

technical memorandum



road safety hardware series

Curved W-Beam Guardrail Terminal

TM-2008

January 2014

Purpose

To advise on the recommended practice for the design and installation of a curved W-Beam guardrail terminal for radii between 5m, 10m, 15m, 20m and 25m. This design has been developed from crash tested systems and is acceptable for new installations, as well as for improving safety at existing sites. These designs are most appropriate for use on low volume highways.

Note:

1. The standard detail in Figure 1 is applicable to non-proprietary timber post semi-rigid W-Beam barrier systems only. For proprietary semi-rigid guardrail systems, refer to the manufacturer to confirm if equivalent NZ Transport Agency accepted details are available.
2. This technical memorandum including Figure 1 is to be used on NZ state highways in preference to Austroads Guide to Road Design Part 6, Appendix L Figures L1 and L2.

Background

Side roads or driveways commonly intersect a highway close to the end of a bridge or other immovable, restrictive feature. To shield both the end of the bridge and the steep embankment, a strong post W-beam guardrail curved around the radius is typically used. Often, these installations have not been effective when the curved section of the barrier has been hit at higher speeds. A vehicle which impacts the barrier under such conditions will generally vault over or penetrate the guardrail; or, in the event that the vehicle is contained by the guardrail, the resulting decelerating forces often exceed the recommended limits for occupant safety.

In many of these situations, it is not practical to change the site conditions by relocating the intersecting roadway further away from the bridge end in order to allow room for a standard approach guardrail. Therefore, a curved guardrail installation which would substantially improve the safety at these sites is required.

Research undertaken by Washington State Department of Transportation and the Federal Highway Administration (FHWA) has resulted in improved curved guardrail designs from which the NZ Transport Agency Curved Guardrail Terminal has been developed for sites where through routes are intersected by low-speed, low-volume roads, driveways, or farm accesses.

The FHWA technical advice may be read here:

http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/barriers/techadvs/t504032.cfm

Recommended practice

- The Curved Guardrail Terminal is to be installed as detailed on NZ Transport Agency Standard Drawing RSB-2 as shown in Figure 1 below. There is a related variation for continuous guardrail installations where the radius is less than 25m (refer drawing RSB-2A)
- Factory (or “shop”) curved W-Beam guardrail is to be used for all curved guardrail elements.
- Sight distances must be maintained in accordance with the Austroads Guide to Road Design.
- A minimum clear area of 22m X 6m with a maximum slope of 6H:1V is to be provided behind the curved rail. A substandard area requires the approval of the Road Controlling Authority. For State highways this is the NZTA Regional Safety Engineer.
- The rail at the apex posts is not bolted through, but sits on shelf angles to maintain the correct height.
- The approach grading is 10H:1V or flatter, and is to be maintained free of obstructions.
- **Where the approach speed on the side road is exceeds 70km/h, accepted Test Level 3 end terminals should be installed where practicable.**

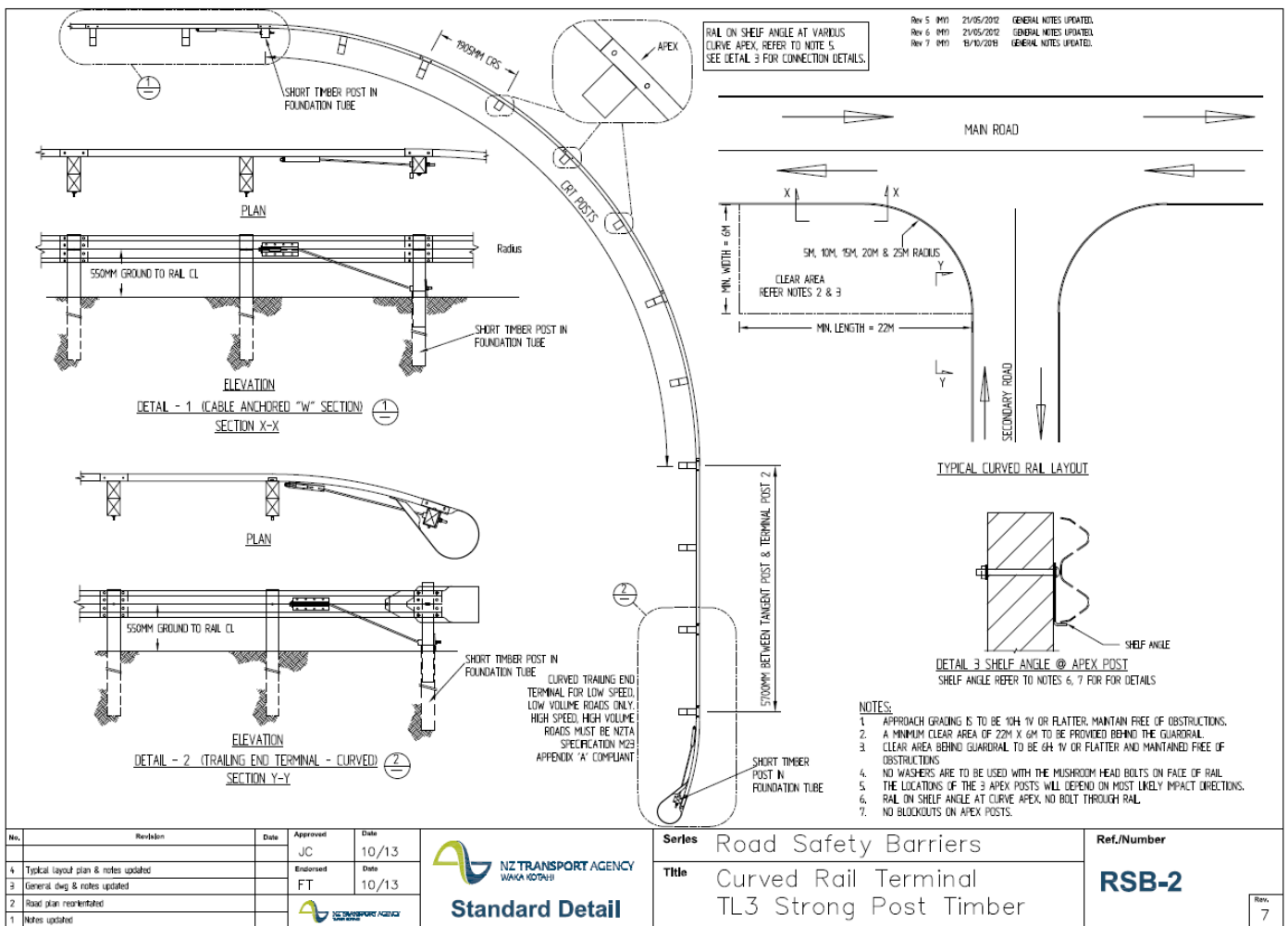


Figure 1 - NZTA Accepted Detail for Curved W-Beam Guardrail Terminal (on Timber Posts)

The accepted details are available for download from the NZ Transport Agency website as NZTA Standard Drawings RSB-2 and RSB-2A). See www.nzta.govt.nz/network/technical/hardware/drawings.html

Endorsed by: National Manager Traffic & Safety