OVERWEIGHT PERMIT MANUAL

APPENDICIES

First Edition 1995

INCORPORATING AMENDMENTS 1-9

READERS PLEASE NOTE:

This document is one of three available on Transit's website. It contains Appendices A to D of the Overweight Permit Manual covering definitions used; permit issuing authorities; standard forms; and calculations.

For information on those vehicles eligible for permits; mobile cranes; payloads; routes; enforcement; bridge supervision and traffic control; inventories; and computer systems please refer to the separate document entitled **Policies**.

For information on the administration and procedures for the issuing of overweight permits please refer to the separate document entitled.**Procedures**

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Keywords : Overweight, Permit, Road.

FOREWORD

This manual replaces the Overweight Permit Policy Document last revised in 1989 and is the result of a complete review of existing policy.

It defines the compliance standards applicable to the issue of overweight permits. These standards apply both to the movement of overweight vehicles on state highways and those roads controlled by local authorities that have also adopted Transit New Zealand's requirements.

Local government comprises seventy-four territorial authorities and sixty nine of these currently require vehicles to comply with the manual's provisions.

To function as an effective management tool, a manual must be both clearly written and presented in a readily accessible format. For this reason, the revised manual has been extensively re-written and reformatted. It is also issued in a ring-binder that makes updating simple. The revised manual now more fully meets our shared operational requirements and we trust that the changes and improvements it incorporates will prove of practical advantage.

R J Dunlop
General Manager

ACKNOWLEDGEMENTS

This manual was produced under the direction of Transit New Zealand's Axle Weights and Loadings Advisory Group. This group includes representatives from the following organisations:

Transit New Zealand
Land Transport Safety Authority
New Zealand Police
New Zealand Local Government Association Inc
New Zealand Road Transport Association Inc
New Zealand Heavy Haulage Association Inc
Power Crane Association of New Zealand Inc

In addition to the above organisations, the draft version of this manual was circulated in 1993 for comment to the following organisations:

New Zealand Rail Limited
Association of Local Government Engineers of New Zealand
Works Consultancy Services Ltd
Vogel Corporation Ltd

Record of Amendments included in this edition

Amendment _	Date of Issue	Effective Date	Master Updated By	Date Updated
1	Oct 1995	1/11/95	Transit NZ	Sept 1997
2	Oct 1996	21/10/96	Transit NZ	Sept 1997
3	April 1997	14/4/97	Transit NZ	Sept 1997
4	Sept 1997	22/9/97	Transit NZ	Sept 1997
5	Jan 1998	14/1/98	Transit NZ	Jan 1998
6	March 1999	1/3/99	Transit NZ	March 1999
7	Sept 1999	1/10/99	Transit NZ	Oct 1999
8	November 2000	13/11/00	Transit NZ	Nov 2000
9	December 2001	10/12/01	Transit NZ	Dec 2001

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TABLES, DIAGRAMS AND GRAPHS

APPENDIX A DEFINITIONS

In this manual, unless the context indicates to the contrary, the terms used shall have the following meanings:

* As defined in the Heavy Motor Vehicle Regulations 1974.
** As defined in the Traffic Regulations 1976.

Approving Engineer	For permits issued by Transit New Zealand, the Approving Engineer is the Regional Manager. For any local authority, the Approving Engineer is the registered engineer currently serving that authority in the position of city or district engineer or their assistants.
Area Permit	Is an overweight permit that covers all travel on a specified network of roads by a vehicle that is eligible for continuous permits, and carrying an indivisible load.
Articulated Vehicle **	Any motor vehicle with a trailer attached, so that part of the trailer is superimposed upon the motor vehicle and a substantial part of the weight of the trailer and of its load is borne by the motor vehicle. Such a trailer shall be called a semi-trailer. (Refer Diagram A3).
A Train **	An articulated vehicle towing a full trailer. (Refer Diagram A3).
Axle *	One or more shafts, spindles or bearings in the same vertical transverse plane by means of which, in conjunction with wheels mounted on those shafts, spindles, or bearings, a portion of the weight of the vehicle is transmitted to the roadway. * "Axle set" is a single axle set or a tandem axle set or a tri-axle set. * "Oscillating axle" is any axle which complies with the following provisions: (a) The axle has 4 wheels attached thereto, consisting of 2 pairs of wheels; and

Axle (continued)

(b) Each such pair of wheels is mounted on a separate axle so affixed to the motor vehicle as to share the load equally between the 2 wheels and to permit oscillation of the separate axles in a vertical transverse plane which is at right angles to the longitudinal centre line of the vehicle; and

(c) The centre of each such wheel is at least 50 cm distant from the centre of every other wheel fitted to the motor vehicle.

"4-tyred oscillating axle" (represented by (4)) is an oscillating axle, having one tyre on each of the four wheels.

"8-tyred oscillating axle" (represented by (8)) is an oscillating axle having twin tyres on each of the four wheels.

* "Single-tyred axle" is any axle fitted with 2 or more wheels, but which is neither an oscillating axle nor a twin-tyred axle.

* "Single axle set" is either 1 axle or 2 axles having their centres spaced less than 1 m apart.

* "Single large-tyred axle" (represented by SL) is a single-tyred axle that is not a single standard-tyred axle.

* "Single standard-tyred axle" (represented by S) is a single-tyred axle fitted with tyres smaller than:

(a) A manufacturer's designated tyre section width of 13 inches or 330 mm and a rim diameter of 24 inches at the bead seat; or

(b) A manufacturer's designated tyre section width of 14 inches or 355, and a rim diameter of 19.5 inches at the bead seat.

* "Tandem axle set" is 2 axles having their centres spaced not less than 1 m and not exceeding 2 m apart and are load sharing.

