

Vehicle dimensions and mass permitting manual (volume 1)

Part B

Overweight permits

Current as at 1 October 2021

Disclaimer

This publication is intended to provide general information about the permitting of vehicles that exceed dimension and mass limits. While every effort has been made to ensure the quality and accuracy of this information, readers are advised that the information provided does not replace or alter the laws of New Zealand, does not replace any legal requirement, and is not a substitute for expert advice applicable to the reader's specific situation. Readers should also be aware that the content in this publication may be replaced or amended subsequent to this publication, and any references to legislation may become out of date if that legislation is amended.

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Record of amendments in this part

Note: Amendments are numbered consecutively and may affect individual or multiple parts in one or both volumes of the *Vehicle dimensions and mass permitting manual*. For a complete record of all amendments to this manual, please refer to the 'Record of amendments' at the start of both volume 1 and volume 2.

Amendment to 2nd edition	Description of changes in this part	Effective date
Amendment 7	B3.9 Iso containers: Information added that operators may need to purchase an additional RUC licence if carrying a load under an overweight permit that exceeds the vehicle's permanent RUC licence.	1 October 2021
Amendment 5	Revisions reflect legislation changes from the Land Transport (NZTA) Legislation Amendment Act 2020 the Land Transport Rule: Omnibus Amendments 2020. Updated sections: Introduction: Information added about the Director of Land Transport role, delegations of authority, and the terminology used in the manual. B1.4 and B1.5: New mass limits for standard-tyred tri-axle sets added to the general access mass limit tables from the VDAM Rule and definition of 'tri-axle set' amended.	1 May 2021
Amendment 3	B9.4 Calculating the VAI: Tyre size ('specified standard other than single-tyred spaced') and cross-reference corrected in procedure.	21 September 2020
Amendment 2	Updates reflect amendments to various land transport rules from the Land Transport Rule: Regulatory Stewardship (Omnibus) Amendment 2018, which took effect on 1 June 2019. In addition, outdated information was removed and the information on towing of disabled vehicles was clarified. Updated sections: B1.3.and B1.7: 45/46t without a permit. Outdated warnings about route restrictions removed. B2.1 Minimum axle requirements for rigid vehicles transporting a load clarified. B2.2 Maximum speeds. Speed limit for vehicles with unsprung axles changed to 45km/h (previously 30km/h). B2.3 Maximum tyre pressure for radial-ply tyres updated. B3.6 Towing disabled vehicles: Criteria for determining 'nearest safe area' clarified. B8.10 Declaration on permit application form: Clarification added that false statements may incur penalties.	1 June 2020

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Part B: Overweight permits

Introduction

About this part

This part of the *Vehicle dimensions and mass permitting manual* (volume 1) describes Waka Kotahi NZ Transport Agency's policy for issuing overweight permits under section 5.8 of the Land Transport Rule: Vehicle Dimensions and Mass 2016 (referred to as the 'VDAM Rule' in this manual).

Policy purpose

The purpose of the overweight permitting policy is to:

- protect road network facilities from loadings that may lead to premature structural deterioration
 - provide guidance to the transport industry on road network limitations to enable development of better vehicles for the transport of heavy loads
 - provide guidance to the designers and manufacturers of heavy items requiring transport by road
 - ensure the safety of overweight vehicle operations
 - give guidance to transport operators on how to apply for an overweight permit, and
 - enable permitting staff to process applications consistently and with a minimum of administrative and technical effort.
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Role of the Director of Land Transport

Waka Kotahi's Director of Land Transport is responsible for issuing overweight permits in accordance with the requirements of the VDAM Rule.

The Director has delegated the authority to issue permits to Waka Kotahi's permitting staff and their contractors. References in this manual to Waka Kotahi/the Transport Agency or to permitting staff should be interpreted as references to the Director if the reference relates to a Director function under the VDAM Rule.

Audience

The audience for this part is:

- operators who need to apply for an overweight permit
 - Waka Kotahi staff and contractors involved in the processing of overweight permit applications
 - local road controlling authorities (RCAs)
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Introduction continued

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- Audience**
(continued)
- designers and manufacturers of heavy items requiring road transport
 - designers and manufacturers of vehicles that might operate under an overweight permit, and
 - enforcement agents such as the Commercial Vehicle Safety Team (CVST) of New Zealand Police.
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Terminology and abbreviations Specific terminology and abbreviations are used throughout this manual. For definitions and explanations, see *Part I: Definitions and glossary* in this volume of the manual.

In this part This part contains the following chapters:

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Chapter B1: Legal mass limits and when an overweight permit is required

Overview

About this chapter

This chapter explains when an overweight permit is required. The general access mass limits from the Land Transport Rule: Vehicle Dimensions and Mass 2016 (the VDAM Rule) can also be found in this chapter.

In this chapter

This chapter contains the following sections:

Section	See page
B1.1 Definitions and general principles for overweight permits	B1-2
B1.2 Other permits that may be required	B1-5
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B1.4 Individual axle mass limits	B1-7
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B1.1 Definitions and general principles for overweight permits

What is an overweight vehicle?

A vehicle is considered overweight if it exceeds any of the legal mass limits referred to as 'general access' limits in the VDAM Rule.

The different types of mass limit are described in detail in section *B1.3 Specific legal mass limits* below.

Rationale for general access mass limits

The general access mass limits represent the maximum weights that can be sustained under normal conditions without undue deterioration of the road network's pavement and bridges.

Legal basis

The general access mass limits that are legal for an unpermitted vehicle on New Zealand roads are specified in the VDAM Rule schedule 3, parts 1 and 2.

Temporary mass limits for the protection of a road from excessive damage are covered by regulation 10(4) of the Heavy Motor Vehicle Regulations 1974 or section 16A of the Land Transport Act 1998.

Mass limits for weak bridges are covered by regulation 11 of the Heavy Motor Vehicle Regulations 1974.

Law is paramount

Overweight permits do not override the requirements of the VDAM Rule or any other act or regulation, or the vehicle's certificate of loading (CoL). Overweight permits include a disclaimer to this effect.

When is an overweight permit required?

An overweight permit is required for a vehicle that:

- exceeds the general access mass limits, and
- transports an **indivisible** load.

Although there is no established right to exceed the general access mass limits, it is impractical to reduce some loads. Permits help to manage the number of heavy loads using the network and thereby limit the consequent damage.

Permits may impose limitations on gross weights to protect bridges, and on axle weights to protect pavements. Permits may also specify structures and bridges with restricted weight loadings, and conditions that allow vehicles to cross bridges safely, such as 'crawl central'.

Continued on next page

B1.1 Definitions and general principles for overweight permits continued

What is an 'indivisible load'?

Only vehicles that carry indivisible loads are eligible for overweight permits.

A load is considered to be indivisible if it cannot, without disproportionate effort, expense or risk of damage, be divided for transport. This includes customs-sealed ISO containers and certain loads specified in the VDAM Rule as indivisible.

For more details see section *B3.1 Divisible loads eligible for overweight permits*.

'Overweight' versus 'higher mass' permits

Overweight permits are distinguished from 'higher mass' permits, which are either for high productivity motor vehicles (HPMVs) or specialist vehicles such as buses that exceed general access mass limits.

Higher mass permits are available for both divisible and indivisible loads. For details see in this volume:

- *Part D: HPMV higher mass permits*
 - *Part F: HPMV 50MAX permits, or*
 - *Part G: Specialist vehicle permits.*
-

Change of ownership

Permits are not transferable. On change of ownership, the new owner (or registered person) must apply for a new permit.

Any dispensations applicable to the permit in question may be transferred to the new owner (or registered person) provided that the pavement loading ratio (PLR) and the deck loading ratio (DLR) are acceptable.

Enforcement

The police enforce overweight permits. They may stop vehicles travelling under permits at any time, which may involve enforcement weighing.

For more information, see *Chapter A4: Enforcement* in part A of this volume.

Continued on next page

B1.1 Definitions and general principles for overweight permits continued

Revocation

Waka Kotahi may revoke an overweight permit if, in its opinion:

- the operator has breached permit conditions
- there is a significant risk to public safety, or
- the operation of the vehicle under the permit may cause extraordinary damage to the road or structures.

Waka Kotahi must advise the operator of the vehicle as soon as practicable that the permit has been revoked. The notice does not need to be in writing but must include the reasons for revocation.

The revocation takes effect immediately on notice, or when specified.

B1.2 Other permits that may be required

Multiple permits

This section describes other permits that may be required in addition to an overweight permit.

Multiple permits must be carried together in the vehicle and shown to enforcement officers on request.

Overdimension permit

If your vehicle or load exceeds the standard dimension limits specified in the VDAM Rule, you may require an overdimension permit in addition to an overweight permit.

For details see *Part C: Overdimension permits* in this volume of the manual.

Railway crossings and overbridges

When processing overweight permit applications, Waka Kotahi permitting staff do not check the ability of an overweight vehicle to safely cross railway level crossings.

Permission from the rail operator is required for certain overweight and overdimension vehicles and loads to travel over railway crossings and/or under overhead electrification.

More information can be found on KiwiRail's website at www.kiwirail.co.nz.

Permits for local roads

If your route includes local roads, you need a separate permit from the local road controlling authority (RCA), unless the local RCA has delegated authority to Waka Kotahi to include its roads on a permit issued by Waka Kotahi.

If a local RCA has not delegated permitting authority to Waka Kotahi, the RCA is responsible for issuing permits for the movement of overweight vehicles on local roads (ie excluding state highways) within its boundaries.

B1.3 Specific legal mass limits

Different categories of mass limits

A vehicle carrying an indivisible load and exceeding the general access mass limits specified in the VDAM Rule requires an overweight permit. More specifically, an overweight permit is required if any of the following apply:

- The mass on any **individual axle** exceeds the limits in the table in section B1.4 below.
 - The mass on any **axle set** (tandem, tri- or quad-axle) exceeds the limits in the tables in section B1.5 below.
 - The combined axle set limit, which depends on the distance from the first axle in any set to the last axle in any other set, exceeds the mass limits in the table in section B1.6 below.
 - The mass on any axle exceeds a temporary limit specified by the road controlling authority for part of the intended route of the vehicle.
-

45/46t without a permit

The maximum total mass for general access specified in the VDAM Rule is 44,000kg, but vehicles with seven or more axles and a minimum wheelbase may carry up to 46,000kg without a permit, as follows:

- 45,000kg (45 tonnes) for 7-axle combinations with a minimum wheelbase of 16.8m, and
- 46,000kg (46 tonnes) for 8-axle combinations with a minimum wheelbase of 17.4m.

Eligible vehicles operating at these limits have general access on all local roads and state highways, except where restrictions are posted.

Legislation reference: VDAM Rule section 4.3(11) and schedule 3, part 2, table 2.2.

Diagrams

Diagrams of the various axle types and axle sets referred to in the tables in the following sections are illustrated in section *B9.3 Types of axle*.

B1.4 Individual axle mass limits

Individual axle limits

This table shows the maximum general access mass limits on individual axles according to tyre type.

A set of two axles less than 1 metre from the centre of the first to the centre of the last axle is counted as a single axle.

Legislation reference: VDAM Rule schedule 3, part 1, tables 1.1A and 1.1B.

Type of axle	Mass limit (kg)
<i>Single standard tyres</i>	
In a twin-steer or in a tandem axle set with a single large-tyred axle	5500
In a tandem axle set with a twin-tyred axle:	
• in a passenger service vehicle	5800
• in any other vehicle	5500
In a tri-axle set	3000
In any other axle set	6000
<i>Single large-tyred</i>	
In a twin-steer axle set or a quad-axle set	5500
In a tandem set with a single large-tyred axle or a single standard-tyred axle or in a tri-axle set	6600
In any other axle set	7200
<i>Single mega-tyred</i>	
In a twin-steer axle set	5500
In a single-steer axle set	7200
In a quad-axle set	6000
In a tri-axle set	7000
In any other axle set	7600

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B1.4 Individual axle mass limits continued

Individual axle limits (continued)

Type of axle	Mass limit (kg)
<i>Twin-tyred</i>	
In a quad-axle set	6000
In a tri-axle set	7000
In a tandem axle set with a single standard-tyred axle:	
• in a passenger service vehicle	8700
• in any other vehicle	8200
In any other axle set:	
• in a public transport service bus	9000
• in any other vehicle	8200
<i>Oscillating axle</i>	
In any axle set	9500

B1.5 Axle set mass limits

Tandem axle set limits

This table shows the maximum general access sum of axle mass on two axles in a tandem axle set.

A tandem axle set consists of two axles that are at least 1 metre but no more than 2 metres from the centre of the first to the centre of the last axle.

The 2-metre maximum does not apply to twin-steer axle sets.

Legislation reference: VDAM Rule schedule 3, part 1, table 1.2.

Type of axle	Mass limit (kg)
<i>Two single standard-tyred axles</i>	
In a twin-steer set or not in a twin-steer axle set	11,000
<i>Two single large-tyred axles</i>	
In a twin-steer axle set	11,000
Not in a twin-steer axle set	13,000
<i>Two single mega-tyred axles</i>	
In a twin-steer axle set	11,000
Not in a twin-steer axle set	14,000
<i>Two twin-tyred axles</i>	
Spaced less than 1.3m from first axle to last	14,500
Spaced 1.3m or more but less than 1.8m from first axle to last	15,000
Spaced 1.8m or more from first axle to last	15,500
<i>Twin-tyred axle</i>	
For a passenger service vehicle: <ul style="list-style-type: none"> with a single standard-tyred axle and load share of 60/40, or with a single large-tyred axle or single mega-tyred axle and load share between 60/40 and 55/45 	14,500
For any other vehicle: <ul style="list-style-type: none"> with a single large-tyred axle or single mega-tyred axle and load share of 60/40 with a single large-tyred axle or single mega-tyred axle and load share of 55/45 	13,600
	14,500

Continued on next page

B1.5 Axle set mass limits continued

Tandem axle set limits (continued)

Type of axle	Mass limit (kg)
<i>Single standard-tyred axle</i>	
with an oscillating axle	13,000
with a single large-tyred axle or a twin-tyred axle or a single mega-tyred axle	12,000
<i>Other combinations</i>	
Two oscillating axles	15,000

Tri-axle set limits

This table shows the maximum general access sum of axle mass on a tri-axle set.

A tri-axle set consists of three axles where:

- the axles are spaced at least 2 metres (or 1.8 metres in the case of a single standard-tyred axle) but no more than 3 metres from the centre of the first to the centre of the last axle, and
- all axles contain an equal number of tyres.

Legislation reference: VDAM Rule schedule 3, part 1, table 1.3.

Type of axle	Mass limit (kg)
<i>Three oscillating axles, three twin-tyred axles, three single large-tyred axles or three single mega-tyred axles</i>	
Spaced 2m or more and less than 2.4m from the first axle to the last axle	16,000
Spaced 2.4m or more and less than 2.5m from the first axle to the last axle	17,500
Spaced 2.5m or more from the first axle to the last axle	18,000
<i>Three single standard-tyred axles</i>	
Spaced 1.8m or more and less than 3m from the first axle to the last axle	8200

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B1.5 Axle set mass limits continued

Quad-axle set limits

This table shows the maximum sum of axle mass for general access on a quad-axle set.

A quad-axle set consists of four axles where:

- the axles are spaced at least 3.75 metres and no more than 4 metres from the centre of the first to the centre of the last axle
- all axles contain an equal number of tyres, and
- none of the axles is a single standard-tyred axle.

Legislation reference: VDAM Rule schedule 3, part 1, table 1.4.

Type of axle	Mass limit (kg)
Four twin-tyred axles	20,000
Four single large-tyred axles	
Four single mega-tyred axles	

Other axle mass limits

This table shows the maximum sum of mass on any two or more axles that together do not constitute a single tandem axle set, a single tri-axle set or a single quad-axle set, where the distance from the centre of the first axle to the centre of the last axle is 1.0 metre or more but less than 1.8 metres (including maximum gross mass).

Legislation reference: VDAM Rule schedule 3, part 1, table 1.5.

Type of axle	Mass limit (kg)
Two single standard-tyred axles	11,000
Two single large-tyred axles	12,000
A single standard-tyred axle with a single large-tyred axle, single mega-tyred axle or a twin-tyred axle	12,000
Any other two or more axles	14,500

B1.6 Axle group and gross mass limits

General access total mass limits

This table shows the maximum sum of mass for general access on any two or more axles that together do not constitute a single tandem axle set, single tri-axle set or single quad-axle set, where the distance from the centre of the first axle to the centre of the last axle is 1.8 metres or more (including maximum gross mass).

Legislation reference: VDAM Rule schedule 3, part 2, table 2.1.

Distance from the centre of the first to the centre of the last axle	Mass limit (kg)
1.8m but less than 2.5m	15,500
2.5m but less than 3.0m	17,500
3.0m but less than 3.3m	19,000
3.3m but less than 3.6m	20,000
3.6m but less than 4.0m	21,000
4.0m but less than 4.4m	22,000
4.4m but less than 4.7m	23,000
4.7m but less than 5.1m	24,000
5.1m but less than 5.4m	25,000
5.4m but less than 5.8m	26,000
5.8m but less than 6.4m	27,000
6.4m but less than 7.0m	28,000
7.0m but less than 7.6m	29,000
7.6m but less than 8.2m	30,000
8.2m but less than 8.8m	31,000
8.8m but less than 9.4m	32,000
9.4m but less than 10.0m	33,000
10.0m but less than 10.8m	34,000
10.8m but less than 11.6m	35,000
11.6m but less than 12.0m	36,000
12.0m but less than 12.5m	37,000
12.5m but less than 13.2m	38,000

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B1.6 Axle group and gross mass limits continued

General access total mass limits	Distance from the centre of the first to the centre of the last axle	Mass limit (kg)
(continued)	13.2m but less than 14.0m	39,000
	14.0m but less than 14.8m	40,000
	14.8m but less than 15.2m	41,000
	15.2m but less than 15.6m	42,000
	15.6m but less than 16.0m	43,000
	16.0m or more	44,000

B1.7 Maximum total mass for heavy vehicles with at least seven axles

45/46t gross mass limits

This table shows the maximum general access gross mass limits for heavy motor vehicles with at least seven axles and a minimum wheelbase of 16.8m.

Note: Restrictions on routes or bridges set by road controlling authorities may reduce the allowable mass. Such restrictions must be signposted.

Legislation reference: VDAM Rule schedule 3, part 2, table 2.2.

Axle requirements	Mass limit (kg)
<i>Distance from the centre of the first axle to the centre of the last axle:</i>	
16.8m or more, and a minimum of 7 axles	45,000
17.4m or more, and a minimum of 8 axles	46,000

Chapter B2: Vehicle requirements

Overview

About this chapter

This chapter contains information on specific vehicle requirements for carrying indivisible loads above the general access mass limits under an overweight permit.

In this chapter

This chapter contains the following sections:

Section	See page
B2.1 Axle requirements for vehicles carrying a separate payload (transporters)	B2-2
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B2.1 Axle requirements for vehicles carrying a separate payload (transporters)

Minimum number of axles

To be eligible for an overweight permit, the minimum number of axles for a heavy vehicle **transporting a separate payload** is as follows:

Vehicle type	Minimum number of axles
Rigid heavy vehicle ¹ (single unit)	4 axles
Vehicle combination (prime mover and trailer(s))	<ul style="list-style-type: none"> • 5 axles, and • 2 driving axles
Full trailer ² , if the payload cannot be distributed in part to other axles of the combination	five axles

Notes:

1. Only if transporting a load, ie the minimum axle requirement does not apply to vehicles such as harvesters or mobile plant.
2. A full trailer is a trailer with two axle sets, the foremost of which is steered by a drawbar. It includes a semi-trailer with non-steering axles coupled to a converter dolly.

