

Information Sheet

Tier 2 and 3 Masses for Performance Based Standards (PBS) Vehicles

Purpose

The purpose of this document is to describe different tiers (levels) of PBS bridge assessments. There are three tiers applicable to PBS vehicles.

The purpose of bridge assessment is to determine whether the load effects of a vehicle are acceptable to the bridge owner.

What is PBS?

PBS is a performance based scheme that provides an alternative to the traditional method of regulating heavy vehicles. It involves engineering assessment against sixteen safety standards and four infrastructure standards and offers the heavy vehicle industry the potential to achieve higher productivity and safety through innovative and optimised vehicle design.

The PBS scheme is designed to facilitate productive, safe and sustainable outcomes for heavy vehicle road access. PBS vehicles operate on networks matched to their performance level. The basic principle of PBS is matching the right vehicles to the right tasks.

PBS focusses on the performance of a heavy vehicle and how that performance can be matched to the available infrastructure. PBS vehicles are tested against sixteen safety standards and four infrastructure standards to ensure they fit the existing road network and are safe.

PBS vehicles fall into one of four levels, and have corresponding levels of road networks to which they have access. There are instances where vehicles could be approved for more than one PBS level due to it's performance under varied loading scenarios. The **NHVR PBS Vehicle Configurations Chart** is downloadable from the NHVR's [website](#).

Summary of PBS Levels

The PBS levels are summarised in Table 1 below:

Table 1 PBS Levels and length

Vehicle Performance Level	Network Access by Vehicle Length, L (m)	
	Access Class 'A'	Access Class 'B'
Level 1	L ≤ 20 (General Access)	
Level 2	L ≤ 20	26 < L ≤ 20
Level 3	L ≤ 36.5	36.5 < L ≤ 42
Level 4	L ≤ 53.5	53.5 < L ≤ 60

Bridge Assessment Tiers

The effects caused by a PBS vehicle on any bridge on the route/network requested, will be limited by either of the following methods or 'tiers' (note that each successive tier may allow greater gross mass and may reduce the extend of network access)

The PBS bridge standards ensure load effects of PBS vehicles are matched to bridge capacity.

Tables 2 to 4 below summarise the bridge assessment tiers outlined in the *PBS Scheme – The Standards and Vehicle Assessment Rules*.

Tier 1

Table 2 Tier 1 bridge assessment

Tier 1 – General Access or Restricted Access	
✓ Low risk with network access	
<i>Definition</i>	Must meet the bridge formulae relevant to network access.
<i>Requirements</i>	Assessors must demonstrate that proposed vehicle designs satisfy the appropriate bridge formulae.

Table 3 below outlines the different bridge formula.

Table 3 ASMS Bridge Formula (Tier 1)

Type of access	PBS route classification	Bridge formula	Restrictions
General access	Level 1	$M = 3L + 12.5$	$M \leq 42.5 \text{ t}$
		$M = L + 32.5$	$M \geq 42.5 \text{ t}$
B-double Network	Level 2	$M = 3L + 12.5$	$M \leq 46.5 \text{ t}$
		$M = 1.5L + 29.5$	$M \geq 46.5 \text{ t}$
Road Train Network	Level 3 and 4	$M = 3L + 12.5$	for all M

L (m) is the minimum distance between the extreme axles of any combination of axle groups, for a given total gross mass M (tonnes).

Note:

The tier 1 bridge formulae are presented in tabular format in the 'Axle Tables' in Schedule 1 of the *Heavy Vehicle (Mass, Dimension and Loading) National Regulation* (MDL Regulation) for corresponding prescriptive combinations.

Tier 2

Table 4 Tier 2 bridge assessment

Tier 2 – General Access or Restricted Access	
✓ Medium Risk with limited network access	
Definition	Must not cause more effects than those caused by existing commercial vehicles acceptable to the bridge owner.
Requirements	<p>Assessment must be undertaken by a prequalified bridge engineer. The engineer must demonstrate that the vehicle will not cause bridge effects that exceed acceptable limits for the bridges on the network/route/link proposed for use by the vehicle.</p> <p>This can be done by comparing subject PBS vehicles to reference vehicles (e.g. Austroads or prescriptive vehicles operating on specific networks).</p>

Tier 3

Table 5 Tier 3 bridge assessment

Tier 3 – Specific Link Access	
✓ High risk and route specific	
Definition	Approval by the owners of the bridges to use all of the bridges on a specific link based on detailed individual bridge assessment.
Requirements	This assessment should be undertaken by the bridge owner. Some authorities may be prepared to accept assessment by a prequalified bridge engineer using the authorities' bridge data.