* "Tri-axle set" is 3 axles, where:

(a) The centre of the first and third axles are spaced not less than 2 m and not exceeding 3 m apart; and

Axle (continued)	(b) All axles contain an equal number of tyres of the same size, and none of the axles is a single standard tyred axle; and (c) The axles are a load sharing axle set. * "Twin-tyred axle" (represented by T) is: (a) Any axle, not being an oscillating axle, which has a wheel track of 1.3 m or more and is equipped with 4 or more tyres: (b) Any other axle declared to be a twin-tyred axle by the Secretary for Transport by notice in the *Gazette*. * "Twin steer set" is a tandem axle set with single tyres, where both axles are connected to the same mechanism in order to steer similarly. (A dual-wheel assembly consisting of twin wheels fitted with twin tyres shall be deemed to be one wheel.) Axle types are shown in Diagram A1. Axle sets are shown in Diagram A2.
Axle Group	A series of axles is an axle group if the axle spacings are all less than 2.4 metres — refer section D1.
Axle Index	The ratio of the weight on an axle, to the reference axle weight for that axle — refer section D1.
Axle Spacing	The longitudinal distance between centre lines of any two adjacent axles.
Bridge Class	A measure of the ability of the main structural members of a bridge to carry overweight vehicles —refer section 12.3.1.
Bridge Engineering Supervision	Is supervision provided to ensure that the effects of a vehicle are kept within the capacity of a bridge. Bridge engineering supervision is indicated if the DLR exceeds 130% or if the BLR exceeds 175%. However, these limits may be exceeded without bridge engineering supervision if a detailed structural analysis of the bridge shows that allowable stress levels are not exceeded when the particular vehicle operates unsupervised. TOPS more accurately defines the extent of bridge engineering supervision needed — refer section 11 for supervision procedures.

Bridge Loading Ratio (BLR)	An indicator of the extent to which the gross load on the whole or any part of a particular vehicle will load the main structural members of a particular bridge — refer section D5 for method of calculation.
B Train **	An articulated vehicle comprising 2 semi-trailers of similar length that are not load dividing dollies. (Refer Diagram A3).
Certificate of Loading	A document issued by a Certificate of Fitness issuing authority, e.g., Vehicle Testing New Zealand, on which is stated the maximum permissible loading.
Continuous Permit	A continuous permit that covers the movement of a vehicle that is used frequently in a specific area or on a specific route. The vehicle's load is constant and not considered to be divisible. (Refer section 3.3.3.)
Critical Span	The length of the most critical longitudinal span of a particular bridge as assessed during rating of the bridge.
Critical Wheelbase	The wheelbase giving the VGI (ie, maximum GI) — refer section D2 for method of determination.
Deck Capacity Factor (DCF)	Is used for deck calculations in TOPS. It is more accurate than deck grades.
Deck Grade	A measure of the ability of a bridge deck to carry overweight vehicles — refer section 12.3.2.
Deck Grade Factor	Refer section 12.3.2.
Deck Loading Ratio (DLR)	An indicator of the extent to which the axles of a vehicle will load a particular bridge deck — refer section D4 for method of calculation.
Divisible Load	A payload that is either a fluid or has more than one separate component even though these components may be temporarily connected for the purposes of handling, storage or transport. Examples are milk, gravel, logs, animals, bundles of steel or timber.
Full Trailer **	A trailer with 2 axle sets the foremost of which is steered by a drawbar. (Refer Diagram A3).
General Manager	The general manager of Transit New Zealand

Gross Index (GI)	The ratio of the weight on any grouping of axles, to the reference weight for that grouping — refer section D2 for method of calculation.
Gross Combination Weight	The maximum laden weight of motor vehicles used in the combination, as specified by the manufacturer.
Gross Vehicle Weight	The maximum laden weight of a motor vehicle as specified by the manufacturer.
Heavy Motor Vehicle *	A motor vehicle (other than a motorcar that is not used, kept, or available for the carriage of passengers for hire or reward) the gross weight of which exceeds 2,000 kg; but does not include a traction engine or vehicle designed solely or principally for the use of fire brigades in attendance at fires.
Large Tyres	Refer definition of axle — single large-tyred axle, and section D1.4.
Linked Permits	Are separate permits covering the movement of vehicles, of the same owner, travelling in convoy over the same route with similar bridge engineering supervision requirements. (Refer section 3.3.4.)
Load Sharing Axle Set **	An axle set fitted with a suspension system that utilises a hydraulic method or a pneumatic method or a mechanical method, and only one of those methods, to effect substantially equal sharing of the set's total load by all of the ground contact surfaces of the set, in proportion to the number of tyres on each axle, and effective damping characteristics on all axles.
Maximum Allowable Gradient for Combination (MGC)	The maximum uphill gradient which a particular vehicle combination can negotiate without subjecting the pavement surface to the possibility of damage through loss of traction by driving wheels — refer section D6 for method of calculation.
Mobile Plant	A vehicle that is operated mainly off the highway and which does not carry a separate payload while on the highway. This includes mobile cranes, motor scrapers, dump trucks, drilling rigs, front-end loaders, forklifts, crushing plants, batching plants, etc.

Mobile Power Crane	A self propelled pneumatic tyred vehicle consisting of either: • A crane mounted on a purpose made crane carrier; or • A crane mounted on a truck.
Multiple Trips	Are the separate movements of one particular vehicle over the same route with similar payloads within a limited time period. (Refer section 3.3.2.)
National Highway Manager	The National Highway Manager of Transit New Zealand
Overdimension Permit	A permit issued by Police under authority from the Land Transport Safety Authority to allow vehicle dimensions to exceed the legal dimension limits as allowed under the Traffic Regulations 1976.
Overweight Permit	Transit New Zealand terminology for a permit issued by a road controlling authority to allow vehicle weights to exceed the legal weight limits as allowed under the Heavy Motor Vehicle Regulations 1974. It is issued on form TNZ 805 which complies with Form B of the regulations.
Pavement Grade	A measure of the ability of a road pavement to carry overweight vehicles — refer section 12.2.1 for method of determination.
Pavement Grade Factor	Refer section 12.2.1
Pavement Loading Ratio (PLR)	An indicator of the extent to which the axles of a particular vehicle will load a particular road pavement — refer section D3 for method of calculation.
Payload	Any load carried by a vehicle that is not permanently attached to the vehicle.
Permit Issuing Officer	The person who issues the overweight permit on behalf of the road controlling authority, signing form TNZ 805.
Rating Load	Is used to rate bridges. It is equivalent to the maximum load which would be allowed to cross a Class 100 Grade A bridge without bridge engineering supervision under the overweight policy — refer section 12.3.