Dispensations

Waka Kotahi's Lead Advisor, Pavements (for movements on state highways) or the local authority approving engineer (for local roads) may, in exceptional circumstances, approve a dispensation from the above requirements to allow the use of a short wheelbase vehicle combination with less than five axles where the road alignment dictates the use of such a vehicle and no alternative route is available.

B2.2 Vehicle speed and travel time restrictions

Maximum speeds

Maximum vehicle speeds for vehicles operating under an overweight permit are as follows:

If the vehicle...	Then the speed limit is...
has one or more unsprung axles (unless the unsprung axles are connected to the chassis by a longitudinal walking beam or beams)	45km/h ¹
is fitted with large earthmover tyres	30km/h
is truck-mounted with fully sprung axles and is fitted with large or mega truck tyres (see <i>B9.2 Types of tyre</i>)	70km/h

In all other cases, the legal highway speed limit for heavy motor vehicles applies. This is 90km/h except for school buses, which have a speed limit of 80km/h.

Note:

1. **Legislation reference:** Land Transport (Road User) Rule, section 5.5.

Off-peak restriction

If a low speed limit is likely to create a high risk to other road users, travel may be restricted to off-peak hours.

Consult with Waka Kotahi, the police and the heavy transport industry in such cases.

B2.3 Tyre pressures

Policy

Tyres must be at pressures recommended by either the manufacturer or the tyre and rim associations.

Maximum tyre pressures

The **maximum** cold inflation pressures allowed for heavy motor vehicles are:

Type of tyre	Maximum cold inflation pressure
Cross-ply tyre	700kPa
Radial-ply tyre	<ul style="list-style-type: none">• 825kPa, or• if the manufacturer specifies an inflation pressure higher than 825kPa, that inflation pressure, to a maximum of 900kPa

Legislation reference: Land Transport Rule: Tyres and Wheels 2001, section 2.4.

B2.4 Traction limits

Introduction	<p>Traction restrictions for overweight permits are based on the maximum allowable gradient combination (MGC).</p> <p>The MGC indicates whether a vehicle combination is able to develop sufficient traction to prevent damage to the pavement surface by wheel slip.</p> <p>For more details, including how to calculate the MGC, see section <i>B10.7 Traction limits (MGC)</i>.</p>
MGC permit requirement	<p>When applying for an overweight permit, an operator must ensure that the MGC of their vehicle combination is greater than all uphill gradients on the proposed route for the mass applied for.</p>
Finding the gradients for a route	<p>The maximum uphill gradient on a route can be determined by Waka Kotahi from highway information sheets or its databases. It is expressed in percent.</p>
Increasing the MGC	<p>The MGC can be increased by the addition of:</p> <ul style="list-style-type: none">• another prime mover in series, and/or• ballast over the driving axles (see section <i>B3.5 Ballast</i>).

B2.5 Mobile plant (other than mobile cranes)

Introduction	<p>This section describes the overweight permit requirements for mobile plant.</p> <p>For information on mobile cranes, see section <i>B2.6 Mobile cranes</i>.</p>
Definition of 'mobile plant'	<p>'Mobile plant' means a vehicle that is operated mainly off the highway and that does not carry a separate payload while on the highway. This includes motor scrapers, dump trucks, drilling rigs, front-end loaders, forklifts, crushing plants, batching plants and agricultural vehicles.</p> <p>Note: Mobile plant excludes tractors towing trailers carrying divisible loads. Divisible loads are not eligible for an overweight permit under section 5.8 of the VDAM Rule.</p>
Permit depends on VAI	<p>Overweight permits may be issued to mobile plant up to a maximum vehicle axle index (VAI) of 1.50.</p> <p>For details see section <i>B2.9 VAI and PLR limits by vehicle and permit type</i>.</p>
Detachable axles	<p>The use of detachable (or tag) axles is not permitted on items of mobile earthmoving plant for transport purposes.</p>
Dispensations	<p>In exceptional circumstances, a dispensation from VAI and detachable axle requirements may be approved by Waka Kotahi's Lead Advisor, Pavements (for state highways) or the local authority approving engineer (for local roads).</p> <p>Dispensations will only be considered if the pavement loading ratio (PLR) does not exceed 150% for the pavements involved.</p> <p>For more information about PLR, see section <i>B10.3 Pavement grades and pavement loading ratio (PLR)</i>.</p>
Towing of trailers	<p>Trailers and equipment that are associated with the off-highway operation of mobile plant may be towed behind that vehicle provided that this practice does not increase the bridge engineering supervision requirements.</p>

B2.6 Mobile cranes

Introduction	This section describes the overweight permit requirements for mobile cranes.
Maximum VAI	<p>A mobile crane may be issued with an overweight permit up to a maximum VAI of 1.50, provided that this does not result in exceeding any of the manufacturer's safety ratings (eg for gross vehicle mass (GVM), maximum permissible axle ratings, etc).</p> <p>For details see section <i>B2.9 VAI and PLR limits by vehicle and permit type</i>.</p>
Boom trailers	<p>Mobile cranes configured with boom trailers may be issued with overweight permits provided that:</p> <ul style="list-style-type: none">• The boom is free to luff and slew (ie pivot in all directions) at all times the crane is operating on the road.• The application contains a statement from the applicant that:<ul style="list-style-type: none">– the boom is free to pivot, and– no device to alter the load distribution to the axles is in operation.• The maximum VAI on the crane and the boom trailer does not exceed 1.50.• The applicant submits full details of each trailer configuration for technical evaluation when first applying for a permit.
Travel without trailer	<p>Mobile cranes may travel short distances to work sites after parking the trailer provided that:</p> <ul style="list-style-type: none">• the speed of travel does not exceed 10km/h, and• the route does not involve any bridges.

Continued on next page

B2.6 Mobile cranes continued

Counterweights Counterweights may be repositioned from the manufacturer's designed operating position on the crane's body provided that:

- The maximum VAI is reduced by the repositioning.
- The counterweight is securely fixed in the new position while on the road.
- The maximum VAI on the crane does not exceed 1.50.
- The applicant submits full details for technical evaluation when first applying for a permit.

Counterweights required for a mobile crane's normal lifting operation may also be carried on a trailer towed behind the crane provided that this practice does not increase the bridge engineering supervision requirements.

B2.7 Traction engines

Consent required

Consent must be obtained from road controlling authorities before a traction engine can travel on New Zealand roads.

The Heavy Motor Vehicle Regulations 1974 specifically exclude traction engines from the definition of a heavy motor vehicle.

If the traction engine also exceeds legal mass limits, then an overweight permit must be obtained.

Considerations

The two matters for road controlling authorities to consider before authorising travel by traction engines are:

- the effects of high axle loadings on pavements, bridge decks and underground services, and
 - the potential disruption and associated risk to other traffic from their slow travel speed.
-

Travel on state highways

Before a traction engine can travel on a state highway, all wheels must be fitted with solid rubber tyres with a minimum thickness of 25mm.

Waka Kotahi checks any bridge crossings required, assuming an 18.00-22.5 single mega tyre size and reference axle mass of 8.0 tonnes.

In addition, Waka Kotahi may impose conditions on the travel, bearing in mind the impact these vehicles have on other road users. Time of travel may be restricted where traffic flows are significant.

Local roads

Local road controlling authorities may issue permits subject to the conditions they consider appropriate.

B2.8 Other vehicle types

Tracked vehicles

Written consent must be obtained from the road controlling authority before tracked vehicles can use New Zealand roads.

Legislation reference: Land Transport Rule: Tyres and Wheels 2001, section 2.3(18).

Such consent is usually considered only for vehicles that are either of limited mass (eg a Bren Gun carrier) or have rubber cleats or tracks to minimise road damage.

Where consent is given, or the operator applies for a permit for increased mass, conditions can be imposed, such as:

- maximum speed
- legal mass limits not to be exceeded
- vehicles not allowed on motorways
- pivot turns prohibited on pavements
- heavy braking to be minimised on pavements
- minimum clearances for rubber pads on track shoes, or
- compliance with any other Waka Kotahi requirements.

Steel wheeled vehicles – steam rollers

Steel wheeled or tyred vehicles require written consent from road controlling authorities before they can travel on New Zealand roads.

No consent is required for work on road construction sites.

NZ Defence Force vehicles

Operational vehicles controlled by the New Zealand Defence Force may be eligible for exemptions from specific permitting requirements. Waka Kotahi may grant such exemptions to a Defence Force vehicle or vehicle type, having regard to the same considerations as for other exemptions (see *Exemptions for divisible loads* in section B3.1).

Legislation reference: Land Transport Act 1998, section 166A.

B2.9 VAI and PLR limits by vehicle and permit type

Table The table below shows the vehicle axle index (VAI) and pavement loading ratio (PLR) limits for different vehicle and overweight permit types.

For details about how to calculate the VAI of a vehicle, see *Chapter B9: Calculating the vehicle axle index (VAI)*.

For details about the PLR, see section *B10.3 Pavement grades and pavement loading ratio (PLR)*.

Vehicle type	VAI limit		PLR limit (%)	
	Single or multiple trip permit	Continuous permit	Single or multiple trip permit	Continuous permit
Agricultural harvester	1.50	1.50	150	150
Agricultural vehicle	1.50	1.50	150	150
Agricultural tractor	1.50	1.50	150	150
Building removal vehicle	1.50	1.50	150	150
Dump truck	1.50	1.50	150	150
ISO container truck	1.10	1.10	110	110
Mobile crane	1.50	1.50	150	150
Mobile plant	1.50	1.50	150	150
Motor scraper	1.50	1.50	150	150
Slurry truck ¹	1.50	1.50	150	150
Special projects transporter ²	1.50	N/A	150	N/A
Tow truck	1.50	1.50	150	150
Transporter	1.50	1.50	150	150
Traction engine	1.50	N/A	150	N/A

Notes:

1. Travel is limited to a maximum radius of 20km from the stockpile to the sealing site.
2. Loads greater than 200 tonnes.

Chapter B3: Payload requirements

Overview

About this chapter

This chapter contains information on the requirements for the payloads of vehicles operating under an overweight permit.

In this chapter

This chapter contains the following sections:

Section	See page
B3.1 Divisible loads eligible for overweight permits	B3-2
B3.2 Building removals	B3-4
B3.3 Platform trailers	B3-5
B3.4 Load dividers	B3-6
B3.5 Ballast	B3-7
B3.6 Towing and transporting disabled vehicles	B3-8
B3.7 Fire-fighting vehicles	B3-10
B3.8 Slurry sealing	B3-11
B3.9 ISO containers	B3-12

B3.1 Divisible loads eligible for overweight permits

Definition of 'indivisible'

Under the VDAM Rule, overweight permits can only be issued for indivisible loads.

A load is considered to be indivisible if it cannot, without disproportionate effort, expense or risk of damage, be divided for transport. This includes the loads listed in the table below.

Legislation reference: VDAM Rule section 5.8(1) and part 2, definitions.

Divisible loads eligible for overweight permits

As certain types of divisible load would incur disproportionate effort, expense or risk to the load if they were to be divided or separated, they are considered indivisible loads under the VDAM Rule for the purpose of obtaining an overweight permit.

The following table lists divisible loads that are specified in the VDAM Rule as eligible for an overweight permit.

Load type	For details see section...
Ancillary items associated with the indivisible load or vehicle	
Ballast being carried with an overweight load	B3.5
Building removals	B3.2
Construction equipment being transported with attachments used with that equipment	
Converter dolly or trailer being carried with an overweight load	B2.1
Disabled vehicle being towed or carried	B3.6
Load divider being carried with an overweight load	B3.4
Platform trailer carried on another platform trailer	B3.3
Slurry being carried to or used at sealing sites	B3.8
Transformer oil	
Water being carried by a fire-fighting vehicle	B3.7

Legislation reference: VDAM Rule, section 5.8(3).

Continued on next page

B3.1 Divisible loads eligible for overweight permits

continued

ISO containers Customs-sealed ISO containers loaded or packed for export or import may be considered to be indivisible loads and eligible for overweight permits – see section *B3.9 ISO containers*.

Exemptions for divisible loads

Waka Kotahi may grant an exemption and consider a divisible load to be indivisible and eligible for an overweight permit.

When considering granting an exemption, Waka Kotahi must be satisfied that the risk to safety will not be significantly increased. It must also consider the potential impact on infrastructure, including the potential for damage to roads and the cost of repairs.

Note: There is no legal right to an exemption, and there is no guarantee that an exemption can be granted.

Legislation reference: Land Transport Act 1998, section 166.

B3.2 Building removals

Introduction Theoretically, buildings for removal may be reduced to their individual components. Some judgement is required in determining what is disproportionate effort, expense or risk of damage to a building when reducing it in size and weight.

This section provides the criteria to be followed in granting overweight permits for building removals.

PLR limit Overweight permits may be issued for building removals up to a maximum pavement loading ratio (PLR) of 150%.

PLR exceeds 150% - approval needed For movements on state highways when the PLR exceeds 150%, the approval of Waka Kotahi's Lead Advisor, Pavements, must be obtained. This is done as part of the permitting process.

Overdimension requirements Building removals generally also require an overdimension permit.

Buildings must be transported in accordance with the requirements specified on the overdimension permit. For details refer to *Part C: Overdimension permits* in this volume.

B3.3 Platform trailers

Permit for second trailer

Overweight permits may be issued to allow empty platform trailers towed behind ballasted prime movers to carry a second empty trailer.

Legislation reference: VDAM Rule, section 5.8(3)(b).

B3.4 Load dividers

What is a load divider? A load divider is a smaller trailer used to spread the load over more axles. It is located between the prime mover and the main transporter.

May be carried when not in use In some situations, the load divider may not be required for all sections of a journey. The load divider may be carried on the transporter in addition to the payload when they are required for only a part of the overall journey.

Permit load description The description of the load on the overweight permit will include the words 'and a load divider if required'.

B3.5 Ballast

Traction	Ballast may be used to ensure traction. See section <i>B2.4 Traction limits</i> for when such ballast may be required.
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Carriage of ballast not in use	When ballast is required for one section of a journey, or the return/ outward part of a journey, the ballast can remain on the prime mover when the trailer is unladen, even if the ballast is not required for traction purposes for that section of the journey.
---------------------------------------	--

The following criteria apply:

- The VAI of the prime mover must not exceed 1.50.
 - The maximum weight of the prime mover must not exceed 24,000kg gross for three axles.
 - The maximum weight of the prime mover must not exceed 28,000kg for four axles.
-

B3.6 Towing and transporting disabled vehicles

Introduction This section describes the overweight permit requirements for the towing of vehicles that have been involved in an accident or suffered mechanical failure.

The VDAM Rule includes formal provision for the towing of disabled vehicles under an overweight permit.

Legislation reference: VDAM Rule, section 5.8(3).

Overdimension issues The towing of a disabled vehicle also often results in the tow combination exceeding legal dimension requirements. The VDAM Rule allows towing to the nearest safe area without compliance with the rule dimension requirements or the requirement to operate under an overdimension permit.

Legislation reference: VDAM Rule, section 3.14(11).

Requirement to tow to 'nearest safe area' A heavy vehicle recovery service must determine the nearest safe area that a disabled vehicle may legally be towed to by taking account of the following three criteria specified in the VDAM Rule:

- volume of traffic
- vehicle load, and
- ability to undertake repairs safely at the roadside.

The requirement to tow to the **nearest** safe area is paramount and overrides any other considerations by the tow truck operator or vehicle owner.

To access the nearest safe area, tow truck operators must comply with any bridge weight limits or posted limits.

Legislation reference: VDAM Rule, section 3.14(11).

Permits for moving disabled vehicles Continuous overweight permits may be issued to breakdown trucks and multi-axle low bed transporters to move disabled vehicles that exceed the legal mass limits.

These are non-standard overweight permits because the disabled vehicle may not be specifically known to Waka Kotahi. To establish appropriate permit conditions, permitting staff have to run a series of pro-forma heavy vehicles behind the tow truck through the permitting process.

Continued on next page

B3.6 Towing and transporting disabled vehicles continued

Permit conditions

The maximum VAI for an overweight permit is 1.50.

Peak traffic restrictions do not generally apply because the removal of the disabled vehicle enhances traffic flow at such times.

Under normal circumstances, the critical factor is the load on the rear axles of the tow truck. Waka Kotahi generally requires the vehicle to have on-board scales to provide confidence that these critical axle loads are maintained within the stated permit limits.

Waka Kotahi may consider alternatives to on-board scales if the tow operator can demonstrate compliance with permit limits.

There are no specific brake requirements or speed limits for these permits. It is the tow operator's responsibility to ensure that brake capacity for the tow combination and operating speeds are safe at all times.

Other legal requirements

The operator is also responsible for compliance with any other legal requirements that may apply, for example the Land Transport Rule: Dangerous Goods 2005 and the Health and Safety at Work Act 2015.

Permit applications

To apply for an overweight permit for towing a disabled vehicle, complete the overweight permit application form and email it to overweightinquiries@nzta.govt.nz.

You should include the following information:

- overweight permit number of the disabled vehicle (if applicable), or
 - number of axles and axle loadings of the disabled vehicle.
-

B3.7 Fire-fighting vehicles

**Eligible for
overweight
permit**

Fire appliances that exceed the legal mass limits when carrying water to maintain fire-fighting capability are eligible for overweight permits on public roads.

This includes appliances operated by Fire and Emergency New Zealand, the New Zealand Defence Force or by civilian airports.

B3.8 Slurry sealing trucks

Permit eligibility

Overweight permits may be issued to allow loaded slurry sealing trucks to operate between stockpiles and sealing sites.

Restrictions

The VAI limit is 1.50, and the maximum permitted radius of movement from the stockpile is 20km.

B3.9 ISO containers

Eligibility	<p>Generally, containers are considered to be divisible loads. However, ISO containers may be considered to be indivisible loads and eligible for an overweight permit if they have been loaded or packed for the sole purpose of export or import and are customs-sealed.</p> <p>These criteria apply to containers that are up to 40 feet long and carried on articulated vehicles incorporating a prime mover and semi-trailer with a tri-axle set or quad-axle set as defined in the VDAM Rule.</p> <p>Other shipping and transport containers that are not ISO approved are not eligible for an overweight permit.</p>
Permissible prime movers	<p>Prime movers may be either 6 x 4 or 8 x 4 with two rear driving axles, but excluding tri-drive units.</p>
Permits and route conditions	<p>Single, multiple or continuous permits may be issued for vehicles carrying ISO containers, subject to the following conditions:</p> <ul style="list-style-type: none"> • the roads on the journey route(s) are specifically named, and • routes are to and from sea ports. <p>For details see section <i>B8.6 Overweight permit types – overview</i>.</p>
Maximum VAI and mass limits	<p>The following mass limit conditions apply to overweight permits for vehicles carrying ISO containers:</p> <ul style="list-style-type: none"> • The vehicle axle index (VAI) must not exceed 1.10. • The mass on quad-axle sets on semi-trailers, having either twin-tyred or single large-tyred axles, is limited to 22,000kg. • The mass on each of the front axles on the prime mover is limited to either the legal mass limit, ie 6000kg (standard tyres), 7200kg (large tyres), 7600kg (mega tyres) and 5500kg (twin-steer axle set) OR the manufacturer’s rating, whichever is the lesser. • Gross mass of the vehicle combination is limited to either 46,000kg or the sum of the axle group masses, whichever is the lesser.
Road user charges (RUC)	<p>Operators must ensure they are paying the correct road user charges (RUC) for the gross weight they are allowed to carry under an overweight permit.</p> <p>If a vehicle will carry loads under a permit that exceed its permanent RUC weight, the operator must purchase an additional RUC licence that covers the additional weight carried under the permit.</p>

Continued on next page

B3.9 ISO containers continued

Attributes check sheet

All permit applications for ISO containers must be accompanied by a vehicle attributes check sheet completed and signed by a heavy vehicle specialist certifier (see section *B8.4 Applying for a permit for ISO containers*).

