

Suggested Restrictions for Australian Slip Base Sign Posts

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There is a considerable amount of evidence that slip base posts don't work as designed in certain applications. These include on filled slopes and where a post may be hit by a vehicle at an angle outside the design parameters of the post. Road Safety Barriers are assessed and limitations are placed on their installations. Some restraints placed on barrier installations include the batter must be less than 1:10 and the barrier must be at least 200mm behind the face of a kerb. A similar process should be used for sign supports.

Most slip base posts seem to be derived from the AASHTO Roadside Design Guide criteria. The Austroads report AP-R200 "Frangible Sign Supports Part 2: State of the Art Review" Section 3: International Practice and Literature Review 3.1.1 AASHTO Roadside Design Guide states "The guide discusses location of signs to minimise the risk of the support being struck. The mechanism of failure is dependent to some extent on what height the vehicle strikes the support.

For this reason the likely impact position may be affected when locating supports on slopes. Where possible the supports should be located on level terrain."

AP-R200 section 2.9 also reported discussions with representatives from each state. Responses included "Concern that if a sign is not struck at the normal height (eg flat approach) that the sign will not fail properly. This may be as a result of a vehicle striking a kerb, or travelling out of control

down an embankment". There are two problems here. One is that hitting the sign high means uncertainty whether the slip base will function. The other problem is if the slip base does function and if the hinge point functions there is still a heavy steel post behind the sign. There is a chance of the steel post penetrating the windscreen and entering the cabin of the vehicle. This would apply particularly for high vehicles like trucks. Anywhere that a car is likely to become airborne is a location that slip base posts should not be used.

AP-R200 section 2.9 reported another concern; "Frangible signs at intersections are difficult to cater for, with the possibility of the sign being struck from almost any direction". This is a problem with slip base posts. They have been designed to be hit from the front or back, but not from the side. Truly frangible supports will absorb the energy of the impact no matter where they are hit.

Austroads publication AP-T47 06 Revision of Guide to Engineering Practice - Part 8 - Traffic Control Devices 5.2.3 Large Supports when describing slip base posts warns "However they are designed for impact up to a limited angle and may not perform as intended if struck from the side."

AP-T47 06 5.5 Installation and maintenance issues for frangible supports states "The following aspects are critical to the successful behaviour of a frangible sign support:

- Base bolts must be installed and maintained at the tension specified on drawings or in specifications
- The frangible mechanism must be installed at the correct height above the ground surface. If it is too low the surrounding surface may impede the correct operation of the slip base, and if it is too high an impacting vehicle will snag on that part of the base that remains in place
- The ground level around the base plate must be compacted and finished so that it remains at the correct level relative to the slip base, debris will not build up around the base, and the soil will not erode from around the base
- Hinges should be installed strictly in accordance with drawings and should not be modified (e.g. by welding) for any purpose as part of maintenance operations.

AP-T47 06 5.2.2 Small Supports states "... it is important that the spacing between posts is such that an errant vehicle is likely to only collide with one of the posts. Opinion varies on the spacing, a value in the range 1.5m to 2.4m being adopted."

AP-T47 06 5.6 Frangible post selection guidelines states "In selecting post numbers and sizes the:

- Smallest possible number of posts should be used
- Distance between posts should not be less than 1.6 metres to avoid the risk of an errant car simultaneously striking more than one post



We submit to you that although steel slip base posts are infinitely safer than rigid posts, they do have limitations in their applications. We believe the following limitations should be applied to the use of slip base posts immediately.

1. Slip base posts be banned from filled batters of 1:3 or greater or where the base plate will be more than 400mm below the road level. This is a Danish regulation, Norwegian Road Authority specifies batters steeper than 1:4. The Norwegian specification should be adopted by January 1, 2012
2. Slip base posts be banned from gore areas as the GE2-3 exit signs are (a) likely to be hit, (b) likely to be hit at an angle greater than the design parameter of the slip base post, (c) the post is likely to finish up on a roadway, and (d) a vehicle is likely to hit more than one post simultaneously as the signs are 1.8m wide giving a standard post spacing of 1.08m (1.8 x 0.6).
3. Height of stubs above ground of existing installations should be checked and any rectification works to be completed within 12 months.
4. Torque settings of bolts on existing installations should be checked every 3 months for at least one year, until it is evident that the torque is not changing.
5. Installers are to be liable for checking and maintaining torque settings for 5 years from installation. This is to be introduced after an Approved Sign Installer program is initiated. The price of this checking is to be included in the initial installation price. Records of torque settings to be presented to the Approved Installer Program administrator.
6. Slip base posts to be banned where it is likely that a vehicle will hit the sign from an angle other than the design angle. This includes within 60m of an intersection.
7. Slip base posts to be banned where there is kerbing.

Points 1 to 6 can be avoided by using an approved energy absorbent post. A post may be considered energy absorbent if it meets the requirements of NCHRP 350 or EN 12767 and has a failure mechanism which does not rely on a slip base. It must function when struck from any direction. Full crash test reports to either standard must be supplied to Queensland Main Roads. The full scale crash test must use a vehicle as specified in the standard. Computer simulations will not be accepted unless the largest and smallest posts in a "family" of posts have been successfully full scale crash tested. The structural requirements must be satisfied by showing compliance with AS1170.2 2002 - Structural Design Actions - Wind Actions and a relevant



Australian Standard. This compliance must be from an independent Australian certified Structural Engineer. Foundation sizes are the responsibility of the manufacturer / supplier. It is suggested that these are designed an independent Australian certified Structural Engineer.

Also the following restrictions should be placed on all posts.

Unless protected by a barrier which is there for another purpose, no posts may be installed with less than 1.5m between the posts. Note: Minimum centre to centre of posts is 1.5m plus one post diameter. Hitting 2 x 50NB posts is the same as hitting 1 x 100NB post.



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