Reference Axle Weight	The nominal allowable weight given to an axle which takes into account the axle type and spacing. In general terms the reference axle weight is equivalent to the legal axle weight limit. (Refer section D1.2).
Reference Gross Weight	For any grouping of axles this is the nominal allowable weight given to that grouping of axles. (Refer section D2.1)
Regional Manager	The regional manager of one of Transit New Zealand's seven regional offices: Auckland, Hamilton, Napier, Wanganui, Wellington, Christchurch and Dunedin.
Road Controlling Authority *	The authority, body or person or persons having control of the road; and includes any person acting under and within terms of any delegation or authorisation given by a controlling authority
Semi-Trailer	See articulated vehicle
Single Trip	A continuous movement under permit by one vehicle. This includes a movement in one general direction with stops totalling no more than two days but without change of load. Also included is an outwards plus return journey over substantially the same route with stops totalling no more than two days with or without change of load. (Refer section 3.3.1.)
Spaced Axle	An axle that is 2.4 metres or more from the nearest axle— refer section D1
Small Standard Tyres	Are standard tyres with their tyre designation listed in Table R4. They have smaller footprint areas, and hence lower reference axle weights, than standard tyres. (Refer section D1.4).
Specified Standard Tyres	Are standard tyres with their tyre designations listed in Table R3. They have larger footprint areas, and hence higher reference axle loads, than standard tyres. (Refer section D1.4).
Standard Tyres	Refer definition of axle — single standard-tyred axle and section D1.4.

Strippable Load	A payload that can be significantly reduced in weight (albeit with some difficulty) without causing irreparable damage. Examples are removal of blade, rippers and ripper mechanism from a tractor, removal of jib and counterweights from a crane, cutting of a log which would otherwise later be cut at a mill, the cutting of a welded steel truss. **Note:** Once the load is stripped the parts are then a divisible load.
Traction Friction Coefficient	A value that reflects the friction force developed between the wheel/tyre and the pavement surface during traction
Transporter	A vehicle specifically designed to carry a payload.
TOPS	The computer based permit checking system used by Transit New Zealand — refer section 12.4.
Vehicle Axle Index (VAI)	The maximum axle index for the vehicle. It is an indicator of the extent to which axles of a particular vehicle are loaded, taking into account the type of axle involved — refer section D1 for method of calculation.
Vehicle Gross Index (VGI)	The maximum gross index for a vehicle. It is an indicator of the effect of the gross load of a vehicle on bridges — refer section D2 for method of calculation.
Wheelbase	The distance from the centre of the first axle to the centre of the last axle in a grouping of axles.
Wheel Track *	The distance between the centres of the left-side and right-side wheels of a pair of wheels. (Refer Diagram A1 for inner and outer wheel tracks for oscillating axles.)