SRT compliance certificates

To manage the increased vehicle rollover risk associated with ISO container trucks, valid static roll threshold (SRT) compliance certificates must be submitted with an overweight permit application for all trailers listed on the application form (see section *B8.4 Applying for a permit for ISO containers*).

Acceptable documents for enforcement purposes

The police may demand to see bona fide evidence confirming that, in the case of export containers, the entire contents of the container were loaded or packed for the sole purpose of export or, in the case of imported containers, the entire contents of the container were loaded or packed overseas.

Any of the following documents is acceptable as bona fide evidence:

- shipping company delivery order
- shipping company carter's note
- carrier's waybill
- wharf gate pass, or
- any other traceable document.

A photocopy of the document is sufficient. It must be carried in the vehicle and shown to an enforcement officer on request.

Vehicle safety requirements

Under the VDAM Rule, semi-trailers (vehicles of class TD) with a VAI not exceeding 1.10 must hold a certificate of loading incorporating the vehicle's static roll threshold (SRT) compliance results for load height and gross mass in accordance with the most recent technical bulletin on SRT requirements for export/import containers (memo 70 series) at <https://vehicleinspection.nzta.govt.nz/virms/hvsc/tb/srt-requirements>.

In addition, the semi-trailer mass must not exceed the maximum towed mass on the vehicle's certificate of loading.

Chapter B4: Weight determination

Overview

About this chapter

This chapter contains information about the weighing of vehicles. It also discusses weighing endorsements and certificates.

In this chapter

This chapter contains the following sections:

Section	See page
B4.1 General principles for weighing	B4-2
B4.2 Weighing mobile plant	B4-3
B4.3 Mobile crane weight certificates	B4-4

B4.1 General principles for weighing

Basis of method	All weighing must be done in accordance with the Transport (Measurement of Weight) Notice 1997.
Supervision	All weighings must be supervised by the police or a consultant approved by Waka Kotahi to ensure that correct procedures are used when weighbridge certificates are obtained by the applicant.
Weighing records	<p>The weighing record must include a concise description of the vehicle and its loading condition, including the extent of operating gear carried and the description and position of the payload.</p> <p>In general, the police will accept these weighing records.</p>
Weighing for permit	<p>The permit issuing officer (PIO) processing an overweight permit application, or any of the road controlling authorities involved in a movement, may require the vehicle to be weighed at a specific locality as a condition of the permit. This requires either that:</p> <ul style="list-style-type: none">• confirmation of axle masses from a certified weighing facility be sent to the PIO clearly indicating the permit serial number, or• the weighing be done under the control of a person nominated by the PIO. <p><i>Evidence of load sharing</i></p> <p>In addition, the road controlling authority may, by exception, require evidence of satisfactory load sharing of vehicles that have non-compliant suspension systems.</p>

B4.2 Weighing mobile plant

Permit weight endorsement Fixed mass mobile plant (such as motor scrapers, forklifts or mobile cranes) having constant axle masses and dimensions may have their overweight permits endorsed with their certified masses obtained from a supervised weighing site.

Conditions for recognition Police officers recognise such certified masses as an alternative to enforcement weighing, provided that:

- weighings and dimension checks are conducted under police supervision
- only approved and certified weighing equipment is used
- the endorsement applies only to the trips listed on the permit and ceases to have effect when the permit date has expired
- no modifications that affect the certified weights have been made to the vehicle or load
- the vehicle has either a current certificate of fitness or a warrant of fitness, whichever is applicable
- the vehicle complies with the mass limitations imposed by the certificate of loading, and
- the vehicle complies with all the provisions of the Road User Charges Act 1977.

B4.3 Mobile crane weight certificates

Fixed weight mobile crane

To prevent repeated enforcement weighing of a fixed weight mobile crane, a mobile crane weight certificate may be issued by the Crane Association of New Zealand.

The certificate incorporates a detailed description of major accessories likely to significantly affect the mass. It also includes photographs.

Not routinely weighed

Cranes issued with a mobile crane weight certificate are not routinely weighed by police officers, provided they meet all the conditions for recognition listed in section *B4.2 Weighing mobile plant* above.

Enforcement weighing

The above does not prevent police from weighing a mobile crane if they consider there is good reason to do so.

Chapter B5: Route requirements

Overview

About this chapter

This chapter describes the routes vehicles operating under an overweight permit may follow. Route limitations and restrictions may be a condition of an overweight permit.

In this chapter

This chapter contains the following sections:

Section	See page
B5.1 Alternative routes	B5-2
B5.2 Use of local bypasses for weak bridges	B5-3
B5.3 Use of motorways	B5-4

B5.1 Alternative routes

**When
alternative
routes may be
required**

In general, permits are issued for the route desired by the applicant.

If there are bridges that cannot be bypassed and that have decks with a deck loading ratio (DLR) exceeding 130%, the bridge consultant may require that an alternative route be used.

B5.2 Use of local bypasses for weak bridges

**When
bypasses may
be required**

Where an acceptable ford, railway level crossing or other crossing is available as an alternative to a bridge that would require bridge engineering supervision, the bridge consultant may require that such an alternative crossing be used instead of the bridge.

B5.3 Use of motorways

Why motorway travel may be restricted

In general overweight vehicles are allowed to use the motorway network in preference to urban roads and streets. The principal restriction on the use of motorways is the need to reduce the hazard from vehicles that cannot operate at a reasonable speed.

Vehicles not permitted to travel on motorway

Vehicles are not permitted to travel on motorways if they:

- cannot operate safely at 70km/h or greater, or
 - are restricted to a maximum speed of 50km/h or less as a condition of the overweight permit.
-

Speeds lower than 70km/h

Motorway travel at speeds below 70km/h may be permitted at the discretion of Waka Kotahi's Manager, System Management (regional), provided additional local conditions covering vehicle movement (eg time of travel) are also imposed.

Appropriate local conditions for motorway travel are determined by the Manager, System Management (regional) in consultation with the police and the heavy transport industry.

Evidence of capability

In some cases, evidence of the vehicle's speed capability may be required from the vehicle manufacturer.

Chapter B6: Bridge engineering self supervision (BESS)

Overview

About this chapter

Some bridges may be at risk of being damaged by vehicles operating under an overweight permit. The permit may therefore specify restrictions on speed, vehicle positioning or traffic management to reduce the load effects on certain bridges.

To ensure such restrictions are complied with, permits also specify supervision requirements for bridge crossings. Permits specify whether supervision:

- can be carried out by bridge engineering self supervision (BESS), or
- must be done by a qualified bridge engineering consultant.

This chapter describes the BESS system that enables operators to supervise their own bridge crossings.

Supervision by a bridge engineering consultant is covered in the next chapter.

Results of BESS

The effect of BESS has been largely to eliminate the use of Waka Kotahi consultants for bridge crossings with restrictions on state highways and the associated costs and delays.

In this chapter

This chapter contains the following sections:

Section	See page
B6.1 General BESS policy	B6-2
B6.2 Getting BESS registered – companies	B6-5
B6.3 Getting BESS registered – drivers	B6-7
B6.4 Breaches of BESS conditions	B6-10
B6.5 Traffic control at bridge crossings	B6-12

B6.1 General BESS policy

What is BESS? Bridge engineering self supervision (BESS) is a training and registration system for companies and drivers of heavy vehicles that operate under an overweight permit.

When is BESS registration needed? Companies and drivers must be registered for bridge engineering self supervision (BESS) if they operate a heavy motor vehicle under an overweight permit with bridge restrictions.

What bridge restrictions may apply? Bridge restrictions on a permit may be:

- speed limits when crossing a bridge to reduce the dynamic load effects on the bridge
- removal of other traffic crossing at the same time to reduce total load effects, and/or
- positioning the vehicle (usually in the centre) to optimise load distribution over the bridge.

Supervision by bridge engineer Under specific circumstances, bridge capacity and/or traffic safety considerations may necessitate that qualified bridge engineering consultants supervise bridge crossings. Load pilots and/or traffic controllers may also need to be involved – see *Chapter B7: Bridge engineering supervision and traffic safety*.

Who is eligible for BESS? Waka Kotahi may approve companies to carry out bridge engineering self supervision if they have a good record of compliance with driving rules, transport legislation, permit conditions and Waka Kotahi's overweight permit policy.

BESS registration of drivers A BESS-approved company can nominate, on the basis of a proven good record, the driver(s) it wishes to have BESS-registered to provide bridge supervision.

Drivers may also apply in their own right for BESS registration without being nominated by a company.

Drivers accepted for BESS registration must sit and pass the NZQA unit standard 23436.

For details see section *B6.3 Getting BESS registered – drivers*.

Continued on next page

B6.1 General BESS policy continued

Register	Waka Kotahi keeps a register of approved companies, together with a schedule of approved drivers.
Permit conditions	Permit issuing officers specify on an overweight permit if a BESS-registered driver or supervisor is needed and which bridges have restrictions.
Who may supervise bridge crossings under BESS?	<p>Usually, the person who performs bridge engineering self supervision is a BESS-registered driver operating the permitted overweight vehicle.</p> <p>Alternatively, a BESS-registered supervisor may accompany the driver to control any restricted bridge crossings and ensure that restrictions on the permit are complied with.</p> <p>Pilots who are BESS-registered cannot act as a BESS driver as well as act as a pilot for a bridge crossing.</p>
Advice of damage	<p>The BESS driver or supervisor, or the overweight permit holder, must advise the road controlling authority or the Manager, System Management (regional) at the relevant Waka Kotahi office of any damage associated with a bridge crossing on a state highway.</p> <p>Such advice should be given as soon as possible, but in any event within 24 hours of the crossing.</p>
Disqualification	<p>If permit conditions are breached, Waka Kotahi may disqualify the company and/or the driver and remove their names from the BESS register.</p> <p>For details see sections <i>B6.4 Breaches of BESS conditions</i>.</p>
Reinstatement after disqualification	Companies that provide evidence of measures taken to avoid a recurrence of a breach of an overweight permit may be reinstated to the BESS register after six months.

Continued on next page

B6.1 General BESS policy continued

Appealing against a BESS decision

Companies or drivers may appeal to Waka Kotahi's Manager Permitting against a decision about their BESS registration, such as a declined application or disqualification.

The Manager Permitting will convene a review panel, which will review the initial decision and any additional information submitted and provide a final decision in writing.

B6.2 Getting BESS registered – companies

Company registration requirements

To be eligible for BESS registration, companies must:

- be valid legal entities
 - hold a transport service licence (TSL), if applicable, and
 - have a good record of compliance with driving rules, transport legislation and permit conditions.
-

Considerations and consultation

When assessing applications for BESS registration, Waka Kotahi considers the compliance record of the company together with advice received from consultants and other road controlling authorities.

Provisional registration

If there are concerns about a company's traffic offence history or compliance record, Waka Kotahi may approve BESS registration on a six-month trial basis.

Waka Kotahi may decline an application in rare cases when there are serious concerns about a company's compliance record.

How to apply for BESS registration

Companies can apply for BESS registration by completing the company application form on Waka Kotahi's website at www.nzta.govt.nz/commercial-driving/permits/overweight-permits/bridge-engineering-self-supervision-bess/.

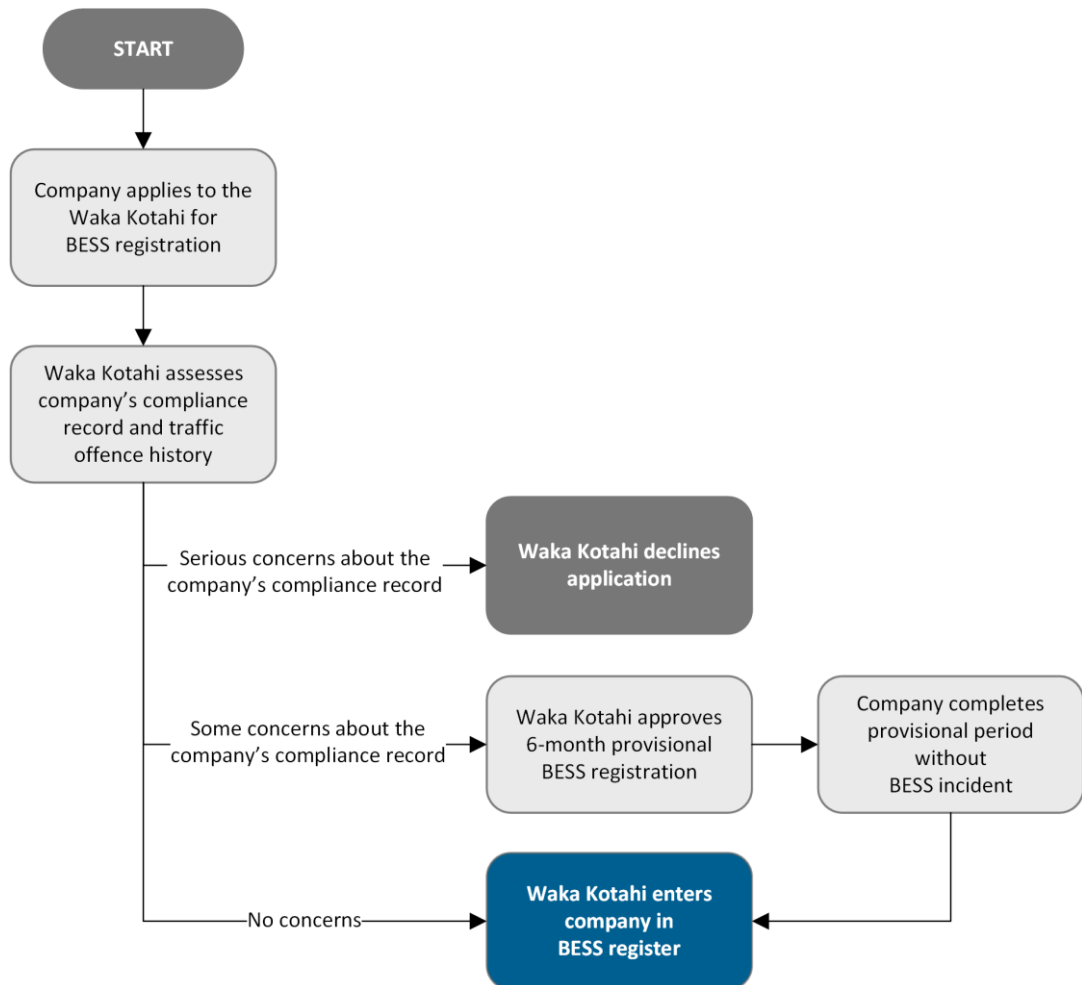
Overview diagram

The diagram on the next page gives an overview of the BESS registration process for companies.

Continued on next page

B6.2 Getting BESS registered – companies continued

Diagram This diagram shows the process for companies to become BESS registered.



B6.3 Getting BESS registered – drivers

Acceptable driver licence classes

To be eligible for BESS registration, drivers must have a current driver licence class 1, 2, 3, 4 or 5 when they apply.

Good driving record

Drivers must also meet Waka Kotahi's criteria for a good driving record, ie:

If in the last 2 years a driver got...	Then the driver is...
less than 50 demerit points	eligible for BESS training and full registration valid for 5 years.
50-99 demerit points	eligible for BESS training and provisional registration for 6 months.
100 or more demerit points	not eligible for BESS training and registration.

BESS training

A driver eligible for BESS training must sit and pass the NZQA unit standard 23436 within six months from being referred to a BESS assessor by Waka Kotahi.

Provisional or full registration

When a driver has successfully completed BESS training, Waka Kotahi will grant either full or provisional registration based on the driver's demerit points over the last two years (see the table above).

Drivers with provisional registration will automatically receive full BESS registration after six months if they get no more demerit points during the provisional period.

How to apply for BESS registration

Drivers can apply for BESS registration by completing the driver application form on Waka Kotahi's website at www.nzta.govt.nz/commercial-driving/permits/overweight-permits/bridge-engineering-self-supervision-bess/.

Overview diagram

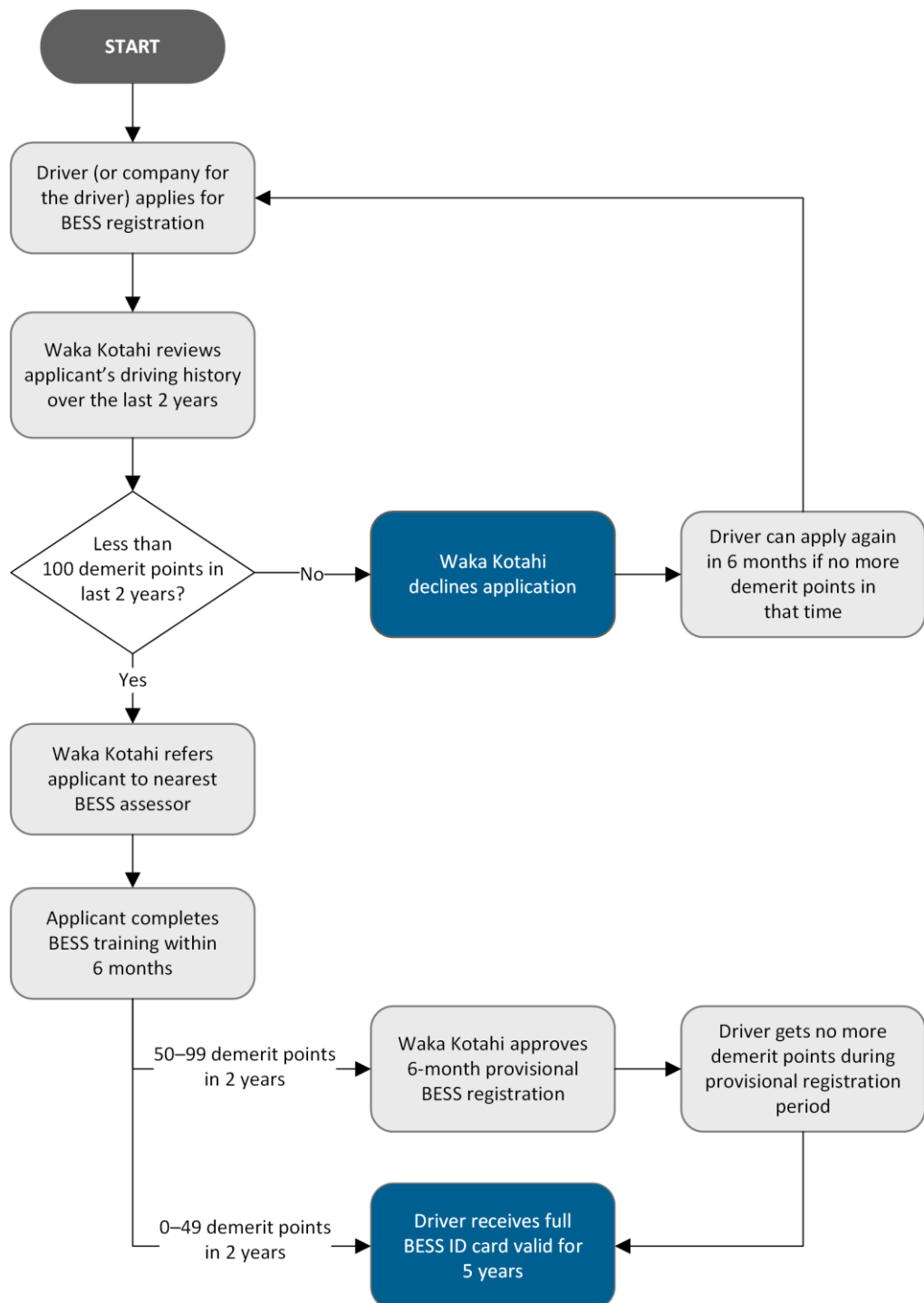
The diagram on the next page gives an overview of the BESS registration process for drivers.

