Technical Direction

Bridge

BTD 2011/05 Rev 1 | RMS 18.1096 – 12 November 2018

Minimum Restraint Requirements for Superstructures

Summary:	Audience:
This bridge technical direction sets design requirements to prevent dislodgment of bridge superstructures in the event of over-height vehicle impact.	• Designers • Regional Managers • Motorway Managers • Project Managers • Industry Partners

Background

In 2009 the superstructure of an RMS pedestrian bridge at Maitland was dislodged from its supports and collapsed onto the highway due to the impact from an over-height vehicle.

This bridge superstructure had adequate lateral restraint but insufficient vertical restraint at its supports to resist the impact force from the over-height vehicle.

As a result of this bridge collapse, the first version of this bridge technical direction was issued to minimise the risk of bridge superstructures being dislodged in the event of over-height vehicle impact. It required that new bridges be designed to provide minimum vertical restraint to superstructures and mandated a minimum vertical clearance of 5.5 m for all pedestrian, cycleway and shared path bridges.

Information

The restraint requirements in the earlier version of this bridge technical direction were based on the UK Highway Agency Design Manual for Roads and Bridges Part BD 60/04 (May 2004), in the absence of any

Approvals:

Owner:	Wije Ariyaratne Director Bridges and Structures	**Review Date:**	7 November 2023
Authorised by:	Chris Harrison Director of Engineering	**Effective Date:**	25 March 2011 (1st issue) 7 November 2018 (Rev 1)

vertical restraint requirement in AS 5100:2004 *Bridge design*. In the earlier version of the BTD, the superstructure supports were required to resist a force of 500 kN acting at any inclination between horizontal and (upward) vertical, concurrent with the minimum permanent vertical load multiplied by a factor of 0.75.

This revision of the bridge technical direction accords with the amended minimum restraint requirements in AS(AS/NZS) 5100:2017.

Bridge Technical Direction

This bridge technical direction applies to the design of new RMS bridges and bridges that will become the property of RMS, over roads, railway lines and waterways.

Restraint system between the superstructure and the substructure must meet the greater of the minimum restraint requirements in Clause 10 of AS 5100.2:2017 and other requirements specified in AS(AS/NZS)5100.

A load factor of 0.75 must apply to the minimum permanent (downward) vertical loads concurrent with the upward force of 500 kN specified in Clause 10 of AS 5100.2.

Unless approved otherwise by the Director Bridges & Structures, the upward force described above and the 500 kN horizontal force specified in Clause 10 of AS 5100.2 must apply to bridges crossing low flood velocity creeks or gullies.

The load path for the transfer of both the horizontal and vertical restraint forces to the substructure must be determined and the bearings, restraint, substructure and foundations designed accordingly.

Separate restraint systems must be provided to resist each of the horizontal and upward forces.

The minimum vertical clearance specified in Table 13.7 of AS 5100.1:2017 applies to all pedestrian, cycleway and shared path bridges, except that it must not be less than 5.5 m over the road carriageway unless approved otherwise by the Director Bridges & Structures.

References:

AS(AS/NZS) 5100	*Bridge design*
AS 5100.1	*Scope and general principles*
AS 5100.2	*Design* loads

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