barrier lines) can be found in Figures TCS-C-2.04 and TCS-C-2.05 attached.

## **2. Design Considerations Regarding No Passing Zones**

No passing zones shall be established where the minimum sight distance for the speed limit is equal to or less than the non-striping sight distance outlined in Section B.2.5 of the Highway Geometric Design Guide (1999 Edition). The non-striping sight distance for each design speed is substantially shorter than the corresponding passing sight distance, but it will still allow sufficient time for a passing vehicle to safely abort the passing operation if an oncoming vehicle appears at the critical moment. Alberta uses an eye height and object height of 1.15m in the non-striping sight distance model.

During design of new highways, efforts should be made to achieve at least minimum non-striping sight distance on the flatter crest curves to maximize passing opportunities and consequently improve the level of service. This is especially important on higher volume highways in rolling terrain.

In general, designers should strive to achieve at least 75 percent of the length of a highway as barrier-free. Higher percentages are desirable on higher volume roads. It should also be borne in mind that barrier lines are used at intersections and climbing/passing lanes even where there is no sight line restriction.

Distances immediately above the minimum non-striping sight distance values may cause a false feeling of safety for passing because of the absence of barrier lines. On the other hand, frequent barrier lines are likely to appear unreasonable to drivers and may be ignored. It is, therefore, important that sight distances only slightly greater than the non-striping values be increased as much as economically possible. Furthermore, designers should exercise engineering judgement to increase the length of barrier lines where appropriate to take into account steep upgrades, severe hazards, complex combinations of geometric features, etc. All these should be done with careful considerations of the implications on the level of service for the highway under design.

In situations where it is not feasible to provide the non-striping sight distance, it may be desirable to reduce the length of vertical curve to approach the stopping sight distance. This accomplishes three things: it shortens the total length of the no passing zone, it may make the restrictive marking appear more reasonable to the driver, and it may provide a more economical design. Where passing opportunities are limited, designers should assess the passing demand to determine if the construction of climbing/passing lanes is appropriate. This is especially true on new construction type projects.

For all provincial highways, Alberta currently installs barrier lines where the sight distance is equal to or less than 425m. The department plans to review in the near future the need to adjust the 425m sight distance used for the establishment of no-passing zones, but before the review is finalized, the minimum sight distance of 425m for establishment of no passing zones still applies.

### 3. Establishment of Beginning and End of Solid Lines in the Field

Sight distance for establishment of no passing zones on a vertical curve is the distance at which an object 1.15m above the pavement surface can just be seen from another point 1.15m above the pavement. Similarly, sight distance for establishment of no passing zones on a horizontal curve is the distance measured along the centreline of the roadway (or the centreline of the right lane of a three-lane highway) between two points 1.15m above the pavement on a line tangent to any obstruction that cuts off the view on the inside of the curve. This approximates the distance traveled by the vehicle along the lane. The beginning of a no passing zone (Ab and Bb in the attached Figure TCS-C-2.06) is where the available sight distance first becomes less than 425m for the direction of travel being considered. The end of the zone (Ae and Be in the attached Figure TCS-C-2.06) is where the available sight distance again becomes greater than 425m for the same direction of travel.

The resulting solid line should not be less than 100m in length. If the actual no passing distance is less than 100m in length, the solid line should be extended to 100m in length with the additional length added at the beginning of the no passing zone.

If a passing zone is less than 100m long between two no passing zones, then the no passing zone should be continuous throughout the entire length.

The detailed method of establishing the beginning and end of solid lines for no passing zones on vertical curves illustrated in the attached Figure TCS-C-2.06 is described below:

**Step 1:** Commencing on the upgrade side of the curve (i.e. travelling eastbound as shown in the Figure), workers A and B pull the line taut with A sighting through the slot peephole in his target at frequent intervals to see B's target. At the point where the centre of B's target just drops out of sight, A marks a "T" at point Ab, as shown in the Figure. Immediately afterwards, B takes a look through the slot peephole in his target to make sure that A's target is still visible and marks a "T" at point Be, as shown in the Figure.

**Step 2:** A and B continue over the vertical curve with A sighting B's target until the centre of B's target becomes just visible to A. A then marks a "T" at point Ae, as shown in the Figure. Immediately afterwards, B takes a look through the slot peephole in his target to make sure that A's target is still visible and marks a "T" at point Bb, as shown in the Figure.

**Step 3:** The application of solid lines for no passing zones on successive vertical curves (or successive horizontal curves) and the method of establishing them in the field is shown in the attached Figure TCS-C-2.07. Care must be taken to check the sight distance available and to verify the start and end points of barrier lines accordingly. The checking procedure must ensure that 1150mm target is visible in the subject direction for the entire 425m from any point 1150mm above a broken line. The checking procedure is required to eliminate "hidden dips" or other blind spots.

## **4. Responsibilities of Engineering Consultants**

### **a. During Design Stage**

During design, the Consultant shall strive to achieve highly cost-effective designs while providing the standards that are appropriate for the highway according to the current edition of the "Highway Geometric Design Guide". Pavement marking requirements for all no passing zones should be shown in the relevant documents with the approximate locations of the termini of the no passing zones derived from designed horizontal alignment and vertical profile using the appropriate designed speed and sight distance.

### **b. During Construction Stage**

On new construction projects, after paving is complete, the Consultant is required to set out the beginning and end points of solid lines for no passing zones using the method described in Section 3 above so that the contractor can paint the lines accordingly. If the Consultant believes that there is a more cost-effective method of setting out the beginning and end points of the solid lines, he should submit a detailed written proposal to the Project Sponsor outlining the proposed method and the advantages and cost savings for adopting such an alternative method. However, the alternative method must not be used until written approval is received from the Project Sponsor.

It has been noticed in the past that, in many cases, barrier lines were simply re-painted at the same locations after pavement installation or completion of overlays / seal coating without actually checking the sight distance in the field. This practice is not acceptable to the department and should not be followed on future projects.

On pavement overlay projects the Contractor is required to record the limits of existing no passing zones and provide this information to the Consultant as outlined in Specification 1.2.30 Preservation of Traffic Markings of the Standard Specifications for Highway Construction. The Consultant is to confirm the correctness of the existing no passing zones following the procedures outlined in this Design Bulletin. If changes to the existing limits are required the Consultant is to provide the revised limits to the Contractor prior to the lines being repainted. If no changes are required the Contractor is to reinstate the no passing zone limits at the same stations.

After painting has been completed, on all types of construction projects, the Consultant is to confirm that the proper paint and message markings have been placed at the correct locations and to the specified dimensions.

## 5. Reference Documents

The following documents contain relevant information regarding no passing zones and should be referred to for further details when required:

- i. Highway Geometric Design Guide (1999 Edition)
- ii. Alberta Highway Pavement Marking Guide (September 1999 Edition)
- iii. Engineering Consultant Guidelines for Highway and Bridge Projects (2002 Edition)
- iv. Manual of Uniform Traffic Control Devices for Canada (Fourth Edition)
- v. Standard Specifications for Highway Construction (Latest Edition)

## 6. Contact

Any questions on this Design Bulletin should be directed to Technical Standards Branch (Attention: Bill Kenny or Peter Mah, fax (780) 422-2846).

## 7. Attachments

These drawings supersede the ones with the same number in the Alberta Highway Pavement Marking Guide (September 1999 Edition).

Figure TCS-C-2.04:

<http://www.transportation.alberta.ca/Content/docType233/Production/TSCC204.pdf>

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Figure TCS-C-2.06

<http://www.transportation.alberta.ca/Content/docType233/Production/TSCC204.pdf>

Figure TCS-C-2.07

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