Continued on next page

B6.3 Getting BESS registered – drivers continued

Diagram

This diagram shows the process for drivers to become BESS registered.



Continued on next page

B6.3 Getting BESS registered – drivers continued

Renewing driver registration

BESS driver registration is valid for five years. To renew their registration, drivers must complete a renewal course with a Waka Kotahi approved assessor before their current registration expires.

Companies can book a renewal course on behalf of their drivers.

Approved assessors

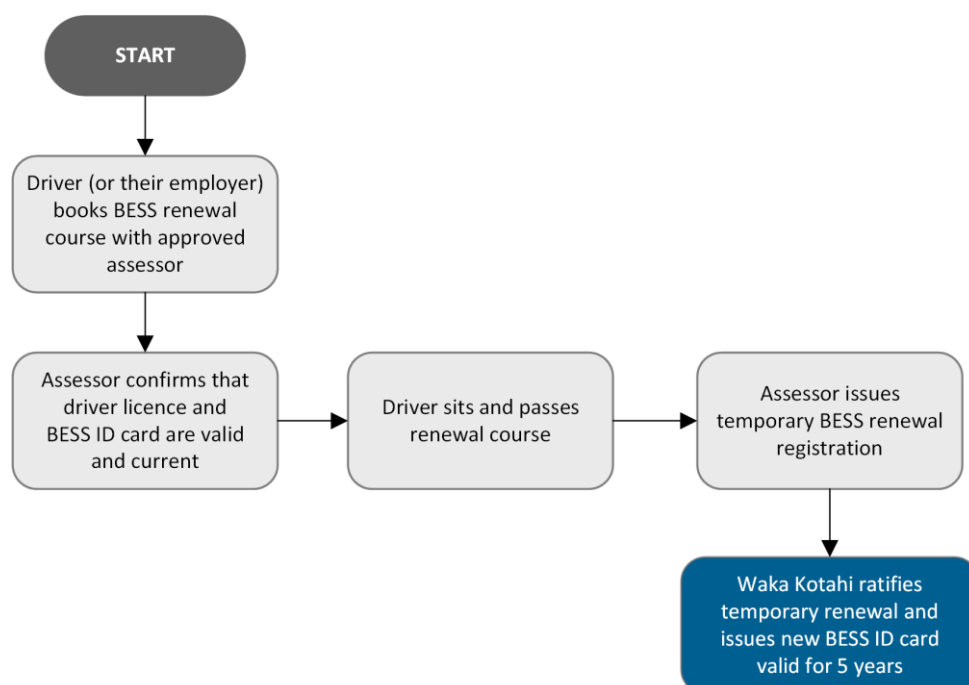
A list of Waka Kotahi approved BESS assessors can be found at www.nzta.govt.nz/commercial-driving/permits/overweight-permits/bridge-engineering-self-supervision-bess/.

What to bring to a renewal course

Drivers must bring their driver licence and their current full BESS ID card to the renewal course.

Overview diagram

The diagram below gives an overview of the BESS driver registration renewal process.



B6.4 Breaches of BESS conditions

Removal from BESS register If a driver or BESS supervisor breaches BESS supervision requirements, Waka Kotahi may disqualify both the company and the driver or supervisor and remove their names from the BESS register.

Minor or first breach If it was a minor or first offence, the company and driver may be put on probation for a period and reinstated on the BESS register if there are no repeat offences during the probation period.

Serious or repeat breaches In the case of serious or repeated breaches of bridge supervision requirements, Waka Kotahi may permanently disqualify a company or driver from the BESS register.

Waka Kotahi may also revoke the company's permits and decline any new permit applications from the company.

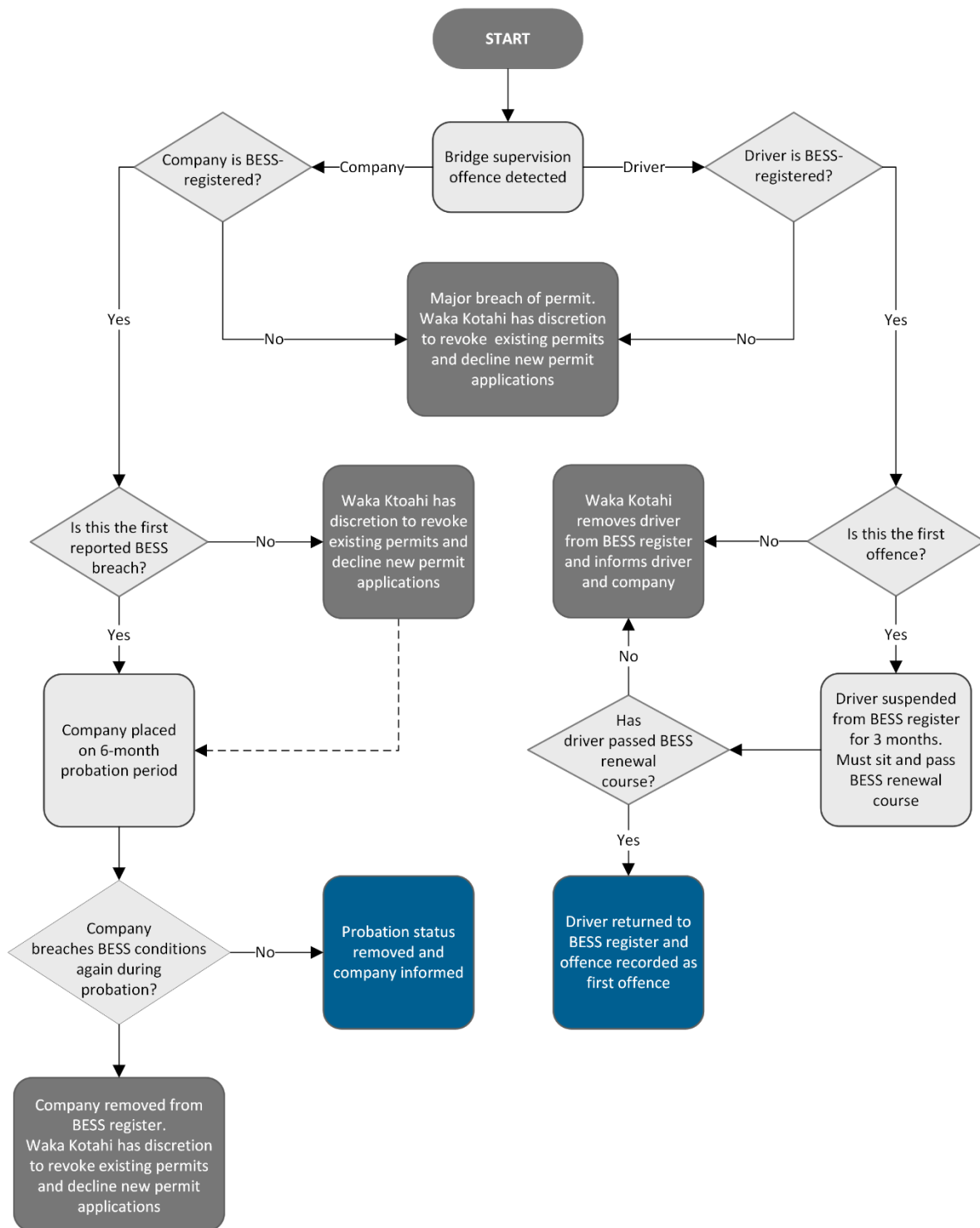
Overview diagram The diagram on the next page shows the process by which Waka Kotahi handles BESS breaches.

Continued on next page

B6.4 Breaches of BESS conditions continued

Diagram

This diagram shows how Waka Kotahi handles breaches of BESS requirements.



B6.5 Traffic control at bridge crossings

Introduction	<p>This section describes traffic control requirements at bridge crossings.</p> <p>Depending on the specific bridge crossing restrictions on an overweight permit, qualified load pilots or traffic controllers may be required to attend bridge crossings in addition to a BESS-registered driver or supervisor.</p>
Approved industry procedure	<p>The New Zealand Heavy Haulage Association and the Crane Association of New Zealand have jointly developed the code of practice <i>Traffic control at bridges being crossed by overweight vehicles</i>.</p> <p>This document meets Waka Kotahi's requirements for traffic control of bridge crossings by overweight vehicles.</p>
Qualification	<p>Traffic controllers who have been registered with either of the New Zealand Heavy Haulage Association or the Crane Association of New Zealand or who have been separately recognised by the road controlling authority may accompany overweight vehicles in order to provide traffic control on bridge crossings as required by this policy.</p> <p>In addition to traffic controllers, a Class 1 or Class 2 pilot may also carry out the traffic control in compliance with the approved industry procedure.</p>
Power to stop vehicles	<p>Any person accompanying an overweight vehicle for which a permit has been issued has the power to stop other vehicles on any road where safety is an issue.</p>

Continued on next page

B6.5 Traffic control at bridge crossings continued

Requirements This table shows the requirements for traffic control at bridge crossings.

Bridge crossing requirement ¹	Risk to other vehicles	Traffic control requirement ⁴
50km/h or 20km/h own lane	Not significant	None required
All 10km/h own lane ('crawl speed') ^{2,3}	Low	Overweight vehicle to have revolving amber light or flashing amber light visible from the rear. If the vehicle is also overdimension, it must have rear facing retro-reflective hazard panels. See <i>Part C: Overdimension permits</i> in this volume.
All 10km/h central or 10km/h offset ^{2,5}	High	Provide qualified traffic controllers or Class 1 or Class 2 certified pilots ⁶ using approved industry procedures.

Notes to table:

- 'Bridge crossing requirement' refers to the bridge engineering supervision requirements, which are outputs from Waka Kotahi's overweight permitting system. It is expected that permits issued by local road controlling authorities using alternative methods follow a similar pattern.
- Operators may need to provide a traffic controller for own lane travel (20km/h or crawl) if other heavy vehicles have to be prevented from travelling on the same bridge as the overweight vehicle.
A minimum separation of 100 metres is required between the overweight vehicle and any other heavy vehicle travelling in the same direction.
- 'Crawl speed' means not exceeding a uniform speed of 10km/h.
- Vehicles or loads exceeding 3.1 metres in width may require a pilot under the VDAM Rule, irrespective of the bridge crossing requirements.
- For 10km/h central or 10km/h offset on one lane bridges, overweight vehicles must comply with the low risk traffic control requirements given in the table.
- Class 1 and Class 2 pilots are certified under Waka Kotahi's scheme for classifying pilots used to escort overdimension vehicles and loads.

Chapter B7: Bridge engineering supervision and traffic safety

Overview

About this chapter

This chapter describes bridge engineering supervision requirements for overweight vehicles by qualified engineering consultants.

For information on bridge engineering self supervision (BESS), see *Chapter B6: Bridge engineering self supervision (BESS)*.

In this chapter

This chapter contains the following sections:

Section	See page
B7.1 Bridge engineering supervision as a permit condition	B7-2
B7.2 Roles and responsibilities in bridge engineering supervision	B7-3
B7.3 Arrangements for rendezvous with bridge supervisor	B7-4
B7.4 Bridge engineering supervision fees	B7-5

B7.1 Bridge engineering supervision as a permit condition

General policy Overweight permits specify bridge engineering supervision as a condition for any bridge on the route that needs special positional and/or speed controls to keep the effects of the vehicle to within the bridge's capacity.

Under specific circumstances, for example during bridge maintenance work, an overweight permit may specify that a qualified bridge engineering consultant must supervise bridge crossings.

Legal basis Under the VDAM Rule, a road controlling authority may:

- impose bridge supervision controls on an overweight vehicle, and
- have its authorised officers ensure that the conditions are met.

Legislation reference: VDAM Rule, section 5.8(5)(f) and 5.8(5)(g).

B7.2 Roles and responsibilities in bridge engineering supervision

Who does it? Bridge engineering supervision is normally carried out by personnel directly responsible for maintaining the structural integrity of the bridge.

For travel on state highways, the bridge supervision service is provided by Waka Kotahi's bridge engineering consultants.

What is involved? Bridge engineering supervision involves checking that the overweight vehicle complies with the permit conditions on bridge crossings.

In many cases a speed restriction with the vehicle remaining in its own lane is sufficient.

For details see section *B6.5 Traffic control at bridge crossings*.

Who is responsible for safety? The responsibility for traffic safety during bridge crossings rests principally with the holder of the overweight permit.

During bridge crossings, bridge engineering consultants limit their routine activities to the protection of the structure, rather than the direction and control of traffic.

Pilots and traffic controllers If complying with supervision conditions means that the overweight vehicle has an impact on traffic safety, then the requirement for a certified load pilot to be present to warn other traffic may also be specified as a permit condition.

For details see section *B6.5 Traffic control at bridge crossings*.

Record of supervision Bridge engineering consultants should keep a record of each bridge crossing for which they have provided supervision. These records must be supplied to Waka Kotahi on request.

Inspecting for damage Road controlling authorities may require that the bridge engineering consultant inspect the bridge for damage after the overweight vehicle has crossed.

The bridge consultant must immediately report any damage observed on a state highway bridge to the Manager, System Management (regional) at the relevant regional Waka Kotahi office.

In the event of an emergency, the police must be notified immediately.

B7.3 Arrangements for rendezvous with bridge supervisor

24-hour notice If supervision by a bridge engineer is a condition of your overweight permit, you must contact the bridge engineering consultant at least 24 hours before the bridge crossing and arrange a meeting at a convenient place before the bridge.

Delay If your overweight vehicle is delayed through unforeseen circumstances, you must make every effort to contact the bridge consultant and change the arranged rendezvous time.

Failure to rendezvous If your overweight vehicle fails to rendezvous within one hour of the time arranged, the crossing arrangements will be deemed to have been cancelled.
The bridge consultant should advise the permit issuing officer of the failure.

Fee incurred Failure to rendezvous incurs a fee – see the next section *B7.4 Bridge engineering supervision fees*.

B7.4 Bridge engineering supervision fees

Scale of fees A bridge engineering supervision fee is charged at the rates below for engineering supervision of state highway bridges:

Fee type	Fee (GST exclusive)
Each bridge crossed under supervision However, there is a maximum per trip, as follows:	\$40
• on trips up to 160km	\$80
• on trips between 160km and 320km	\$160
• on trips over 320km	\$240
Failure to rendezvous	\$40

Local authority fees Local authorities may have other fee scales for local bridges.

Return trips Bridge engineering supervision fees are charged for both directions of a return trip.

Multiple trip permits A separate bridge engineering supervision fee is charged for each of the trips of a multiple trip permit.

Failure to rendezvous If bridge supervision is cancelled because of failure to rendezvous, then you will be charged the equivalent to one supervised crossing.

Payment of fees Bridge engineering supervision fees for the complete permit movement and any adjustments must be paid to the office issuing the permit.
The permitting office then pays the road controlling authority.

Adjustments Fee adjustments may arise because of bridges that were not crossed, additional crossings or by failure to rendezvous.

Chapter B8: How to apply for an overweight permit

Overview

About this chapter

This chapter describes how to apply for an overweight permit.

Audience

The audience for this chapter is transport operators who need overweight permits.

In this chapter

This chapter contains the following sections:

Section	See page
B8.1 Where to apply for an overweight permit?	B8-2
B8.2 Overview diagrams of the overweight permitting process	B8-4
B8.3 Before you apply for an overweight permit	B8-6
B8.4 Applying for a permit for ISO containers	B8-7
B8.5 Specialist analysis of overweight permit applications	B8-8
B8.6 Overweight permit types – overview	B8-10
B8.7 Single trip permits	B8-12
B8.8 Multiple trip permits	B8-13
B8.9 Continuous permits	B8-14
B8.10 Completing and submitting an overweight permit application	B8-15
B8.11 Permit fees and processing time	B8-17

B8.1 Where to apply for an overweight permit?

State highways

Waka Kotahi NZ Transport Agency as road controlling authority has the authority to issue permits for overweight movements on state highways. This authority is delegated to permit issuing officers (PIOs).

Local roads

For roads under the control of a local road controlling authority (RCA), the local RCA is responsible for issuing overweight permits for local roads (ie roads that are not state highways) within its boundary.

Most local authorities that issue overweight permits follow the policies described in this part of the manual.

Delegated authority

Some local road controlling authorities have delegated authority to issue overweight permits for local roads under their control to Waka Kotahi. If Waka Kotahi has such delegated authority, it may issue permits for local roads for these areas on behalf of the road controlling authority.

Contact the local RCA or Waka Kotahi office in your region to find out about local arrangements.

Multiple regions involved

For single and multiple trip permits across several Waka Kotahi permit regions, the PIO of the region where you apply for the permit generally issues a permit for the complete journey. The PIO of the region where the journey starts first obtains clearance to travel within the other region(s) from other regional PIOs.

Continuous permits are issued by permit region. If you need continuous permits for several Waka Kotahi regions, you must apply for a permit in each region.

For a list of permit regions see www.nzta.govt.nz/resources/.

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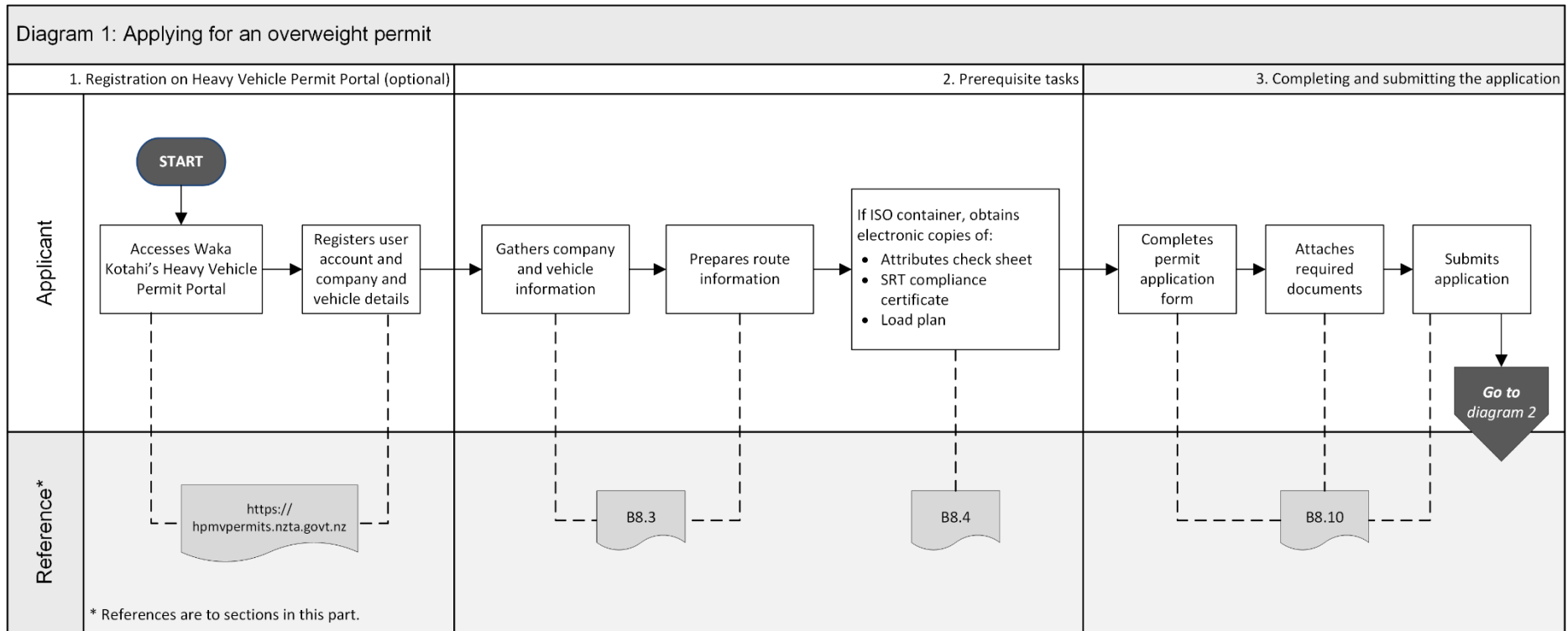
B8.1 Where to apply for an overweight permit? continued

Where to apply Refer to the table below to determine where to apply for the overweight permit(s) that you need.

