

technical memorandum

road safety hardware series



Using low strength concrete around guardrail posts

TM-2005

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Purpose

To advise on the recommended practice for using low strength concrete around timber guardrail posts that are installed in hard surfaces such as concrete footpaths. Refer to manufacturer for details for posts associated with proprietary semi-rigid guardrail systems.

Background

Vegetation around road safety barrier posts can be difficult to maintain. Providing a hard surface around the posts eliminates the need to maintain vegetation, but can potentially limit the performance of the barrier system. Additionally, there may occasions when the posts are to be installed on a concrete footpath, similar to the detail shown in Figure 1.

While these types of treatments are generally restricted to low speed urban environments, the provision of a traditional full depth and full strength surface treatment around the posts may limit the performance of the barrier system. Under these conditions the impacted post will not be able to properly rotate backwards before shearing. This increases the stiffness of the barrier which could lead to snagging or pocketing and, ultimately, rupture or override of the barrier.

The source reference for treatment of hard surfaces around guardrail posts is a memorandum published by the Federal Highway Administration "W-Beam Guardrail Installations in Rock and in Mowing Strips" (ref: HSA-10/B64-B) in March 2004, which can be downloaded [here](#).



Figure 1

Full strength concrete strips can limit barrier performance

Recommended practice

The recommended treatment involves the provision of a low strength concrete fill around the posts to allow appropriate post rotation during impact. The required treatment area is proportional to the dimensions of the post and is referred to herein as a "post rotation area".

The FHWA memorandum advises that road safety barrier post performance was unimpaired with appropriate treatment of a post rotation area around the post. This treatment applies to either timber or steel posts, as

the barrier performance is a combination of the steel barrier ribbon strength and the lateral resistance of the posts as they rotate away from the road.

The post rotation area for a one sided barrier installation comprises a square measuring at least three times the width of the post, measured parallel to the barrier face, and 150mm deep.

The post should be positioned one post depth away from the back of the post rotation area, measured perpendicular to the barrier face.

The post rotation area should be filled with a grout mixture with a recipe by volume of 7 parts sand, 2 parts water and 0.5 parts cement. The compressive strength should be about 1MPa. It must not be a concrete mix (i.e. no graded aggregate composition), but rather a uniform sand and cement matrix to be effective.

For a standard NZ timber post, which is 150mm wide by 200mm deep (i.e. perpendicular to the rail), the post rotation area should be 450mm square (i.e. 3 times the post width of 150mm) and 150mm deep. The post should be positioned one post depth of 200mm away from the rear of the post rotation area to enable post rotation. Any closer will limit rotation and increase the stiffness of the barrier system. The same principle applies for determining the appropriate treatment area when using steel posts.

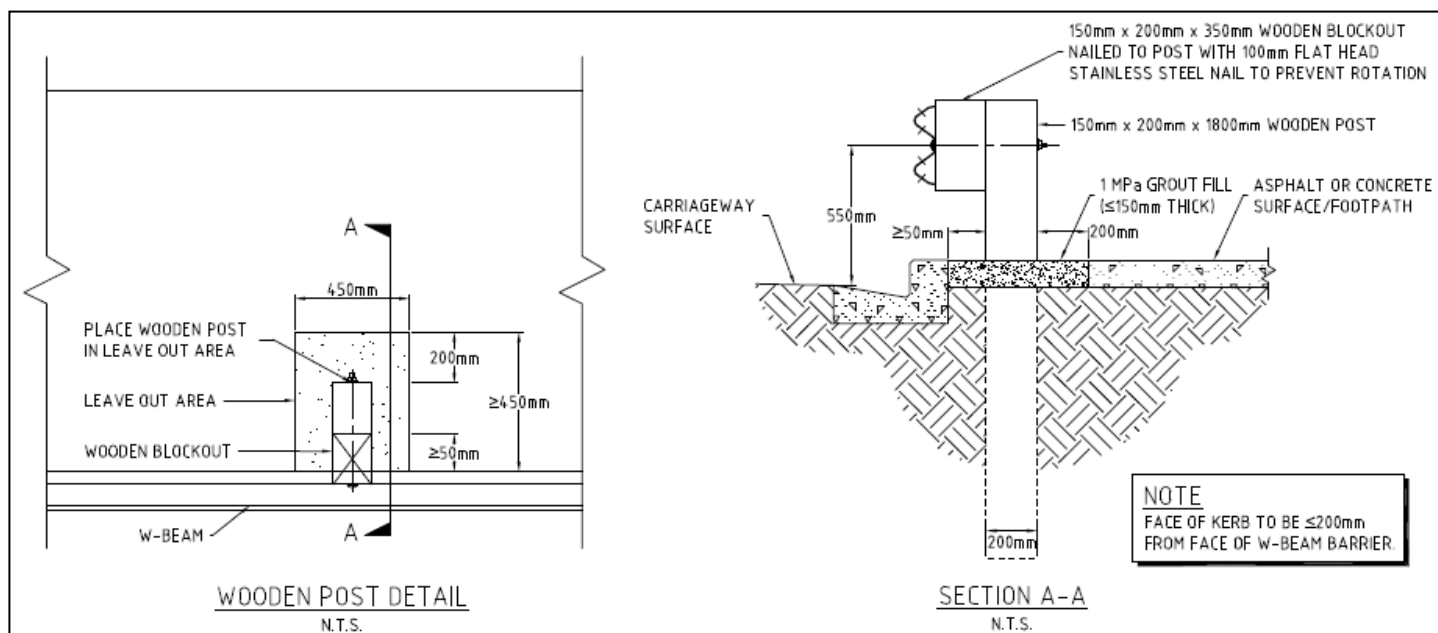


Figure 2 Recommended installation of post rotation area around guardrail posts in hard surfaces

The dimensions of the post rotation area for a median application is 600mm deep (i.e. perpendicular to the rails) and 450mm wide given that the post, with a depth of 200mm, should be no closer than 200mm from either back side of the post rotation area.

This treatment has the added advantage of enabling an easier post replacement and surface repair than that for extracting a broken stub locked in full depth concrete.

Endorsed by: National Manager Traffic & Safety