Diagram A1 : Axle Types

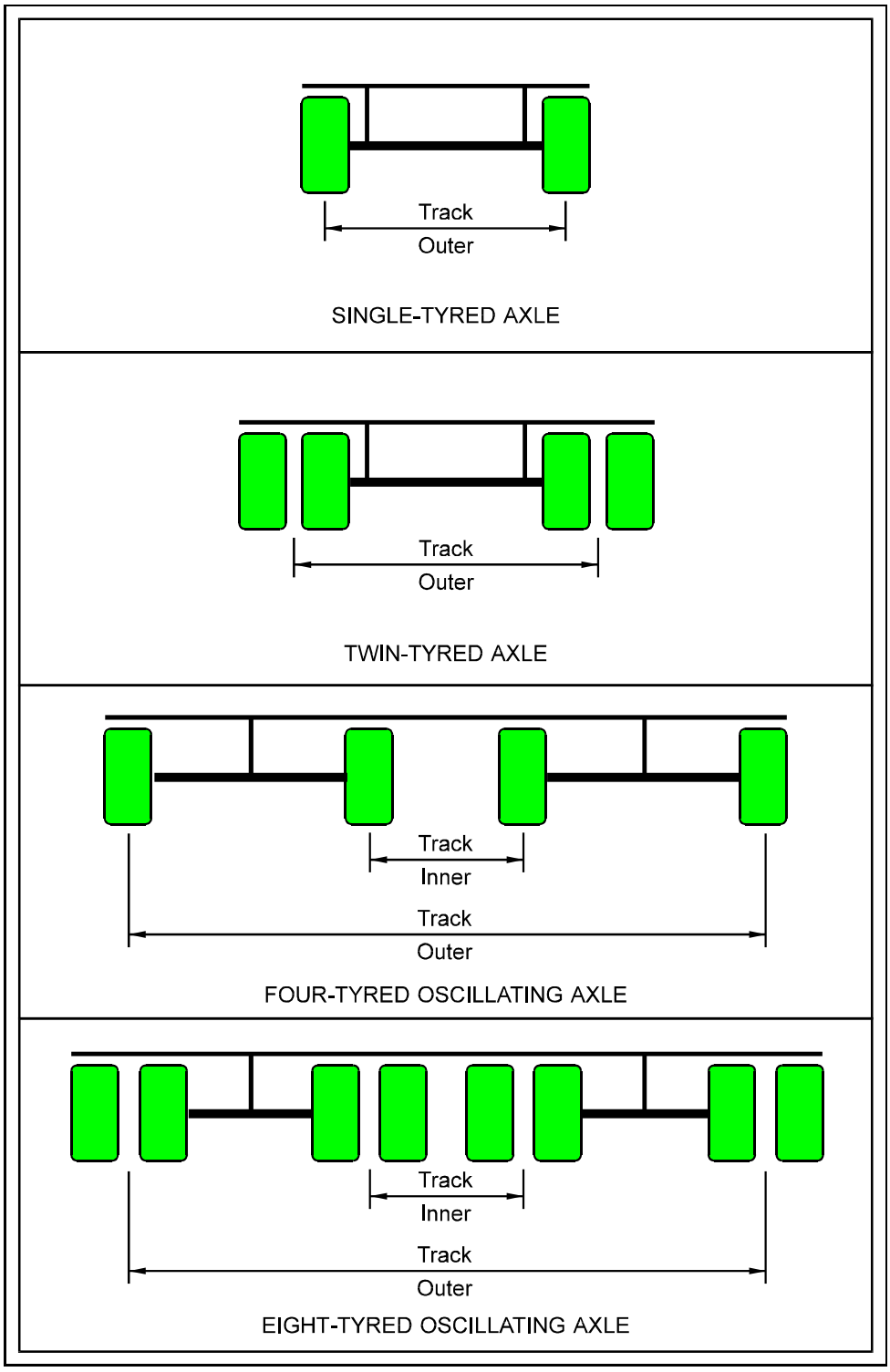


Diagram A2 : Axle Sets

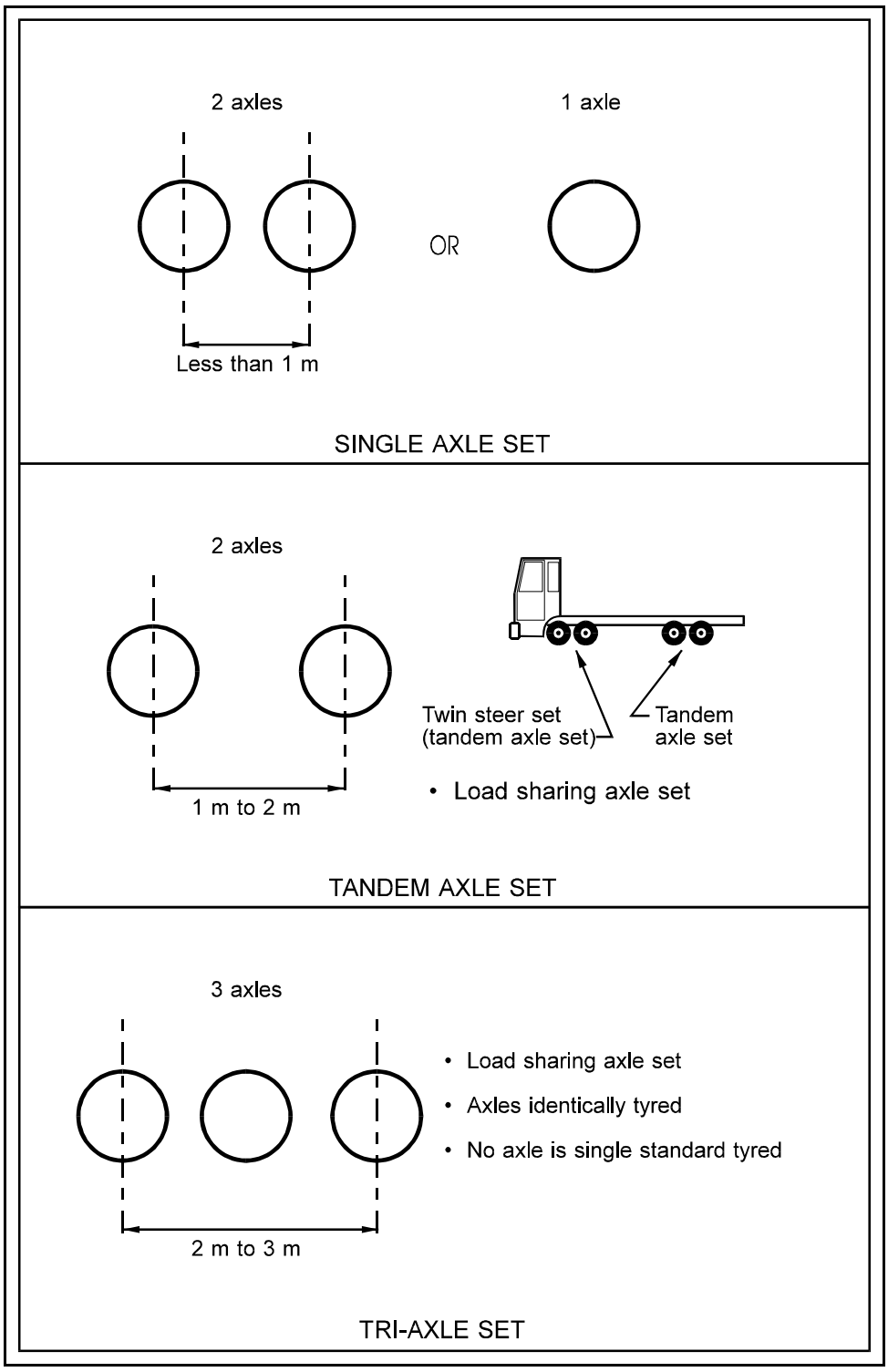
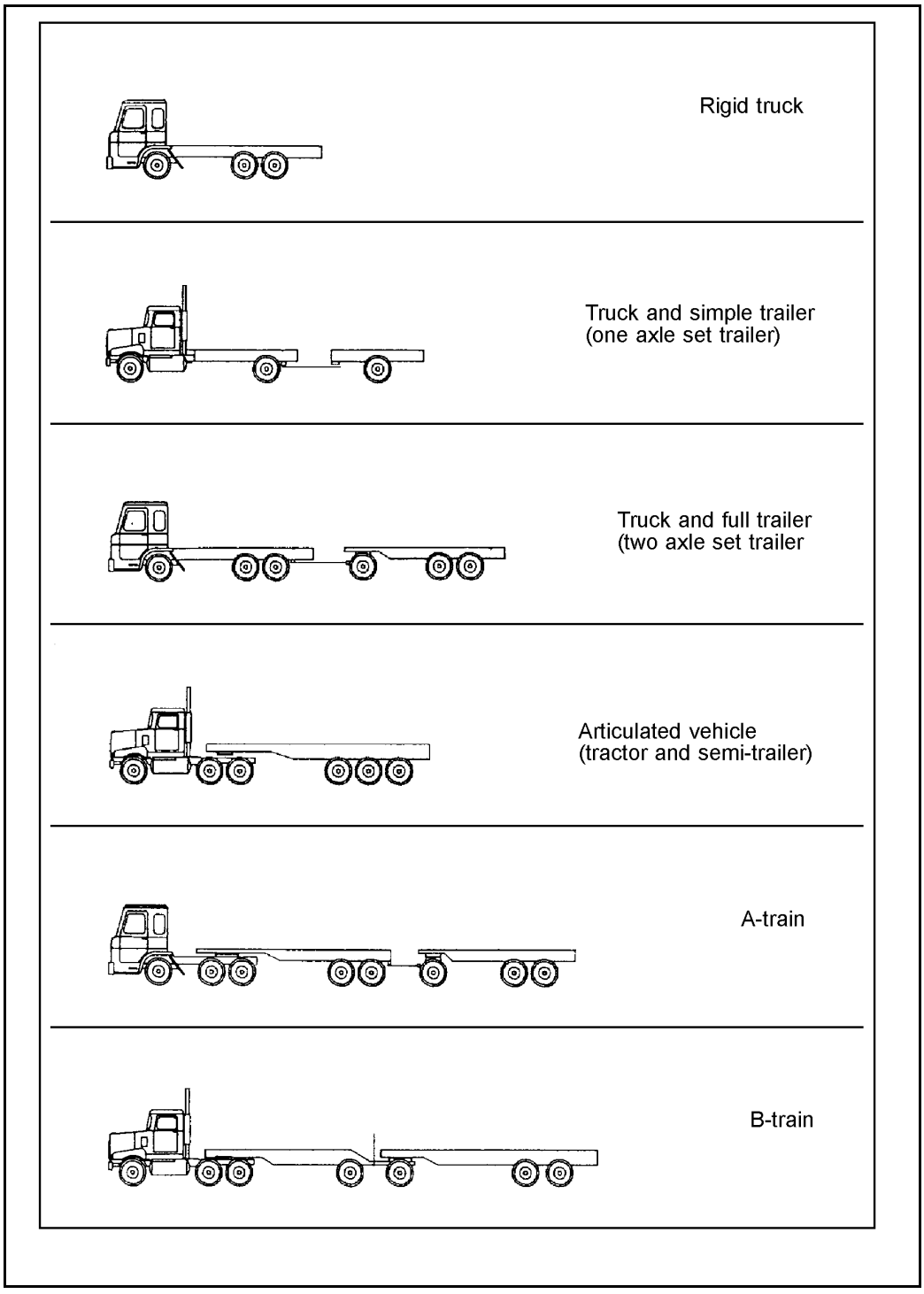