Note:

Quad axles on PBS vehicles may be up to 27t. This is known as the quad axle limit (QML).

Road managers may require tier 3 bridge assessment at GML masses, including masses above 21t on the quad axle group.

PBS bridge assessment

As part of the PBS application, PBS vehicles are assessed against the tier 1 bridge formulae in Table 3. If the PBS vehicle does not meet the Tier 1 bridge formula, the PBS Vehicle Approval will state PBS tier 2 or 3 (or a combination of both).

This tier dictates the level of assessment required for the road manager on the requested route.

Worked Example – 8 axle B-double

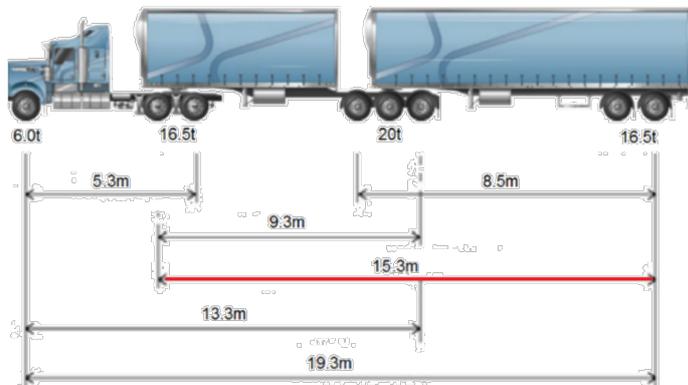


Figure 1 8-Axle B-double

Figure 1 above illustrates an example of a PBS vehicle not meeting the relevant bridge formula. In Figure 1, the axle spacing for a tandem axle group is 1.32m and the tri-axle group is 2.5m (not illustrated).

For axles 2 to 8, the total axle group mass requested is 53t.

Using $M = 1.5L + 29.5$ (from Table 3)

'L' is the distance from axles 2 to 8.

$L = 15.3m$

$M = 1.5(15.3) + 29.5$

$M = 52.45 \text{ tonnes}$

Therefore, the vehicle in Figure 1 does not meet the bridge formula as we are requesting 53t when the capable mass for axles 2 to 8 is only 52.45t. The bridge formulae calculation is applied for all axle group combinations in the combination.

Through the PBS process, when VA is issued it would state Tier 3 to operate at full mass, in this case 59.5t GML, 61.5t CML and 63t HML.

If the example in Figure 1 operated at reduced mass, the vehicle may pass the bridge formula on all axles, which would result in the VA stating Tier 1. Also if the spacing between axles 2 to 8 was increased, the capable mass could be up to 53 tonnes.

The axle spacing's in Figure 1 are example only.

Access Arrangements

Permit Applications

When applying for a permit, road managers may request additional time to assess infrastructure (e.g. bridges) dependent on the mass and bridge assessment tier applicable.

Road managers are required to do a comprehensive bridge assessment for tier 3 prior to granting access.

It is important to note that state, territory and local governments may have different procedures and policies regarding bridge assessments.

For example, state departments may request an extension of time to assess the structural effects of PBS vehicles.

In addition, road managers may request payment for undertaking route assessment.

For additional information on permit applications, please refer to the information sheet titled '[PBS Permit Applications – Tier 3](#)' that outlines the requirements for permit applications when operating at Tier 3.

Access to a Network

With reference to Table 2, seeking access to a network is generally limited to tier 1. Some states and territories allow network access at tier 3 masses. This includes PBS approved short combinations (e.g. prime mover and semitrailer (quad-axle) in New South Wales.

States and territories may impose conditions, such as vehicle tracking, on-board mass (OBM) and minimum axle spacing requirements. This is to limit the effect PBS vehicles may have on bridges and infrastructure.

Available Notices

Please see below for information on existing PBS Notices. Notices are legal documents, the NHVR strongly advises operators to become familiar with the document and any conditions that apply.

Truck and dog combinations

The *National Class 2 PBS Level 1 & 2A Truck and Dog Trailer Authorisation Notice 2016* authorises eligible PBS truck and dog combinations to access the PBS Networks without a permit. Note, this for PBS truck and dog combinations operating at Tier 1 masses.

The NHVR released an [information sheet](#) and [notice](#) for these combinations.

A-doubles in Queensland

The *Queensland Class 2 Performance Based Standards A-Double (Toowoomba to Port of Brisbane) Authorisation Notice 2018* authorises certain PBS A-doubles to access a route at Tier 3 masses. Note, operators must comply with the conditions of the [Notice](#) and [Operators Guide](#).

Note: As a condition of the Notice, eligible vehicles must comply with axle spacing requirements found in the Appendix of the Notice.

For more information:

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