For the part of your route that is on...	Apply to the...
state highways	Waka Kotahi via the Heavy Vehicle Permit Portal (see section B8.10)
local roads	<ul style="list-style-type: none">• local RCA, or• Waka Kotahi if the local RCA has delegated permit issuing authority for local roads

B8.2 Overview diagrams of the overweight permitting process

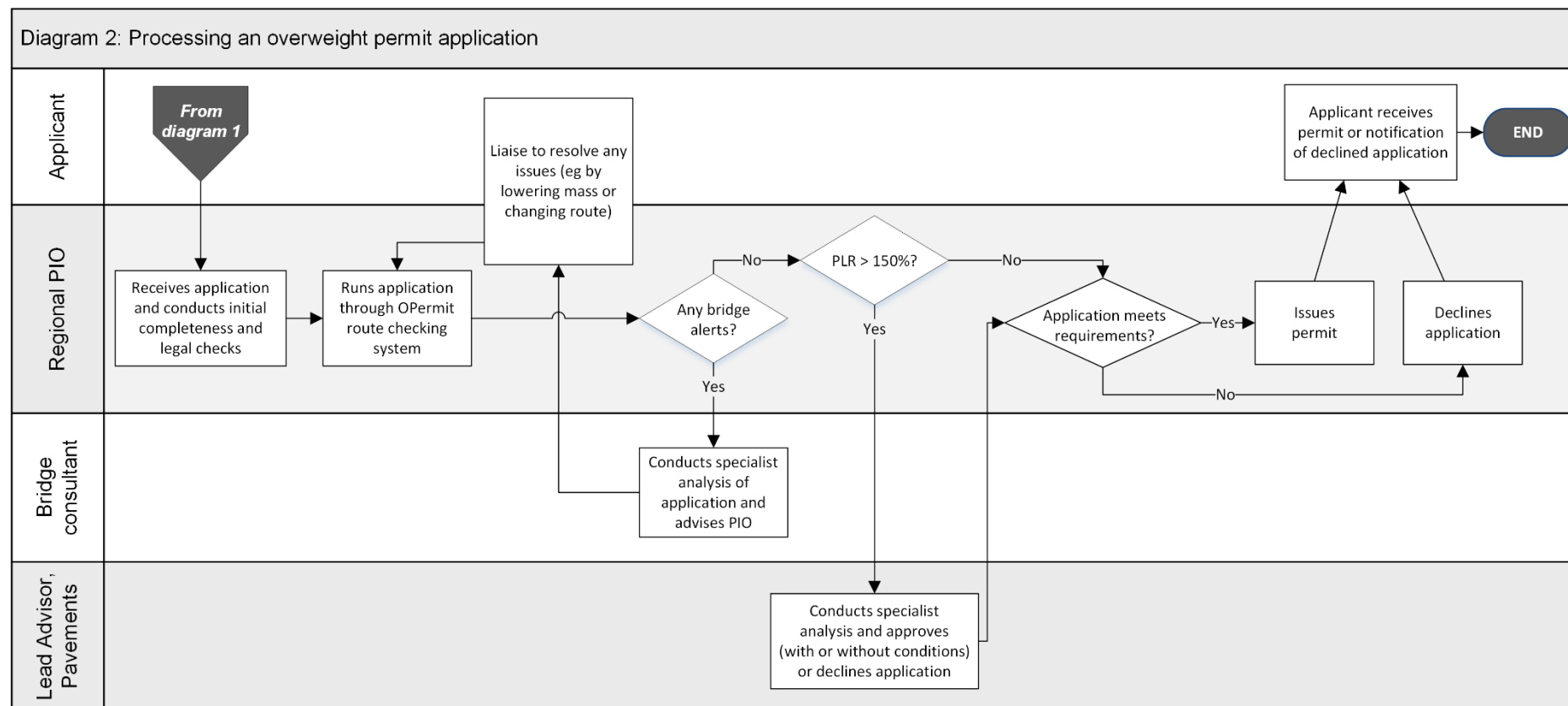
Diagram 1 This diagram shows the steps involved in applying for an overweight permit.



Continued on next page

B8.2 Overview diagrams of the overweight permitting process continued

Diagram 2 This diagram illustrates how Waka Kotahi processes an overweight permit application.



B8.3 Before you apply for an overweight permit

Introduction	This section describes prerequisites to being eligible and the information and documentation required for an overweight permit application.
BESS registration	<p>To be eligible for continuous permits, companies must be BESS-registered.</p> <p>For other permit types, applicants are generally required to be registered for bridge engineering self supervision (BESS) if their route includes bridges that have crossing restrictions and supervision requirements.</p> <p>For details see <i>Chapter B6: Bridge engineering self supervision (BESS)</i>.</p>
Accurate masses and axle spacings	<p>It is essential that you use accurate axle masses on the application form.</p> <p>You must also provide accurate measurements of the distance between axles. Axle spacings must be measured on the laden vehicle from the centre of the first axle to the centre of the last axle.</p>
Route information	<p>You must give specific points of origin and destination of movements as well as details of the proposed route.</p> <p>Waka Kotahi recommends that you submit a map (or maps) with the route clearly marked together with the application form.</p>
Payload description for continuous permits	<p>If you are applying for a continuous permit, you must provide either:</p> <ul style="list-style-type: none">• a list of items to be carried (eg details of construction plant), or• a general description of the payload, eg:<ul style="list-style-type: none">– ‘individual unladen items of construction equipment’, or– ‘one ISO container sealed for export’ (provided this can be supported by documentary evidence of mass if requested by the PIO or the police).
Attributes check sheets	<p>If you are applying for a permit for a vehicle carrying an ISO container, you need to submit a vehicle attributes check sheet together with the application – see the next section <i>B8.4 Applying for a permit for ISO containers</i>.</p>

B8.4 Applying for a permit for ISO containers

Required documentation

If you are applying for an overweight permit for a vehicle carrying an ISO container, you need to supply the following along with your application form:

- a 'High Productivity Motor Vehicle/ISO Permit Attributes Check Sheet' for the prime mover and each trailer listed on the application form
- valid SRT compliance certificates for all trailers listed on the application form, and
- a load plan if SRT option 3 (uniform density SRT at a load height of less than 3.90 metres) is selected on the application form.

For details about SRT options refer to Waka Kotahi's technical bulletin *Memo 70c: SRT requirements for OPermit Export/Import containers*, available at

<https://vehicleinspection.nzta.govt.nz/virms/hvsc/tb/srt-requirements>.

Where to obtain attributes check sheets

Vehicle attributes check sheets can be obtained from a heavy vehicle specialist certifier.

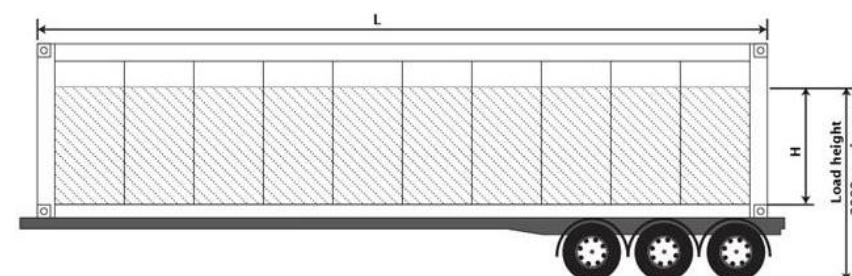
Certifiers must complete and sign the correct Waka Kotahi issued form for each unit of the vehicle combination applied for.

A list of Waka Kotahi approved heavy vehicle specialist certifiers can be found at www.nzta.govt.nz/resources/heavy-vehicle-specialist-certifiers/.

What the load plan must cover

A load plan if SRT option 3 is selected on the application form must show the:

- internal height the container is loaded to ('H' in the diagram below)
- mass of the contents, and
- distance from the road to the top of the load in the container (the load height in the diagram).



The load plan can be in the form of a diagram. It must be carried in the vehicle and shown to an enforcement officer on request.

B8.5 Specialist analysis of overweight permit applications

Introduction When proposed overweight vehicle movements load the route facilities above prescribed limits, Waka Kotahi requires permit issuing officers (PIOs) to refer such permit applications to a bridge consultant and/or the Lead Advisor, Pavements, for consideration.

This section describes what the bridge consultant and Lead Advisor, Pavements, look at if asked to investigate a permit application.

When a bridge consultant gets involved A bridge consultant is asked to analyse bridge decks on a proposed route when the deck loading ratio (DLR) exceeds 130%.

The bridge consultant may also be asked to investigate other bridge issues arising during permit processing.

Permit conditions for bridges The bridge consultant may specify permit conditions to protect bridges, such as the requirement to use a local bypass.

Other actions If the bridge consultant determines that a bridge on the proposed route has insufficient capacity and cannot be bypassed, the bridge consultant may advise the PIO to discuss the following options with the applicant:

- use another route
 - strip or adjust the load to reduce axle masses
 - request further engineering analysis if the applicant is willing to meet the cost, or
 - investigate the use of a more suitable transporter to move the load.
-

When the Lead Advisor, Pavements, gets involved If the pavement loading ratio (PLR) of a proposed overweight movement exceeds 150%, then Waka Kotahi's Lead Advisor, Pavements, must approve the movement before a permit can be issued.

The Lead Advisor, Pavements, will investigate the proposed route of the movement and either approve or decline the movement. He or she may also specify any special conditions or arrangements required as a condition of the permit.

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B8.5 Specialist analysis of overweight permit applications continued

Analysis criteria

Waka Kotahi's Lead Advisor, Pavements, applies the following general criteria in the analysis:

- Can the payload be carried for all or part of the proposed journey by rail or sea transport?
- Is it a non-productive movement (eg sales promotion, routine servicing, etc)?
- Does the size of the item being transported exceed the requirements of use at the destination (eg cranes with surplus lifting capacity, large tractors or motor scrapers for small tasks)?

If any of these apply, the Lead Advisor, Pavements, may reject the application.

B8.6 Overweight permit types – overview

Movement type

There are three types of overweight permit, depending on the frequency of an overweight movement and the route required:

- single trip
- multiple trip, and
- continuous.

These three permit types are covered in more detail in the following sections.

Vehicle fitness testing permit

Single or multiple trip overweight permits may be issued for vehicle fitness testing purposes subject to the following limitations:

- the PLR must not exceed 150% at any time, even if this means driving up to a test site and loading up there
 - sites for brake testing must be limited to sections of road as directed by the road controlling authority, and
 - bridges requiring bridge engineering supervision must not be used.
-

Feasibility study

The application form has the option to apply for a 'Feasibility Study' to find out about the permit eligibility of, for example:

- a new vehicle design
 - a vehicle you wish to import, or
 - a project-specific investigation such as the proposed movements of tunnel-boring machines or large electrical transformers.
-

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B8.6 Overweight permit types – overview continued

Multiple registration permits for identical vehicles

A single overweight permit may be issued for more than one vehicle (or more than one vehicle combination). Such permits are colloquially referred to as 'multi-rego' permits.

To be eligible for a multi-rego permit, the vehicles included must be identical, ie they must meet all the following criteria:

- same model prime mover
 - identical axle spacings
 - same tyre size
 - identical inner and outer wheel track
 - all units (including prime movers) in the combination have a sufficient GVM for the load in question
 - all units (including prime movers) in the combination have sufficient axle ratings for the load in question, and
 - all units (including prime movers) in the combination have sufficient maximum towed mass (MTM), gross combination mass (GCM) and, if applicable, 5th wheel, tow bar and tow ball ratings, etc, for the load in question.
-

B8.7 Single trip permits

Policy	When the payload or route is unique for a particular vehicle or when required dates of travel are spaced well apart, overweight permits are issued for a single trip at a time.
Permit period	The permit is restricted to the date(s) required to complete the proposed movement. The total period allowed for the movement generally does not exceed seven days.
VAI and PLR limits	For VAI and PLR limits for single trip permits, refer to section <i>B2.9 VAI and PLR limits by vehicle and permit type</i> .

B8.8 Multiple trip permits

Policy	One permit may be issued for multiple trips if there is no significant increase in administrative effort in processing the application.
Permit period	<p>The permit may be issued either for a number of specified dates or for a continuous period, but in both cases the expiry date should be no later than one month from the date of issue of the permit.</p> <p><i>Special projects</i></p> <p>Multiple trip permits may be issued for a maximum of six months for specific large projects, such as the movement of multiple bridge beams to a construction site, provided there are no infrastructure issues.</p> <p>The application must include evidence of a specific need if a longer permit period is required.</p> <p>Note: PIOs must obtain approval from Waka Kotahi’s Lead Advisor, Pavements, before issuing a multiple trip permit for longer than six months.</p>
Bridge supervision	When bridge engineering supervision is required for bridges on the route, the exact number of trips must be specified.
VAI and PLR limits	For VAI and PLR limits for multiple trip permits for different vehicles types, refer to section <i>B2.9 VAI and PLR limits by vehicle and permit type</i> .

B8.9 Continuous permits

Policy	Continuous permits are issued for travel on either: <ul style="list-style-type: none">• a network of linked roads, or• in the case of vehicles carrying ISO containers, on specifically named routes that are to and from sea ports.
Permit period	A continuous permit is issued for a maximum of two years.
More than one permit	A vehicle will be issued with more than one continuous permit if it travels across multiple Waka Kotahi permit regions (one permit per region). A list of permit regions can be found at www.nzta.govt.nz/resources/ .
BESS requirement	Continuous permits are granted only to operators who are registered for bridge engineering self supervision. For details see <i>Chapter B6: Bridge engineering self supervision (BESS)</i> .
VAI and PLR limits	For VAI and PLR limits for continuous permits, refer to section <i>B2.9 VAI and PLR limits by vehicle and permit type</i> .
Other conditions	Continuous permits for any type of vehicle are only granted provided that: <ul style="list-style-type: none">• loads to be carried have been substantiated by weighing, or calculations involving known plant masses, to the satisfaction of the bridge consultant• vehicle tare masses are substantiated by weighing at least once in any three-year period, and• unspecified payloads are supported by documented evidence covering both mass and indivisibility.

B8.10 Completing and submitting an overweight permit application

Apply on the permit portal

To apply for an overweight permit from Waka Kotahi, complete and submit the online application form on Waka Kotahi's Heavy Vehicle Permit Portal at <https://hpmvpermits.nzta.govt.nz>.

Registering on the permit portal

To apply on the permit portal, it is recommended to register a user account. Registration is not mandatory, but if you regularly need permits, then having a user account will streamline the application process and save you time.

As a registered user, you can:

- reuse company and vehicle information
- complete applications in stages and save drafts
- monitor the progress of your applications, and
- look up previous applications.

For help with using the permit portal, refer to the portal user guide at <https://hpmvpermits.nzta.govt.nz/home/information>.

Gather required information and documents

It is advisable to have all required information and documents at hand when completing the application form on the permit portal. Unless you are a registered user (see above), you will not be able to save drafts of your application if you have missing information.

Refer to this checklist for the information you need:

- Legal company name and contact details
- Transport service licence (TSL) number, if held
- BESS company registration number, if applicable
- Route information (points of origin and destination, postal codes and electronic map or list of roads)
- Vehicle details (eg registration numbers, make and model, dimensions, GVM, GCM, axle types, masses and spacings, tyre sizes and suspension types), and
- If you are applying for a vehicle transporting an ISO container, electronic copies of attributes check sheets, SRT compliance certificates and load plan (for details see section *B8.4 Applying for a permit for ISO containers*).

Continued on next page

B8.10 Completing and submitting an overweight permit application continued

Trouble-shooting when completing the form

You must complete all fields in the online form marked with an asterisk (*).

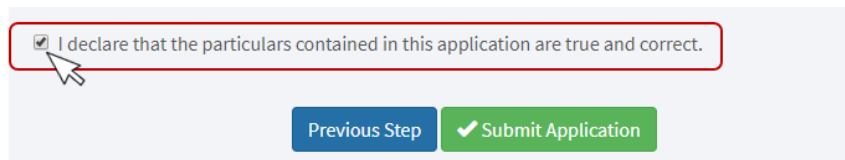
If the portal system does not advance to the next page when you are completing the form, then one or more fields have either missing or incomplete information.

To identify the error, scroll through the page and correct any errors until the red outlines around fields disappear.

Tip: A common error is not entering numbers in the required format. You must enter numerical values to two decimal places and without commas.

Formal declaration

Before you submit your application, you must select the tick box above the Submit button to declare that the particulars you have provided in your application are true and correct.



The screenshot shows a form interface. At the top, there is a tick box followed by the text "I declare that the particulars contained in this application are true and correct." A mouse cursor is pointing at the tick box. Below this text are two buttons: a blue button labeled "Previous Step" and a green button labeled "Submit Application" with a white checkmark icon.

Note: By selecting the tick box, you are making a formal declaration. False statements could be open to prosecution and subject to a penalty of up to \$10,000.

Legislation reference: Land Transport Act 1998, section 44.

Summary email

After submitting a permit application, you will receive an automatic email confirming that Waka Kotahi has received your application.

The email includes a reference number that allows you to track the progress of your application if you are a registered permit portal user.

Note: If you do not receive the confirmation email, Waka Kotahi has not received your application. For assistance contact Waka Kotahi on 0800 699 000.

B8.11 Permit fees and processing time

Permit fees	For the standard fees for overweight permits, see section A1.8 in <i>Part A: Introduction to VDAM permits</i> in this volume of the manual.
Permit processing times	<p>Waka Kotahi will make every effort to process overweight permit applications quickly.</p> <p>In general, permits are issued within two to five working days, depending on the permit type. For details, see section <i>A1.9 Permit processing times</i> in this volume.</p>
Delays to travel	Single or multiple trip permits that involve travel across several regions take longer to process. It may also be necessary to delay travel if the permit specifies bridge engineering supervision requirements, which involve at least 24 hours' notice. Take such possible delays into account when applying for a permit.

Chapter B9: Calculating the vehicle axle index (VAI)

Overview

About this chapter

This chapter describes how to calculate the vehicle axle index (VAI). It includes worked examples.

In this chapter

This chapter contains the following sections:

Section	See page
B9.1 What is the vehicle axle index (VAI)?	B9-2
B9.2 Types of tyre	B9-3
B9.3 Types of axle	B9-4
B9.4 Calculating the VAI	B9-6
B9.5 Reference axle masses for standard-tyred axles	B9-9
B9.6 Reference axle masses and contact areas for large tyres	B9-11
B9.7 Reference axle masses and contact areas for mega tyres	B9-13
B9.8 Reference axle masses and contact areas for single specified standard-tyred axles spaced at 2.4 metres or more	B9-17
B9.9 Reference axle masses and contact areas for twin small-tyred axles spaced at 2.4 metres or more	B9-18
B9.10 Example – Calculating the VAI for a transporter	B9-19
B9.11 Example – Calculating the VAI for an articulated vehicle	B9-20
B9.12 Example – Calculating the VAI for a mobile crane	B9-22
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B9.1 What is the vehicle axle index (VAI)?