Diagram A3 : Vehicle Types



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APPENDIX B APPROVED ISSUING AUTHORITIES

B1 TRANSIT NEW ZEALAND

B1.1 Approving Engineers

In each of Transit New Zealand's regional offices the regional manager, or a person nominated by him/her, is the Approving Engineer.

Transit New Zealand Regional Office	Approving Engineer (write in)
Auckland	
Hamilton	
Napier	
Wanganui	
Wellington	
Christchurch	
Dunedin	

B1.2 Permit Issuing Officers

In each of the following offices there is a Transit New Zealand nominated Permit Issuing Officer:

Office	Permit Issuing Officer (write in)
TNZ Regional Office AUCKLAND	
TNZ Regional Office HAMILTON	
TNZ Regional Office NAPIER	
TNZ Regional Office WANGANUI	

Office	Permit Issuing Officer (write in)
TNZ Regional Office WELLINGTON TNZ Network Consultant MASTERTON **(write in)** _____ TNZ Network Consultant NELSON **(write in)** _____ TNZ Network Consultant BLENHEIM **(write in)** _____	
TNZ Regional Officer CHRISTCHURCH TNZ Network Consultant WESTPORT **(write in)** _____ TNZ Network Consultant GREYMOUTH **(write in)** _____ TNZ Network Consultant TIMARU **(write in)** _____	
TNZ Regional Office DUNEDIN	

B2. LOCAL AUTHORITIES PARTY TO THE POLICY

Each of the following local authorities is party to the Transit New Zealand Overweight Policy. Each has at least one person nominated as Approving Engineer.

Local Authority	**Approving Engineer (write in)**
Far North District Kaipara District	
Rodney District North Shore City Waitakere City Auckland City Manukau City Papakura District Franklin District	
Thames Coromandel District Hauraki District Waikato District Matamata-Piako District Hamilton City Waipa District South Waikato District Otorohanga District Waitomo District Taupo District	
Western Bay of Plenty District Tauranga District Whakatane District Rotorua District Kawerau District Opotiki District	
Gisborne District	
Hastings District Napier City Central Hawke's Bay District New Plymouth District Stratford District South Taranaki District	

B2. LOCAL AUTHORITIES PARTY TO THE POLICY (Continued)

Local Authority	Approving Engineer (write in)
Ruapehu District Wanganui District Rangitikei District Manawatu District Tararua District Palmerston North City Horowhenua District	
Kapiti Coast District Masterton District Carterton District South Wairarapa District Upper Hutt City Porirua City Lower Hutt City Wellington City	
Nelson City Marlborough District Tasman District	
Kaikoura District Hurunui District Waimakariri District Selwyn District Christchurch City Banks Peninsula District Ashburton District Timaru District Mackenzie District Waimate District	
Buller District Grey District	
Queenstown-Lakes District Central Otago District Waitaki District Dunedin City Clutha District	
Southland District Gore District Invercargill District	

B3. LOCAL AUTHORITIES NOT PARTY TO THE POLICY

The following local authorities are not party to the Transit New Zealand Overweight Policy and issue their own overweight permits:

Whangarei District
Wairoa District
Westland District
Chatham Islands County

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APPENDIX C STANDARD FORMS

The following standard forms are used in the administration of the overweight permit policy. Forms are included in this appendix.

TNZ 803 — Heavy Vehicle Inventory Form

This is used to record information on vehicles that operate under overweight permits.

TNZ 804 — Overweight Permit Application Form

This form is used to record all permit applications.

TNZ 805 — Overweight Permit Form

All permits are issued on this form. This complies with requirements of the Heavy Motor Vehicle Regulations 1974, First Schedule, Form B.

TNZ 806 — Bridge Engineering Supervision Form

This form is used as an attachment to the Overweight Permit Form to record bridge engineering supervision requirements and supervisors.

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TRANSIT NEW ZEALAND ARARAU AOTEAROA

Heavy Vehicle Inventory

HVI No:

Owner:.....	
Depot Location:	
Postal Address:	**Phone:**.....

