Austroads Safety Barrier Assessment Panel – Technical Advice

Transition in barrier heights

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Preamble

When two barrier systems meet, with different stiffnesses or heights, there needs to be a transition between the two systems.

The purpose of this Technical Advice is to provide commentary and assist in developing a harmonised approach by Road Agencies.

Audience

- Road Agencies

Commentary

AASHTO (2011) has specified the length of a transition to accommodate a change of stiffness. It states:

> "The transition section should be long enough so that significant changes in deflection do not occur within a short distance. Generally, the transition length should be 10 to 12 times the difference in the lateral deflection of the two systems in question."

For changes in height, the literature is less definitive. When discussing the use of the Tall Wall barrier, AASHTO states that *"the barrier height should be vertically transitioned, on a 10:1 slope [5.8°]"*.

Rosenbaugh et al (2018) stated:

> "Thus, to match the height of adjacent TL-4 bridge rails, the height of the standardized buttress was transitioned from 32 in. up to 36 in. utilizing a 6:1 vertical slope beginning at the upstream end of the buttress."

This produces a ramp at 9.5°.

A memorandum from the US Federal Highway Administration (FHWA, 2010) included frequently asked questions and stated:

> **"Q: HOW DO WE HANDLE THE HEIGHT TRANSITION BETWEEN G4(1S) AND MGS AND THEIR TERMINALS?**
>
> A: You should transition from a 27-3/4 inch tall barrier or terminal to a 31-inch tall barrier over the span of two 12-foot, 6-inch pieces of w-beam rail."

This produces a ramp at 0.6°. This is most likely to ensure the barrier's aesthetics are maintained. A steeper ramp could be visually jarring.

A symmetrical W-beam to thrie beam transition piece increase the height by 90 mm over 1658 mm. That is at an angle of 3.1°

Recommendations

In Australia and New Zealand, the standard w-beam length is 4m, therefore, it is recommended that the height of W-beam barriers should be adjusted over a minimum of two full lengths of guardrail for height differences of up to 200 mm. This equates to a maximum angle of 1.4°.

Transition in barrier heights

For changes in height of concrete barriers, it is recommended that the AASHTO (2011) requirement be used and the top of the barrier be ramped upwards at 1 on 10 or 5.8°.

References

AASHTO 2011, Roadside Design Guide; Fourth Edition, American Association of State Highways and Transportation Officials, Washington, D.C

Federal Highway Administration (FHWA) Memorandum from Michael S Griffith, Director of Safety Technologies to Division Administrators. Dated November 3, 2010.

Rosenbaugh, SK, Schmidt, JD & Faller, RK 2018, Development of a Standardized Buttress for Approach Guardrail Transitions. Transportation Research Record: Journal of the Transportation Research Board, Volume 2672, pp41-51. Transportation Research Board, Washington DC.