Definition of VAI The vehicle axle index (VAI) is a rating determined by a road controlling authority that:

- indicates the relative effect on road pavements and bridge decks of the mass on the axles of a vehicle compared to standard axle mass, and
- describes the highest rating for any of the axles on the vehicle.

Axle index (AI) The AI is given by:

$$AI = \frac{\text{Axle mass}}{\text{Reference axle mass for that axle}}$$

Reference axle mass The reference axle mass for any axle is a nominal allowable mass given to that axle which takes into account the axle type and spacing.

The reference axle mass is the mass for the specified axle and tyres that has the same pavement effects as the standard legal axle mass.

Reference axle masses for various axle types and spacings are listed in the tables in sections B9.5 to B9.9 below.

Basis of calculation Waka Kotahi's vehicle parameter calculations, in particular VAI, are based on axle groups and not axle sets.

Axles are considered to be in a group if all spacings are less than 2.4 metres.

Spaced axle A spaced axle is an axle that is 2.4 metres or more from the nearest axle.

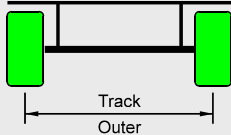
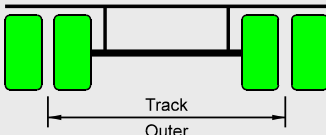
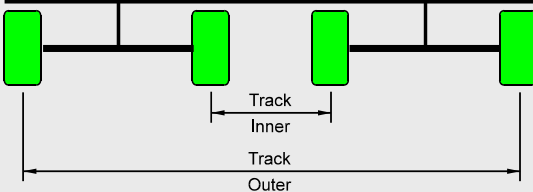
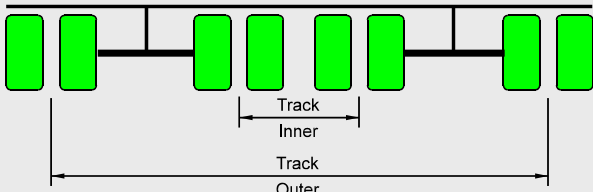
B9.2 Types of tyre

Types of tyre This table shows the types of tyre generally involved in overweight permit applications.

Tyre type	Description
Standard	<ul style="list-style-type: none"> Any tyre with a manufacturer's designated tyre section width of less than 355mm Legal status as per the VDAM Rule <p>Note: Only standard tyres are used on twin-tyred axles and oscillating axles.</p>
Large	<ul style="list-style-type: none"> Any tyre with a manufacturer's designated tyre section width of 355mm or more but less than 444mm Legal status as per the VDAM Rule Tyre designation listed in the table in section B9.6
Mega	<ul style="list-style-type: none"> Any tyre with a manufacturer's designated tyre section width of 444mm or more Legal status as per the VDAM Rule Tyre designation listed in the table in section B9.7
Specified standard	<ul style="list-style-type: none"> Standard tyres with their tyre designation listed in section B9.8 Specified by Waka Kotahi for use in vehicle parameter calculations Can have larger footprint areas, and hence higher reference axle masses, than standard tyres No legal status (legally defined as standard tyres)
Small standard	<ul style="list-style-type: none"> Standard tyres with their tyre designation listed in section B9.9 Specified by Waka Kotahi for use in vehicle parameter calculations Have smaller footprint areas, and hence lower reference axle masses, than standard tyres No legal status (legally defined as standard tyres)

B9.3 Types of axle

Types of axle This table shows the different types of axle referred to in this manual, and their codes.

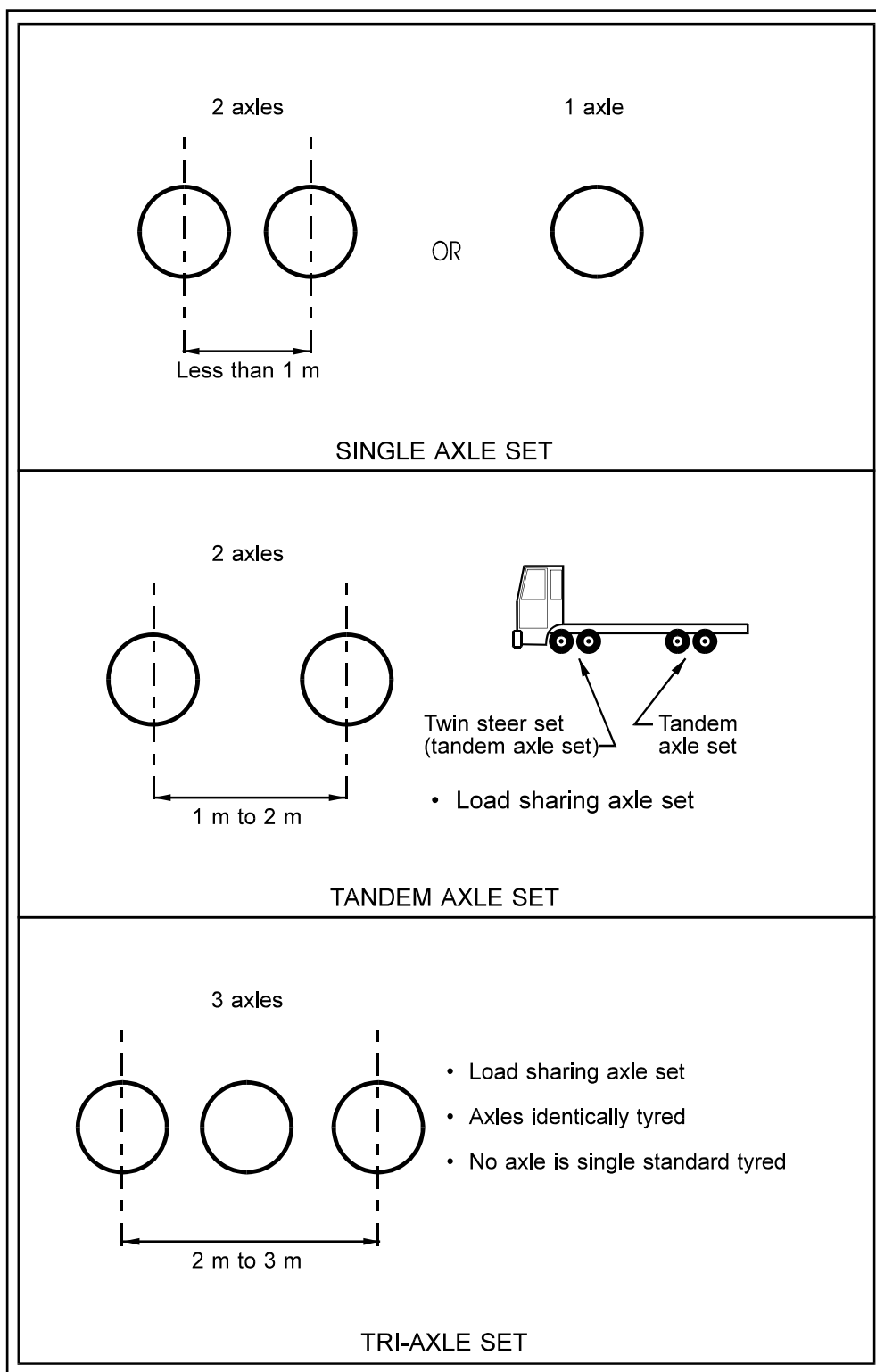
Axle type	Code
 <p data-bbox="475 741 655 763">SINGLE-TYRED AXLE</p>	<p data-bbox="938 510 1023 539"><i>Either:</i></p> <ul data-bbox="938 555 1369 741" style="list-style-type: none"> • Single standard-tyred: S • Single large-tyred: SL • Single mega-tyred SM
 <p data-bbox="483 1003 647 1025">TWIN-TYRED AXLE</p>	<p data-bbox="1158 902 1174 931">T</p>
 <p data-bbox="424 1267 711 1290">FOUR-TYRED OSCILLATING AXLE</p>	<p data-bbox="1150 1167 1182 1196">(4)</p>
 <p data-bbox="424 1525 711 1547">EIGHT-TYRED OSCILLATING AXLE</p>	<p data-bbox="1150 1435 1182 1464">(8)</p>

Continued on next page

B9.3 Types of axle continued

Axle sets

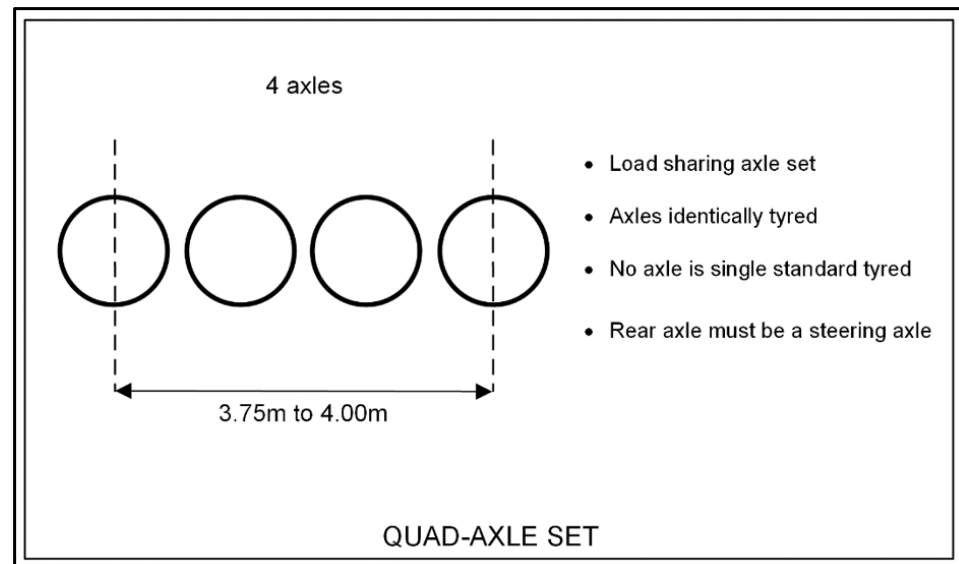
This diagram illustrates the different axle sets.



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B9.3 Types of axle continued

Axle sets (continued)



B9.4 Calculating the VAI

Procedure for calculating VAI

Follow these steps to calculate the VAI for a particular vehicle.

Step	Action																														
1	Obtain the following for the vehicle: <ul style="list-style-type: none"> • axle types • axle spacings • axle masses 																														
2	For each axle, determine the number of axles in the axle group.																														
3	For each axle on the vehicle, look up and note down the value(s) for the reference axle mass using the following table: <table border="1" data-bbox="603 808 1406 1626"> <thead> <tr> <th>If the tyre size is...</th> <th>Then look up the value for the axle in section...</th> <th>And also the value in section...</th> </tr> </thead> <tbody> <tr> <td>standard-tyred</td> <td>B9.5</td> <td>N/A</td> </tr> <tr> <td>single large-tyred spaced</td> <td>B9.6</td> <td>N/A</td> </tr> <tr> <td>single mega-tyred spaced</td> <td>B9.7</td> <td>N/A</td> </tr> <tr> <td>large-tyred other than single-tyred spaced</td> <td>B9.5</td> <td>B9.6</td> </tr> <tr> <td>mega-tyred other than single-tyred spaced</td> <td>B9.5</td> <td>B9.7</td> </tr> <tr> <td>single specified standard-tyred spaced</td> <td>B9.8</td> <td>N/A</td> </tr> <tr> <td>specified standard other than single-tyred spaced</td> <td>B9.5</td> <td>B9.8</td> </tr> <tr> <td>twin small standard-tyred spaced</td> <td>B9.9</td> <td>N/A</td> </tr> <tr> <td>twin small standard-tyred in a group</td> <td>B9.5</td> <td>B9.8</td> </tr> </tbody> </table>	If the tyre size is...	Then look up the value for the axle in section...	And also the value in section...	standard-tyred	B9.5	N/A	single large-tyred spaced	B9.6	N/A	single mega-tyred spaced	B9.7	N/A	large-tyred other than single-tyred spaced	B9.5	B9.6	mega-tyred other than single-tyred spaced	B9.5	B9.7	single specified standard-tyred spaced	B9.8	N/A	specified standard other than single-tyred spaced	B9.5	B9.8	twin small standard-tyred spaced	B9.9	N/A	twin small standard-tyred in a group	B9.5	B9.8
If the tyre size is...	Then look up the value for the axle in section...	And also the value in section...																													
standard-tyred	B9.5	N/A																													
single large-tyred spaced	B9.6	N/A																													
single mega-tyred spaced	B9.7	N/A																													
large-tyred other than single-tyred spaced	B9.5	B9.6																													
mega-tyred other than single-tyred spaced	B9.5	B9.7																													
single specified standard-tyred spaced	B9.8	N/A																													
specified standard other than single-tyred spaced	B9.5	B9.8																													
twin small standard-tyred spaced	B9.9	N/A																													
twin small standard-tyred in a group	B9.5	B9.8																													

Continued on next page

B9.4 Calculating the VAI continued

Procedure for calculating VAI (continued)

Step	Action																
4	<p>Use the following table to calculate the reference axle mass for the axle.</p> <table border="1"> <thead> <tr> <th>If the tyre size is...</th> <th>Then the reference axle mass is...</th> </tr> </thead> <tbody> <tr> <td>standard-tyred</td> <td>the single value from step 3 above.</td> </tr> <tr> <td>single large-tyred spaced</td> <td>the single value from step 3 above.</td> </tr> <tr> <td>large-tyred other than single-tyred spaced</td> <td>the two values from step 3 multiplied and then divided by: <ul style="list-style-type: none"> • 5.4 if the axle is single-tyred • 6.7 if the axle is twin-tyred. </td> </tr> <tr> <td>single specified standard-tyred spaced</td> <td>the single value from step 3 above.</td> </tr> <tr> <td>specified standard other than single-tyred spaced</td> <td>the two values from step 3 multiplied and then divided by: <ul style="list-style-type: none"> • 5.4 if the axle is single-tyred • 6.7 if the axle is twin-tyred. </td> </tr> <tr> <td>twin small standard-tyred spaced</td> <td>the single value from step 3 above.</td> </tr> <tr> <td>twin small standard-tyred in a group</td> <td>the two values from step 3 multiplied and then divided by 8.2.</td> </tr> </tbody> </table>	If the tyre size is...	Then the reference axle mass is...	standard-tyred	the single value from step 3 above.	single large-tyred spaced	the single value from step 3 above.	large-tyred other than single-tyred spaced	the two values from step 3 multiplied and then divided by: <ul style="list-style-type: none"> • 5.4 if the axle is single-tyred • 6.7 if the axle is twin-tyred. 	single specified standard-tyred spaced	the single value from step 3 above.	specified standard other than single-tyred spaced	the two values from step 3 multiplied and then divided by: <ul style="list-style-type: none"> • 5.4 if the axle is single-tyred • 6.7 if the axle is twin-tyred. 	twin small standard-tyred spaced	the single value from step 3 above.	twin small standard-tyred in a group	the two values from step 3 multiplied and then divided by 8.2.
If the tyre size is...	Then the reference axle mass is...																
standard-tyred	the single value from step 3 above.																
single large-tyred spaced	the single value from step 3 above.																
large-tyred other than single-tyred spaced	the two values from step 3 multiplied and then divided by: <ul style="list-style-type: none"> • 5.4 if the axle is single-tyred • 6.7 if the axle is twin-tyred. 																
single specified standard-tyred spaced	the single value from step 3 above.																
specified standard other than single-tyred spaced	the two values from step 3 multiplied and then divided by: <ul style="list-style-type: none"> • 5.4 if the axle is single-tyred • 6.7 if the axle is twin-tyred. 																
twin small standard-tyred spaced	the single value from step 3 above.																
twin small standard-tyred in a group	the two values from step 3 multiplied and then divided by 8.2.																
5	<p>Calculate the axle index (AI) for the axle using:</p> $AI = \frac{\text{Axle mass}}{\text{Reference axle mass from step 4}}$																
6	<p>Repeat steps 3 to 5 until you have calculated the AI for all axles.</p> <p>Result: The highest AI for the vehicle is the vehicle axle index.</p>																

B9.5 Reference axle masses for standard-tyred axles

**Table for
standard-tyred
axles**

This table shows the reference axle masses in tonnes for various configurations of standard type axle.

Axles in group	Distance (m) to nearest axle	Axle types			
		S	T	(4)	(8)
1	2.4 or more	5.4	8.2	9.5	11.8
2	1.0 or more	4.8	7.3	8.4	10.5
	1.1 or more	4.8	7.3	8.5	10.5
	1.2 or more	4.8	7.3	8.5	10.5
	1.3 or more	4.9	7.4	8.5	10.6
	1.4 or more	4.9	7.4	8.6	10.7
	1.5 or more	4.9	7.5	8.7	10.8
	1.6 or more	5.0	7.5	8.7	10.8
	1.7 or more	5.0	7.6	8.8	10.9
	1.8 or more	5.1	7.7	8.9	11.0
	1.9 or more	5.1	7.8	9.0	11.2
	2.0 or more	5.2	7.8	9.1	11.3
	2.1 or more	5.2	7.9	9.2	11.4
	2.2 or more	5.3	8.0	9.3	11.5
2.3 or more	5.3	8.1	9.4	11.7	
3	1.0 or more	4.0	6.1	7.1	8.8
	1.1 or more	4.1	6.2	7.2	8.9
	1.2 or more	4.1	6.3	7.3	9.0
	1.3 or more	4.2	6.3	7.4	9.1
	1.4 or more	4.3	6.5	7.5	9.3
	1.5 or more	4.3	6.6	7.6	9.5
	1.6 or more	4.4	6.7	7.8	9.7
	1.7 or more	4.5	6.9	8.0	9.9
	1.8 or more	4.6	7.0	8.1	10.1
	1.9 or more	4.7	7.2	8.3	10.4
	2.0 or more	4.9	7.4	8.6	10.6
	2.1 or more	5.0	7.6	8.8	10.9
	2.2 or more	5.1	7.8	9.0	11.2
2.3 or more	5.3	8.0	9.2	11.5	

Continued on next page

B9.5 Reference axle masses for standard-tyred axles continued

**Table for
standard-tyred
axles
(continued)**

Axles in group	Distance (m) to nearest axle	Axle types			
		S	T	(4)	(8)
4 or more	1.0 or more	3.8	5.8	6.8	8.4
	1.1 or more	3.9	5.9	6.8	8.5
	1.2 or more	3.9	6.0	6.9	8.6
	1.3 or more	4.0	6.1	7.0	8.7
	1.4 or more	4.1	6.2	7.2	8.9
	1.5 or more	4.2	6.3	7.3	9.1
	1.6 or more	4.3	6.5	7.5	9.4
	1.7 or more	4.4	6.7	7.7	9.6
	1.8 or more	4.5	6.9	7.9	9.9
	1.9 or more	4.6	7.1	8.2	10.2
	2.0 or more	4.8	7.3	8.4	10.5
	2.1 or more	4.9	7.5	8.7	10.8
	2.2 or more	5.1	7.7	8.9	11.1
	2.3 or more	5.2	8.0	9.2	11.4

B9.6 Reference axle masses and contact areas for large tyres

Table for large tyres This table shows the reference axle masses in tonnes and real contact areas for single large-tyred axles spaced at 2.4 metres or more, sorted by rim size.