VEHICLE TYPE (Circle) Transporter/ Mobile Crane/ Mobile Plant/ Other (specify)

DESCRIPTION OF INFORMATION	TRACTOR	DOLLY	TRAILER	TAG AXLE	CRANE
Registration Number					
Make					
Model					
Year					
Number of Axles					
Net Engine Power (kw)					
Pivot Point (m)					
Width (m)					
Deck Height (m)					
Deck Length (m)					
Gooseneck Position (m)					
Gooseneck Height (m)					
Certified Lifting Capacity (tonnes)					
Gross Vehicle Weight (kg) *(from Certificate of Loading)*					
Gross Combination Weight (kg) *(from Certificate of Loading)*					
Total Tare Weight (tonnes)					

Overall Dimensions (metres)	Width:	Height:	Length:

Axle Number	Axle Type	Tyre Size	Tyre Pressure (kPa)	Suspension Type	Track Outer (metres)	Track Inner (metres)	Tare Weight (tonnes)	Axle Spacing (metres)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

COMMENTS:

Signed:

Designation:

Date:

Status: Vehicle checked by TNZ/not checked by TNZ

TNZ 803 Version 310500

Heavy Vehicle Inventory

HVI No:

NOTES ON HEAVY VEHICLE INVENTORY

TNZ 803 Version 310500

Use one form for each combination of tractor, dolly (if used) and trailer. Variations produced by clip-on or tag axles or different king-pin positions are also to be shown on separate forms.

Tractor net engine power - rated engine power of the tractor unit after allowing for ancillaries (1 BHP = 0.75 kW)

Tractor pivot point - see diagram below

Tractor width - distance outside to outside of tyres

Dolly pivot point - see diagram

Dolly width - distance to outside of tyres. If this can be varied, indicate the range of widths

Trailer width - as for dolly width

Trailer deck height - height of the deck above the ground. If this can be varied, indicate the range of heights

Trailer deck length - distance measured from base of gooseneck - see diagram

Trailer gooseneck position - distance from base of gooseneck to centre of leading axle on trailer - see diagram

Trailer gooseneck height - distance from deck of trailer to highest point on gooseneck

Total weight - total tare for transporters - total gross weight for other vehicles

Certified lifting capacity - for cranes only. As certified by an inspection body authorised by regulation under the Health and Safety in Employment Act.

Axle No: - axles are numbered from the front of the vehicle

Axle type - indicate by:
S for single tyred axle
T for twin tyred axle
4 for four tyred oscillating axle
8 for eight tyred oscillating axle

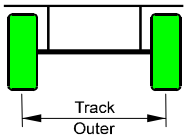
Tyre size -
- state "standard" if smaller than 13.00-24 or 14.00-20
  state tyre code designation for single specified standard tyres (eg 12.00-20)
- state tyre size if equal to or larger than 13.00-24 or 14.00-20.

Suspension type - indicate by:
A for air bag
H for hydraulic
L for leaf spring
B for walking beam (may be in combination with leaf spring)
R for wire rope
O for other
plus: D if on driving axle

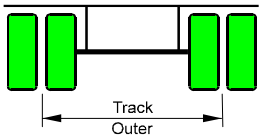
Axle tare - for vehicle in operating condition ie with full fuel tank and normal running gear. For air bag axles, the value required is the tare at zero bag pressure.

Comments - Insert VAI, VGI and state if jib or counterweights are removed from a crane, etc.

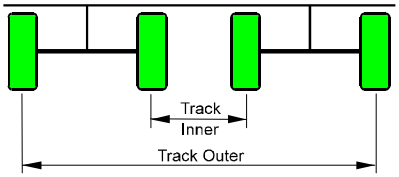
WHEEL TRACKS



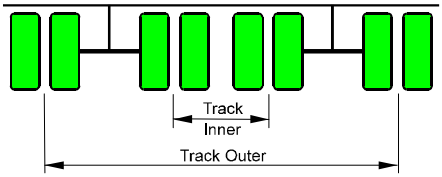
(a) SINGLE-TYRED AXLE



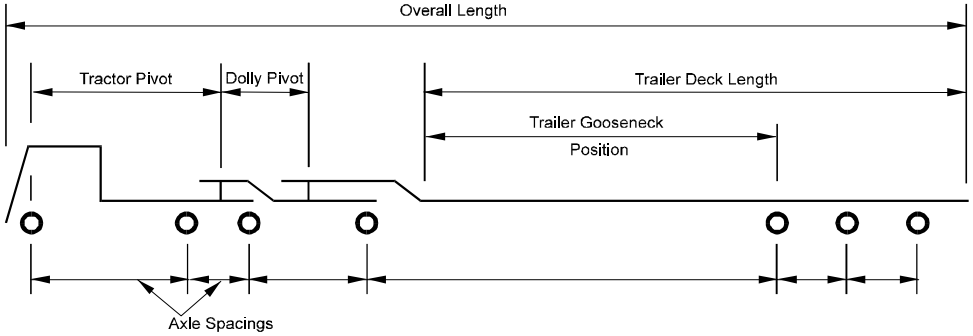
(a) TWIN-TYRED AXLE



(c) FOUR-TYRED AXLE



(c) EIGHT-TYRED AXLE



TRANSIT NEW ZEALAND ARARAU AOTEAROA

PERMIT No .....

Overweight Permit Application

From Vehicle Owner . . . . . To ..... (road controlling authority)

Postal Address .....

Contact . . . . . Tel . . . . . Fax.....

Date of Application . . . . . (written/telephoned) Date Permit Required .....

Vehicle Type (circle) - Transporter/Mobile Crane/Motor Scraper/Dump Truck/Other TNZ 803 HVI No .....

(specify other type) .....

Make . . . . . Model . . . . . Net Engine Power ..... kW

Reg Nos .....

Vehicle Tare Weight . . . . . tonnes Certified Lifting Capacity (mobile crane) .....tonnes

Gross Vehicle Weight or Weights (from certificate of loading) . . . . . tonnes

Gross Combination Weight or Weights (from certificate of loading) . . . . . tonnes

Is the vehicle brake coded or does it meet the Interim Brake Specification (for vehicles carrying ISO containers)? Yes/No

Trip Type (circle) - Single/Multiple (. . . . . trips)/Continuous/Area On/Between (dates) . . . . . To . . . . . .

To Transport (description of load) .....

…….. Payload Weight .....tonnes

From ……To.....

Route Description .....

.....

Overall Dimensions (Vehicle + Payload) in metres :

Width . . . . . Height . . . . . Length .....

Width outside to outside of tyres . . . . . Height above road, at maximum width .....

Gross Weight (Vehicle + Payload) . . . . . tonnes

Axle Number	1	2	3	4	5	6	7	8	9
Axle Type *									
Axle Weight (000 kg)									
Axle Spacing (m)									
Tyre Size									
Additional Information:									
Suspension Type *									
Track Outer (m)									
Track Inner (m)									

* See notes on back of this form.

FOR OFFICE USE ONLY

Processing: Manual/Computer VAI . . . . . VGI . . . . . VCF. . . . . .

Bridge Engineering Supervision on Class . . . . . Bridges and Grade..... Decks

Comments.....

Permit Issued/Refused Signed .....

TNZ 804 June 2001

Notes:

Axle type - indicate by:	S	for single tyred axle
	T	for twin-tyred axle
	4	for four tyred oscillating axle
	8	for eight tyred oscillating axle
Suspension type - indicate by:	A	for air bag
	B	for walking beam (may be in combination with leaf spring)
	H	H for hydraulic
	R	for wire rope
	L	for leaf spring
	O	for other
plus:	D	if on driving axle

TNZ 804 June 2001

TRANSIT NEW ZEALAND
ARARAU AOTEAROA

PERMIT No. ##/##/#/###/#

Permit Given Under Heavy Motor Vehicle Regulations 1974

Pursuant to the Heavy Motor Vehicle Regulations 1974

is hereby authorised to use (vehicle description):

Registered N°(s):

for **Single/Return/Multiple** trip(s) on/between (dates):

to transport (description of load) :

from: to :

over the following route, subject to the conditions, restrictions, and maximum weights in this permit.

ROUTE AND SPECIAL INSTRUCTIONS:

MAXIMUM WEIGHTS ALLOWED:

1.

The Gross Weight of the vehicle with the load shall not exceed : ??.?? (Tonnes) VAI : ?.??

Axle Number	1	2	3	4	5	6	7	8	9	10	11
Axle Type *											
Axle Weight (Tonnes)											
Spacing from previous Axle (m)											
Tyre Size											

* S=Single tyred axle, T=Twin tyred axle, 4=Four tyred oscillating axle, 8=Eight tyred oscillating axle.

2. The total weight on any group of axles shall not exceed the sum of the weights shown for those axles in the table above.

CONDITIONS:

1. This permit shall be rendered void and of no effect if any of its conditions are broken or if the permit is altered or mutilated without authority.
2. This permit shall be carried on the vehicle, and shall be surrendered for inspection on the demand of any police officer, or any authorised agent of Transit New Zealand or road controlling authority.
3. The general conditions on the reverse of this form shall apply together with any other conditions on attached sheets.

Authorised Issuing Officer

..... (Signature)

(Name)

Permit Issuing Officer (Designation)

(for) Transit New Zealand (Controlling Authority)

(Location)

(Date)

TNZ 805 Version 4 - November 2000

PERMIT No. ##/##/#/###/#

General Conditions:

3.1 *Tyres* - Tyres shall be operated at the pressures recommended by either the manufacturer or the Tyre and Rim Associations but not exceeding the maximum pressures stated in the Heavy Motor Vehicle Regulations.
Tyre sizes shall be as indicated in the "Maximum Weights Allowed" Clause of this permit.

3.2 *Travel Speed* - The speed of the vehicle whilst under this permit shall not exceed ….. km/h, or the legal limit posted for the road, or that speed listed for crossing bridges on the attached form TNZ 806, whichever is the least speed applicable to that section of the route.

3.3 *Separate Plant* - The carriage or towing of separate items of plant, equipment or materials not specifically nominated in the description of load shall not be permitted.

3.4 *Motorways* - The vehicle operating under this permit shall not travel on declared motorways unless specifically authorised to do so in the route instructions. Note: Declared motorways are marked by a sign at their beginning and end and all motorway signs have green backgrounds.

3.5 *Weight* - The weight of any axle shall not exceed the weight specified in the "Maximum Weights Allowed" Clause of this permit. The gross weight of the vehicle or combination of vehicles shall not exceed the limit specified on the current certificate of loading.

3.6 *Over-Dimensioned* - Where the vehicle and/or load is also over-dimensioned a separate permit for the excess dimensions shall be obtained from the appropriate authority. This is Transport Registry Centre (TRC), Palmerston North.

3.7 *Railway Level Crossings* - A separate permit shall be obtained from Tranz Rail/Rail Controlling Authority for crossing of railway level crossings.

3.8 *Authorised Agent* - The vehicle shall not be operated on a road or bridge under this permit when in the opinion of an authorised agent of the road controlling authority, as communicated to the operator, it would be contrary to public interest to do so.

3.9 *Non Transferable* - This permit is not transferable either to other users of or to any vehicle other than the vehicle described by this permit.

3.10 *Indemnity* - Notwithstanding the issue of this permit, neither Transit New Zealand nor any Local Authority warrant that any road or bridge or other structure thereon is capable of safely carrying the vehicle loaded or unloaded. In the event that any such road or bridge or other structure failing under the load of the vehicle, the user to whom this permit is issued shall indemnify Transit New Zealand and the Local Authorities against any claim for damages, compensation, costs and expenses in respect of injury or death to persons, or damage to third party property arising therefrom.

3.11 *Weighing* - Police are authorised to divert vehicles up to five kilometres for the purpose of weighing, provided under strength bridges are not included on the route.

3.12 *Bridge Supervision* - Special conditions of this permit relating to bridge supervision shall be in accordance with those on the attached TNZ 806 form. The vehicle described under this permit shall rendezvous with the agent (s) for any required engineering supervision at those places nominated with the agent details. Where no specific rendezvous is nominated the vehicle is to meet the agent at a location where it is safe to stop immediately before the first bridge named for supervision by that agent.

3.13 *Special Conditions* -

Note: This permit is an exemption from the weight limits set out in the Heavy Motor Vehicle Regulations 1974 and does not authorise the user to exceed the exemption so permitted or exempt the user from complying with all other acts, regulations and other laws (including those relating to certificate of loading and road user charges). Breaches of the conditions of the permit will be an offence in the terms of the Transport Act 1962.