Tyre size	Reference axle mass (t)	Contact area (cm ²)
435/50 R19.5	7.8	968
Bridgestone 13.00R20	8.0	1090
14.00-20	7.6	484
365/80R20	7.5	395
365/85R20	7.5	488
395/85R20	7.6	600
14.75/80R20 (13.00R20 Pilote)	7.5	850
15.50/80R20 (G20 Pilote)	7.6	860
16.00-20	8.2	1160
350/75R22.5	6.9	645
355/50R22.5	6.9	406
14R22.5	7.0	650
365/65R22.5	7.1	667
15.00-22.5	7.2	710
385/55R22.5	7.2	439
385/65R22.5	7.2	465
16.50-22.5	7.8	968
425/65R22.5	7.8	968
12.00R24	7.0	464
13.00-24	7.3	774
385/95R24 (14.00R24)	7.8	968
14.00-24	7.8	968
14.9R24	6.5	279
16.00-24	8.6	1355

Continued on next page

B9.6 Reference axle masses and contact areas for large tyres continued

Table for large tyres
(continued)

Tyre size	Reference axle mass (t)	Contact area (cm ²)
13.00-25	7.3	774
14.00-25	7.9	1032
385/95R25 (14.00R25)	8.2	1125
16.00-25	8.8	1420
380/85R30	6.0	311
16.9R34	6.5	341
420/80R46	6.5	415

B9.7 Reference axle masses and contact areas for mega tyres

Table for mega tyres

This table shows the reference axle masses in tonnes and real contact areas for single mega-tyred axles spaced at 2.4 metres or more, sorted by rim size.

Tyre size	Reference axle mass (t)	Contact area (cm ²)
445/45R19.5	7.9	968
17.50/65R20	7.5	840
445/65R22.5	7.9	598
18.00-22.5	7.9	1030
500/60R22.5	8.8	1420
550/60R22.5	8.8	1420
560/60R22.5	7.2	970
700/50R22.5	10.5	2174
710/45R22.5	10.5	1113
750/45R22.5	10.5	2496
480/70R24	6.5	533
500/85R24	7.0	578
540/65R24	7.0	474
445/80R25	8.8	1290
445/95R25	8.8	1290
17.50-25	8.5	1290
18.00-25	9.2	1725
505/95R25	9.2	1725
20.5R25 (525/95R25)	9.5	1740
525/80R25	9.5	1740
20.50-25	9.5	1740
22/65R25	9.6	1740
23.50-25	10.5	2200
24R21 XZL	9.3	1675
26.50-25	11.3	2380

Continued on next page

B9.7 Reference axle masses and contact areas for mega tyres continued

Table for mega tyres
(continued)

Tyre size	Reference axle mass (t)	Contact area (cm ²)
29.50-25	11.8	2496
750/65R25	11.8	2496
480/80R26	6.5	533
540/65R26	7.0	674
580/70R26	7.3	510
28L26	8.2	1165
750/65R26	8.5	702
Trelleborg 500/60R26.5	8.8	1420
600/55 R26.5	9.5	1740
680/55R26.5	8.0	1070
Trellborg 700/50R26.5	9.5	1740
750/45R26.5	10.5	2200
800/45R26.5	10.6	1388
480/65R28	6.8	385
540/65R28	7.0	449
600/65R28	7.5	541
600/70R28	7.5	822
540/65R30	7.0	518
600/65R30	7.5	832
600/70R30	7.5	563
710/55R30	8.2	574
650/75R32	7.9	760
800/65 R32	9.5	866
800/75R32	9.5	1420
900/60R32	10.0	1021
Claas Terratrak 635mm wide	10.5	2144
18.00-33	10.0	2000
18.4R34	6.5	533

Continued on next page

B9.7 Reference axle masses and contact areas for mega tyres continued

Table for mega tyres
(continued)

Tyre size	Reference axle mass (t)	Contact area (cm ²)
480/70R34	6.8	439
540/65R34	7.0	536
540/70R34	7.0	674
600/65R34	7.5	651
710/75R34	8.5	781
600/65R38	7.5	663
650/65R38	7.9	759
650/70R38	7.9	791
650/75R38	7.9	791
650/85R38	7.9	864
710/70R38	8.5	788
715/75R38	8.5	1181
800/70R38	9.5	972
480/70R42	6.8	533
18.4R42	6.8	533
480/80R42	6.8	453
520/85R42	7.0	585
20.8R42	6.9	544
620/70R42	7.6	722
650/65R42	7.9	756
710/65R42	8.5	707
710/70R42	8.5	707
850/55R42	9.5	1669
900/50R42	10	940
18.4R46	6.8	533
480/80R46	6.8	609
520/80R46	7.0	630

Continued on next page

B9.7 Reference axle masses and contact areas for mega tyres continued

**Table for
mega tyres**
(continued)

Tyre size	Reference axle mass (t)	Contact area (cm ²)
520/85R46	7.0	653
620/70R46	7.6	791
480/80R50	6.8	629

B9.8 Reference axle masses and contact areas for single specified standard-tyred axles spaced at 2.4 metres or more

Table for specified standard-tyred axles

This table shows the reference axle masses in tonnes and contact areas for single specified standard-tyred axles spaced at 2.4 metres or more.

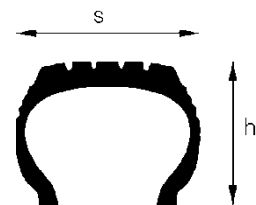
This table applies to mobile plant, including mobile cranes and accompanying towed trailers that use specified standard tyres.

Tyre size	Reference axle mass (t)	Contact area (cm ²)
13/80 R20	6.5	550
12.00 R20	6.9	410
14/80 R20	7.0	610

Tyre size example

Example truck tyre marking 14/80 R20 where:

- 14 is the tyre section width in inches
- 80 is the aspect ratio ($h/s = 0.80$)
- R is the tyre construction (R = radial)
- 20 is the bead seat diameter in inches
- s = section width of tyre
- h = section depth of tyre



If the aspect ratio is 1 (ie $h = s$), then the /80 is not included in the tyre marking, for example, 12.00 R20.

B9.9 Reference axle masses and contact areas for twin small-tyred axles spaced at 2.4 metres or more

Table for twin small-tyred axles

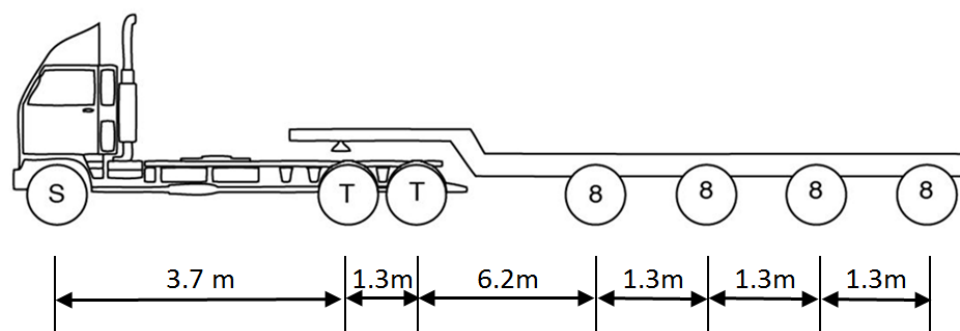
This table shows the reference axle masses in tonnes and contact areas for twin small-tyred axles spaced at 2.4 metres or more.

This table applies to articulated vehicles fitted with small tyres, typically involved in the movement of ISO containers.

Tyre size	Reference axle mass (t)	Contact area (cm ²)
235/75 R17.5	7.8	245
10 R17.5	7.8	310

B9.10 Example – Calculating the VAI for a transporter

Diagram This diagram shows the transporter with axle types and axle spacings.



Standard tyres The vehicle has standard tyres.

Proposed axle masses This table shows the proposed axle mass in tonnes for each of the axles in the above diagram.

Axle type	S	T	T	(8)	(8)	(8)	(8)
Proposed mass (t)	6	8.5	8.5	10	10	10	10

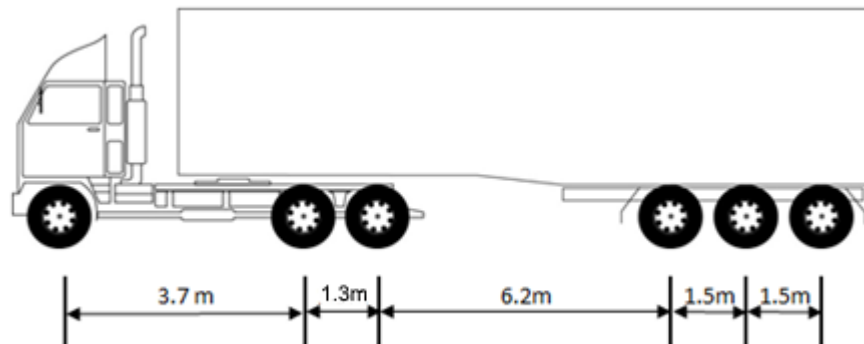
Calculation of axle indices This table shows the reference axle masses for each axle and uses this value and the value of the proposed mass for the axle (see above) to calculate the axle index.

Axle type	S	T	T	(8)	(8)	(8)	(8)
Reference axle mass value from table in section B9.5	5.4 (1 axle in group)	7.4 (2 axles in group)	7.4 (2 axles in group)	8.7 (4 axles in group)	8.7 (4 axles in group)	8.7 (4 axles in group)	8.7 (4 axles in group)
<u>Proposed axle mass</u> Reference axle mass	6/5.4	8.5/7.4	8.5/7.4	10/8.7	10/8.7	10/8.7	10/8.7
Axle index	= 1.11	= 1.15	= 1.15	= 1.15	= 1.15	= 1.15	= 1.15

VAI The VAI for the vehicle is 1.15 (ie the highest axle index from the above table).

B9.11 Example – Calculating the VAI for an articulated vehicle

Diagram This diagram shows an articulated vehicle carrying an ISO container with axle spacings.



Axle types The first axle is single-tyred. The remainder (axles 2 to 6) are twin-tyred.

Standard tyres All axles have standard tyres.

Proposed axle masses This table shows the proposed axle mass in tonnes for each of the axles in the above diagram.

Axle type	S	T	T	T	T	T
Proposed mass (t)	5.95	8.14	8.14	7.26	7.26	7.26

Calculation of axle indices This table shows the reference axle masses for each axle and uses this value and the value of the proposed mass for the axle (see above) to calculate the axle index.

Axle type	S	T	T	T	T	T
Reference axle mass value from table in section B9.5	5.4 (1 axle in group)	7.4 (2 axles in group)	7.4 (2 axles in group)	6.6 (3 axles in group)	6.6 (3 axles in group)	6.6 (3 axles in group)
<u>Proposed axle mass</u> Reference axle mass	5.95/5.4	8.14/7.4	8.14/7.4	7.26/6.6	7.26/6.6	7.26/6.6
Axle index	= 1.10	= 1.10	= 1.10	= 1.10	= 1.10	= 1.10

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B9.11 Example – Calculating the VAI for an articulated vehicle continued

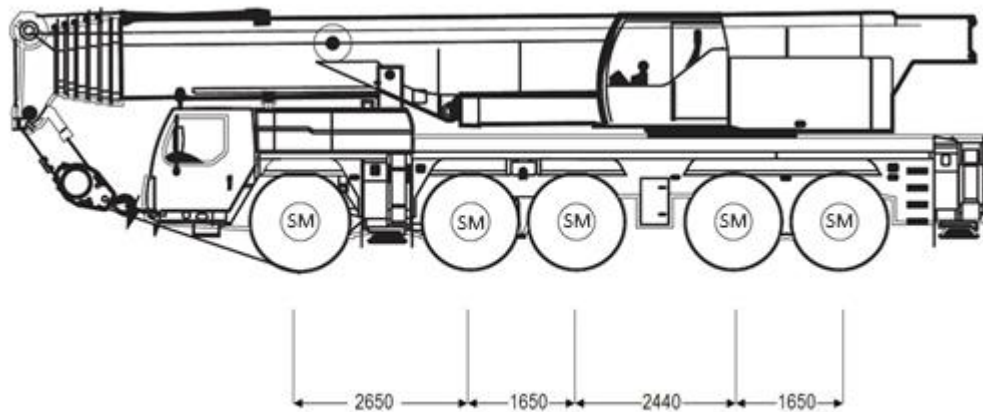
VAI

The VAI for the vehicle is 1.10 (ie the highest axle index from the above table).

B9.12 Example – Calculating the VAI for a mobile crane

Diagram

This diagram shows the mobile crane with axle types and axle spacing in millimetres.



Tyres

All axles have 20.5R25 tyres. These are single mega (SM) tyres.

Proposed axle masses

This table shows the proposed axle mass in tonnes for each of the axles in the above diagram.

Axle type	SM	SM	SM	SM	SM
Proposed mass (t)	11.2	11.2	11.2	10.8	10.9

Continued on next page

B9.12 Example – Calculating the VAI for a mobile crane continued

Calculation of axle indices This table calculates the reference axle masses for each axle and uses this value and the value of the proposed mass for the axle (see above) to calculate the axle index.

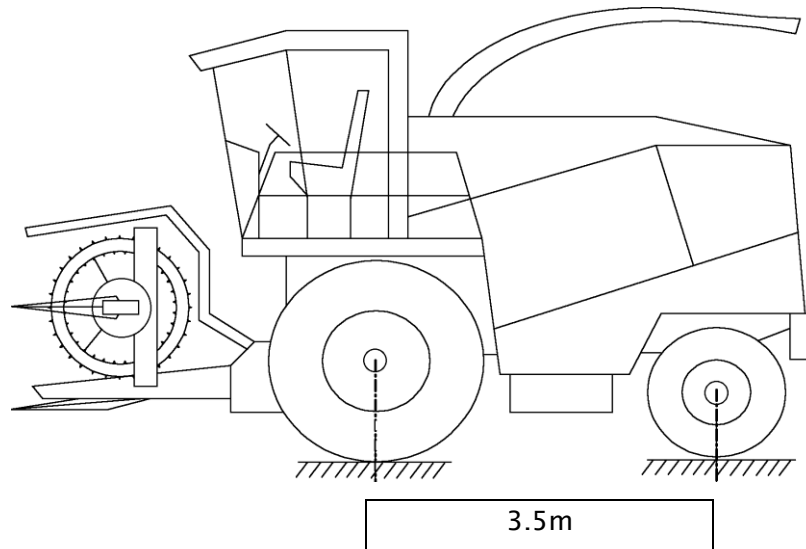
Axle type	SM	SM	SM	SM	SM
Reference axle mass value from table in section B9.5	5.4 (1 axle in group)	5.0 (2 axles in group)	5.0 (2 axles in group)	5.0 (2 axles in group)	5.0 (2 axles in group)
Reference axle mass value from table in section B9.7	9.5	9.5	9.5	9.5	9.5
Combined values from the tables divided by factor 5.4 (see step 4 in section B9.4)	$(5.4 \times 9.5)/5.4$ = 9.5	$(5.0 \times 9.5)/5.4$ = 8.796	$(5.0 \times 9.5)/5.4$ = 8.796	$(5.0 \times 9.5)/5.4$ = 8.796	$(5.0 \times 9.5)/5.4$ = 8.796
<u>Proposed axle mass</u> Reference axle mass	11.20/9.5	11.20/8.796	11.20/8.796	10.80/8.796	10.90/8.796
Axle index	= 1.18	= 1.27	= 1.27	= 1.23	= 1.24

VAI The VAI for the vehicle is 1.27 (ie the highest axle index from the above table).

B9.13 Example – Calculating the VAI for a harvester

Diagram

This diagram shows the harvester with axle spacings (in metres).



Tyres

Tyres are 800/65R32 front and 540/65R24 rear. Both are single mega (SM) tyres.

Proposed axle masses

This table shows the proposed axle mass in tonnes for each of the axles in the above diagram.

Axle type	SM	SM
Proposed mass	11.4	5

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B9.13 Example – Calculating the VAI for a harvester

continued

Calculation of axle indices

This table calculates the reference axle masses for each axle and uses this value and the value of the proposed mass for the axle (see above) to calculate the axle index.

Axle type	S	S
Reference axle mass value from table in section B9.5	5.4 (1 axle in group)	5.4 (1 axle in group)
Reference axle mass value from table in section B9.7	9.5	7.0
Combined values from the tables divided by factor 5.4 (see step 4 in section B9.4)	$(5.4 \times 9.5)/5.4$ = 9.5	$(5.4 \times 7.0)/5.4$ = 7.0
<u>Proposed axle mass</u> Reference axle mass	11.4/9.5	5.0/7.0
Axle index	1.20	0.71

VAI

The VAI for the vehicle is 1.20 (ie the highest axle index from the above table).

Chapter B10: Vehicle parameter calculations other than VAI

Overview

About this chapter

This chapter provides information on how to calculate:

- the vehicle gross index (VGI)
- the pavement loading ratio (PLR)
- the deck loading ratio (DLR), and
- traction limits (maximum allowable gradient for combination or MGC).

It includes worked examples.

In this chapter

This chapter contains the following sections:

Section	See page
B10.1 Vehicle gross index (VGI)	B10-2
B10.2 Reference gross masses for VGI calculation	B10-6
B10.3 Pavement grades and pavement loading ratio (PLR)	B10-8
B10.4 Graphical representation of the PLR	B10-10
B10.5 Deck loading ratio (DLR)	B10-11
B10.6 Graphical representation of the DLR	B10-12
B10.7 Traction limits (MGC)	B10-13
B10.8 Example of MGC calculation	B10-14

B10.1 Vehicle gross index (VGI)

Introduction The vehicle gross index (VGI) is an indicator of the effect of the gross mass(es) of a vehicle on bridges, in particular the main structural members.

It is based on the axle masses of the groups of axles on the vehicle and the reference gross mass for that grouping.

This section describes how to calculate the VGI.

Note that axle types are not relevant; they have no effect on the VGI.

Reference gross mass The reference gross mass for any grouping of axles is the nominal allowable mass given to that grouping of axles.

The reference gross mass for various wheelbases is given in the table in section B10.2.

Wheelbase A wheelbase is the distance between two axles on a vehicle.

A single axle is considered to have a wheelbase of 0.0.

A vehicle with two axles has one non-zero wheelbase.

A vehicle with four axles has six wheelbases. Namely, the distance between axles 1 and 2, 2 and 3, 3 and 4, 1 and 3, 1 and 4, and 2 and 4.

Gross index The gross index (GI) for any group of axles is given by:

$$GI = \frac{\text{Sum of the axle masses for the grouping}}{\text{Reference gross mass for the grouping wheelbase}}$$

VGI The VGI is the maximum gross index for the vehicle.

Critical wheelbase The wheelbase that gives the VGI is the critical wheelbase for the vehicle.

Continued on next page

B10.1 Vehicle gross index (VGI) continued

Procedure for calculating the VGI

Follow these steps to calculate the VGI.

Step	Action
1	Obtain for the vehicle: <ul style="list-style-type: none"> • axle masses • axle spacings
2	For the heaviest loaded axle look up the reference gross mass for the axle in section B10.2.
3	Calculate the gross index (GI) for the axle using: $GI = \frac{\text{Axle mass}}{\text{Reference gross mass}}$
4	For one of the axle groups: <ul style="list-style-type: none"> • sum the axle masses for the group • sum the axle spacings to get the wheelbase • look up the reference gross mass for the group in the table in section B10.2.
5	Calculate the gross index for the group using: $GI = \frac{\text{Sum of axle masses}}{\text{Reference gross mass}}$
6	Repeat steps 4 and 5 until the GIs for all axle groups have been calculated. Result: The VGI is the maximum of the GIs calculated.

Example 1: Transporter

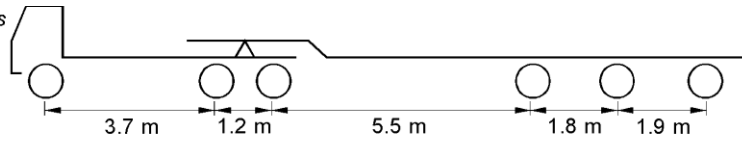
On the next page is an example of calculating the VGI for a transporter.

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B10.1 Vehicle gross index (VGI) continued

Example 1: Transporter (continued)

Note: Axle types and tyre sizes are not relevant to gross loading.



Proposed axle loads (tonnes)

6.4 9.0 9.0 9.3 9.0 8.7

Wheelbase = 1.2 m

Wheelbase = 1.8 m Wheelbase = 1.9 m

$$\frac{6.4}{14.5} = 0.44 \quad \frac{18.0}{14.5} = 1.24$$

$$\frac{18.3}{15.5} = 1.18 \quad \frac{17.7}{15.5} = 1.14$$

Wheelbase = 4.9 m

Wheelbase = 3.7 m

$$\frac{24.4}{25.0} = 0.98$$

$$\frac{27.0}{22.0} = 1.23$$

Wheelbase = 10.4 m

Wheelbase	GI
0.0 m	0.85
1.2 m	1.24
10.4 m	1.30
14.1 m	1.35

$$\frac{45.0}{34.0} = 1.30$$

Wheelbase = 14.1 m

$$\frac{51.4}{38.0} = 1.35$$

Heaviest loaded individual axle is axle 4 with a GI of $9.3/11.0=0.85$
VGI is 1.35 at the critical wheelbase of 14.1 metres.

Critical wheelbase

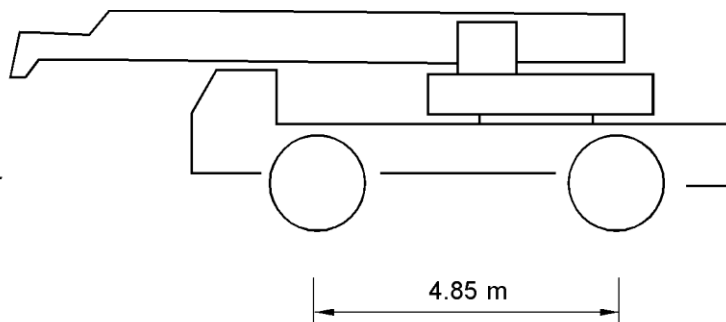
The wheelbase that gives the VGI is the critical wheelbase for the vehicle.

Continued on next page

B10.1 Vehicle gross index (VGI) continued

Example 2: Here is an example of calculating the VGI for a mobile crane.
Mobile crane

Note: Axle type and tyre sizes are not relevant to gross loading.



Proposed axle loads (tonnes)

10.3

12.5

Wheelbase = 0.0
(heaviest axle)

$$\frac{12.5}{11.0} = 1.14$$

Wheelbase = 4.85 m

$$\frac{22.8}{25.0} = 0.91$$

VGI is 1.14 at the critical wheelbase of 0.0 metres.

B10.2 Reference gross masses for VGI calculation

Table of reference gross masses

This table shows the reference gross mass in tonnes for various lengths of wheelbase in metres.

Wheelbase (m)	Reference gross mass (t)
0.0 (individual axles)	11.0
1.0 or more	14.5
1.7 or more	15.5
2.2 or more	17.0
2.5 or more	18.0
2.8 or more	19.0
3.1 or more	20.0
3.4 or more	21.0
3.7 or more	22.0
4.0 or more	23.0
4.4 or more	24.0
4.8 or more	25.0
5.2 or more	26.0
5.6 or more	27.0
6.0 or more	28.0
6.4 or more	29.0
7.1 or more	30.0
7.8 or more	31.0
8.5 or more	32.0
9.2 or more	33.0
9.9 or more	34.0
10.4 or more	34.5
10.9 or more	35.0
11.4 or more	35.5
11.9 or more	36.0
12.4 or more	36.5
12.9 or more	37.0
13.4 or more	37.5

Continued on next page

B10.2 Reference gross masses for VGI calculation

continued

**Table of
reference
gross masses**
(continued)

Wheelbase (m)	Reference gross mass (t)
13.9 or more	38.0
15.0 or more	38.5
16.0 or more	39.0
17.0 or more	39.5
18.0 or more	40.0
19.0 or more	40.5
20.0 or more	41.0
21.0 or more	41.5
22.0 or more	42.0
23.0 or more	42.5
24.0 or more	43.0
25.0 or more	43.5
26.0 or more	44.0
27.0 or more	44.5
28.0 or more	45.0
29.0 or more	45.5
30.0 or more	46.0

B10.3 Pavement grades and pavement loading ratio (PLR)

Introduction The pavement loading ratio (PLR) is used to control the loading on pavements according to the pavement strength. It is based on the vehicle axle index (see *Chapter B9: Calculating the vehicle axle index (VAI)* above), and a pavement grading factor.

Formula The PLR is given by the following formula:

$$\text{PLR} = (\text{VAI} / \text{Pavement grade factor}) \times 100\%$$

This formula is represented graphically in section B10.4 below.

The PLR is expressed as a percentage.

Pavement grade factor This table shows the pavement grade factor for various grades of pavement.

Grade of pavement	Pavement grade factor
A	1.000
B	0.889
C	0.778
D	0.667

Pavement grades A grade A pavement allows axle weights approximating the legal axle weight limits (refer to chapter B1) at a PLR of 100%.

Grades B, C and D allow progressively reducing axle weights, as shown in the following table.

Grade of pavement	Approximate % legal axle weight limits ¹ at PLR 100%	Pavement grade factor
A	100%	1.000
B	89%	0.889
C	78%	0.778
D	67%	0.667

Note:

1. Exact for twin-tyred spaced axles.

Continued on next page

B10.3 Pavement grades and pavement loading ratio (PLR) continued

Who grades pavements?

Waka Kotahi's Managers, System Management (regional) are responsible for grading state highway pavements. They must inform Waka Kotahi's National Office of all grading and regrading determinations as soon as they are made.

Pavement grading considerations

At a PLR of 150%, which is allowed in most cases, axle masses are 50% in excess of masses at the PLR 100% level.

The grading of a particular pavement should be chosen so that the pavement structure and its underlying components (foundation, culverts, services, etc) can sustain axle weights at the 150% PLR level without substantially increasing the pavement wear at the likely overload frequency.

Pavement gradings should be determined in the expectation that they can be maintained for at least five years, although as a matter of routine, gradings should be subject to review at two-yearly intervals.

The following points regarding a pavement's condition should be considered:

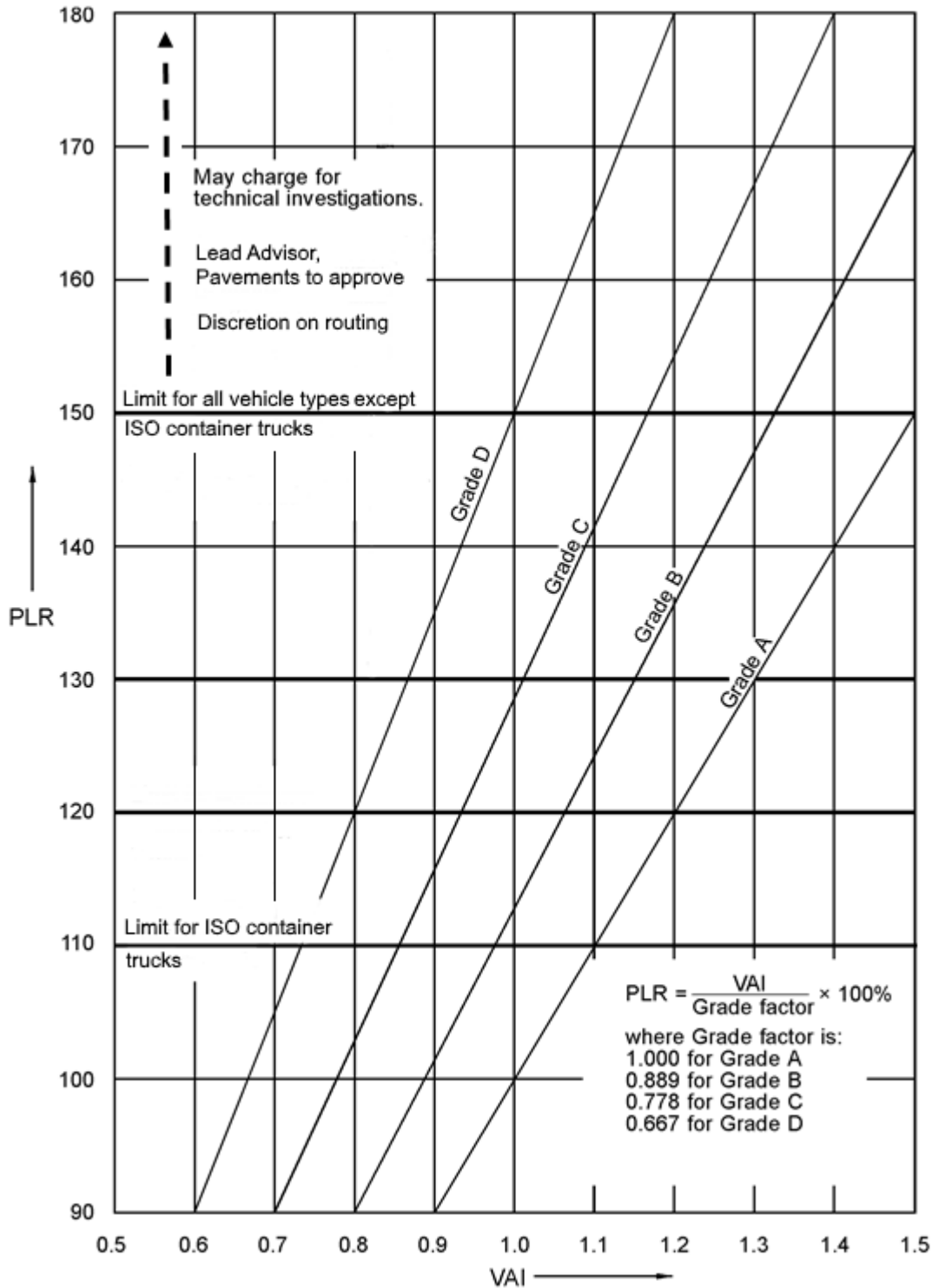
- Pavements that show signs of shape defects appearing, particularly in the wheel tracks, may be suffering from foundation overstrain or low basecourse shear strength, which may justify a lower pavement grading. 'Shape' and 'ride' components of pavement structural ratings should indicate this condition.
- Pavements that are surfaced with structurally dense asphaltic layers and have a 'high' Benkelman Beam deflection together with signs of surface cracking may justify a lower pavement grading, as in this situation the cracking represents a loss of structural competence as well as surface waterproofing. 'Cracking' and 'patching' components of pavement structural ratings should indicate this condition.
- If the strength of a pavement significantly varies on a seasonal basis, the grading of that pavement can be varied accordingly.

If unexpected deterioration of any pavement occurs, the pavement grading should be modified immediately.

B10.4 Graphical representation of the PLR

Diagram

This diagram gives a graphical representation of the PLR.



B10.5 Deck loading ratio (DLR)

Introduction The deck loading ratio (DLR) is used as a first check on bridge decks. It is based on the vehicle axle index (see *Chapter B9: Calculating the vehicle axle index (VAI)*), and a deck grading factor.

Formula The DLR is given by the following formula:

$$\text{DLR} = (\text{VAI} / \text{Deck grade factor}) \times 100\%$$

This formula is represented graphically in section B10.6.

The DLR is expressed as a percentage.

Deck grade factor This table shows the deck grade factor for various grades of deck.

Grade of deck	Deck grade factor
A	1.000
B	0.889
C	0.778
D	0.667

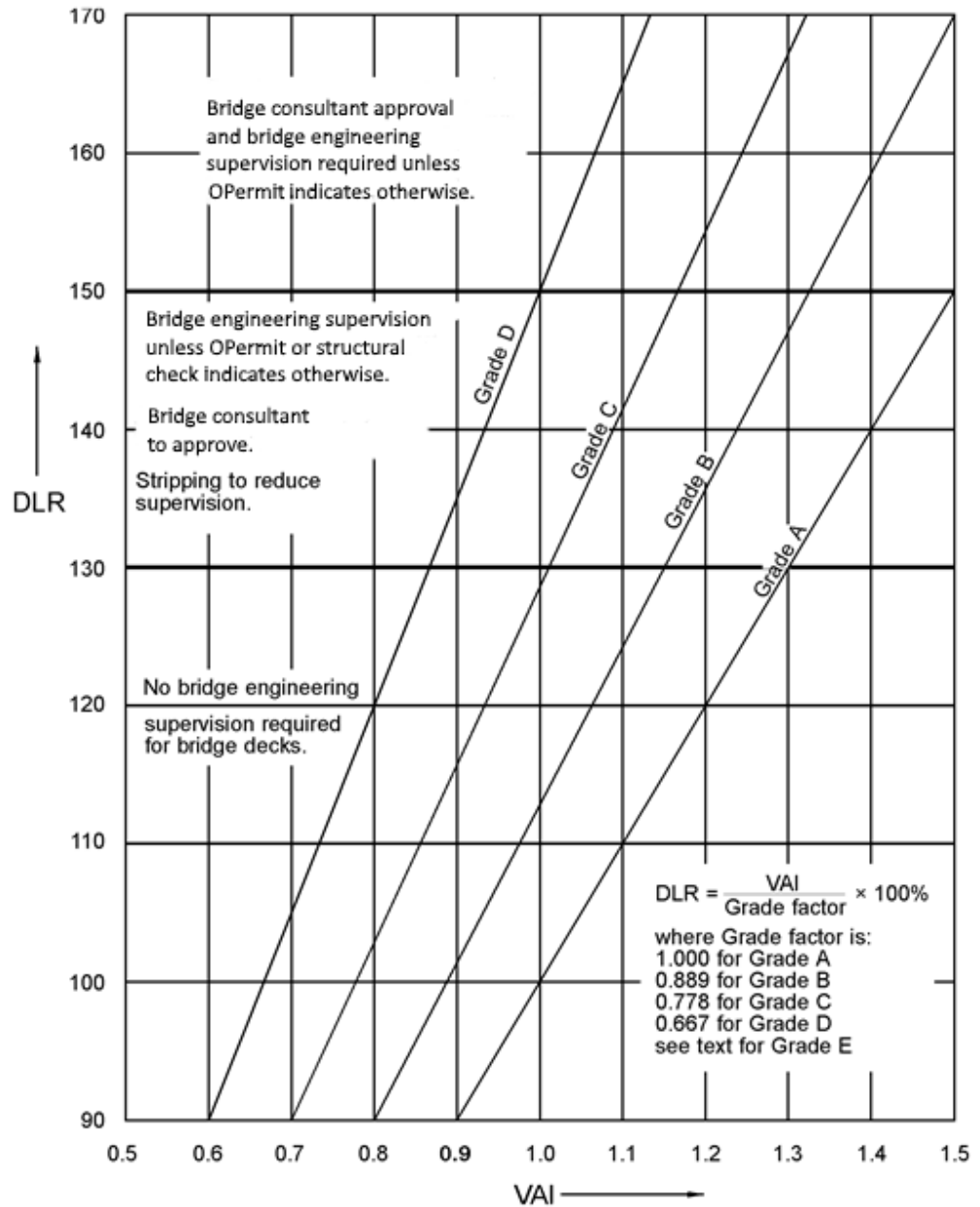
Grade E decks If a bridge deck is grade E then the DLR shall be taken as greater than 130%.

Use of deck capacity factor If the deck capacity factor (DCF) is available from the OPermit system, this should be used in place of the above deck grade factor for more accurate determination of the DLR.

B10.6 Graphical representation of the DLR

Diagram

This diagram gives a graphical representation of the DLR.



B10.7 Traction limits (MGC)

Introduction The maximum allowable gradient for combination (MGC) indicates whether a vehicle combination is able to develop sufficient traction to prevent damage to the pavement surface by wheel slip.

Operator's responsibility It is the operator's responsibility to ensure that a vehicle has sufficient traction for the mass it carries on the route it travels on.

Formula The MGC for a particular vehicle combination is given by:

$$\text{MGC} = [(\text{TFC} \times \text{Drive axle mass} \times 100) / \text{Total mass}] - 2$$

Where:

- TFC (traction friction coefficient) is:
 - 0.6 for chipseal surfacing
 - 0.8 for asphaltic concrete surfacing.
- Total mass is the mass of the whole combination, in tonnes. It includes the mass of prime movers, ballast, trailer and payload.
- Drive axle mass is the sum of the axle masses of all driving axles, in tonnes.
- The numbers 2 and 100 are constants.

The MGC is expressed in percentage.

MGC > maximum gradient When the MGC is greater than the maximum uphill gradient for the route, then the combination has sufficient traction to travel without damaging the road surface.

B10.8 Example of MGC calculation

Introduction This example calculates the MGC for a loaded combination consisting of two prime movers and a ten-axle trailer.

Vehicle data

Prime mover 1:

- mass on steering axle = 5.2 tonnes
- mass on driving axles = 7.0 tonnes each

Prime mover 2:

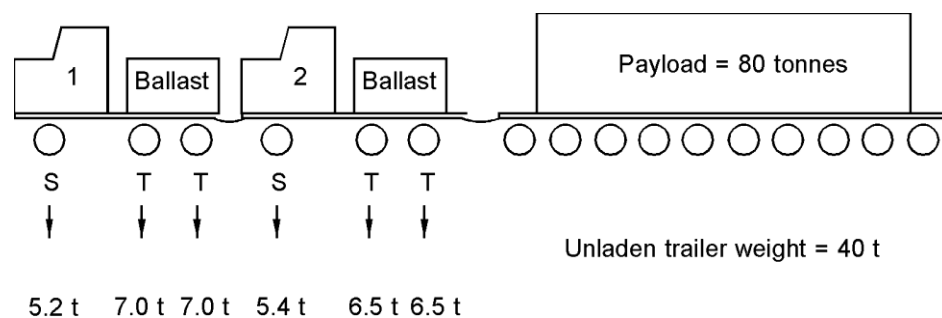
- mass on steering axle = 5.4 tonnes
- mass on driving axles = 6.5 tonnes each

Ten-axle trailer: mass of unladen trailer = 40 tonnes
Payload = 80 tonnes

Road data

Maximum uphill gradient on proposed route = 8%
Pavement surface on proposed route is chipseal.

Diagram Here is a diagram of the combination showing axle masses and axle types.



Continued on next page

B10.8 Example of MGC calculation continued

Calculation

$$\text{MGC} = [(\text{TFC} \times \text{Drive axle mass} \times 100) / \text{Total mass}] - 2$$

Using the above data:

- TFC = 0.6
- Drive axle mass = $2 \times 7 + 2 \times 6.5 = 27$ tonnes
- Total mass = Combination axle mass + payload = $(5.2 + 2 \times 7 + 5.4 + 2 \times 6.5 + 40) + 80 = 157.6$ tonnes

Substituting these in the formula we get:

$$\text{MGC} = [(0.6 \times 27 \times 100) / 157.6] - 2 = 8.28\%$$

This is greater than the maximum uphill gradient for the route, so the prime movers are able to develop sufficient traction to shift the load without damaging the pavement. If this combination complies with the other overweight permit requirements, a permit may be issued.