Fees Payable:

Permit Issuing Fee	**$**	-
Bridge Supervision Fee (0 Trips)	**$**	-
Total Fee	**$**	-
GST	**$**	-
Total	**$**	-

TNZ 805 Version 4 - November 2000

PERMIT No. ##/##/#/###/#

Special Conditions: Bridge Engineering Supervision

1. Engineering supervision of bridges is required during the trip authorised by this permit. For this purpose the user to whom this permit is issued shall contact the agents of the road controlling authorities nominated below at least **24 hours** in advance of the bridge crossing and arrange to meet the supervisor.

   The vehicle and its load shall be operated in strict accordance with all instructions given by the supervisor and it shall not proceed past the arranged meeting place without being instructed to do so by the supervisor.

   Note: (a) A police officer, unless specifically authorised by the road controlling authority, is not empowered to carry out bridge engineering supervision

   (b) If the operator fails to rendezvous within one hour of the time arranged and the supervised crossing(s) is/are postponed or cancelled, a fee of $40 will be charged (the equivalent of one supervised crossing).

2. Agents are:

Bridge No's:	Agents:	Telephone:

3. Bridges requiring engineering supervision are:

Bridge No.	State Highway	Route Position	Bridge Name	Speed*	Position*	Risk to Other Vehicles*	Initials

*See the next page

4. The user to whom this permit is issued shall contact the police at least two working days in advance of the crossing of any bridge in the above list where "police control" is indicated and make arrangements for a police officer to be present to control other traffic during the supervised crossing.

5. Bridge Engineering Self Supervision is permitted only for the bridge listed and the person named in condition 2 above.

Authorised Issuing Officer . . . .

TNZ 806 Version 3 - November 2000

PERMIT No. ##/##/#/###/#

Bridge Engineering Supervision Requirements

A. SPEED

The speed of the overweight vehicle shall not exceed the value shown while on the bridge.

B. POSITION

The vehicle shall travel in the left hand lane on all bridges except those for which alternative bridge engineering supervision instructions are specifically provided in this permit.

Own Lane - the overweight vehicle shall travel in its own lane as far as is practicable.

Offset - the overweight vehicle shall travel so that its centre is at the indicated distance from the kerb on the left of the vehicle.

Central - the overweight vehicle shall travel on that part of the bridge most favourable to the structure. This shall be:

(i) central on the beam system for bridges with beams and concrete decks;
(ii) central between kerbs for slab bridges;
(ii) approximately central on the beam system but with wheels as near as possible over the beams for bridges with timber decks.

Opposite Bridge - the overweight vehicle shall use the bridge for the opposing traffic direction.

Ford or Bypass - the overweight vehicle **shall not cross the bridge** but use the adjacent ford or bypass.

C. TRAFFIC CONTROL

Other heavy vehicles proceeding in the same direction shall be spaced at least 30 metres from the overweight vehicle while it is on the bridge. Cars may be closer if necessary.

Where "offset", "central" or "opposite bridge" is indicated for position, traffic travelling in the opposing direction shall be prevented from crossing the bridge while the overweight vehicle is on it.

Traffic control at bridge crossings shall be in accordance with the "Code of Practice for traffic control at bridges being crossed by overweight vehicles"

Traffic control requirements:

Risk to other vehicles	Traffic control requirements
Not significant	None required
Low	Overweight vehicle to have revolving amber light visible from the rear together with rear facing retro-reflective hazard panels
High	Provide qualified Traffic Controllers or C Grade Pilots using approved industry procedures

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APPENDIX D VEHICLE PARAMETER CALCULATIONS

D1 VEHICLE AXLE INDEX (VAI)

D1.1 Axle Groups

Transit New Zealand'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.

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

D1.2 Reference Axle Weight

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

In general terms the reference axle weight is equivalent to the legal axle weight limit. (Refer section 2.1).

Tables R1, R2, R3 and R4 list reference axle weights for various axle types and spacings.

D1.3 Axle Index (AI)

The AI for an axle is:

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

The vehicle axle index (VAI) for a vehicle is the maximum AI, considering all axles, for that vehicle.

The VAI is an indicator of the extent to which axles of a particular vehicle are loaded. Which in turn indicates the effect of those axle weights on pavements and bridge decks.

D1.4 Types of Tyres

This manual covers the following four types of tyres:

Tyre Type	Description
Standard	• Any tyre smaller than: 330 mm or 13 inches (tyre section width) × 24 inches (bead seat diameter), or 355 mm or 14 inches × 19.5 inches • Legal status • **Only** standard tyres are used on twin-tyred axles and on oscillating axles
Large	• Any tyre not a standard tyre • Legal status • Tyre designation listed in Table R2 • Currently only used on mobile plant, including cranes
Specified Standard	• Standard tyres with their tyre designation listed in Table R3 • Specified by TNZ for use in vehicle parameter calculations They have larger footprint areas, and hence higher reference axle weights, than standard tyres • No legal status (legally standard tyres)
Small Standard	• Standard tyres with their tyre designation listed in Table R4 • Specified by TNZ for use in vehicle parameter calculations They have smaller footprint areas, and hence lower reference axle weights, than standard tyres • No legal status (legally standard tyres)

D1.5 Types of Axles

This manual covers the following five types of axles. These axles are defined in Appendix A and shown diagrammatically in Diagram A1:

Axle Type	Represented
Single standard-tyred	S
Single large-tyred	SL
Twin-tyred	T
Four-tyred oscillating	(4)
Eight-tyred oscillating	(8)

D1.6 Calculation of VAI

To calculate the VAI for a particular vehicle:

- Obtain for the vehicle:
  - axle types
  - axle spacings
  - axle weights
- For each axle determine the number of axles in its axle group.
- For each axle determine its reference axle weight from the tables as follows:

Axle Type	Table
Standard-tyred	R1
* Single large-tyred spaced	R2
* Large-tyred **other** than single-tyred spaced	$\frac{R1 \times R2}{y}$
* Single specified standard-tyred spaced	R3
* Specified standard-tyred **other** than single-tyred spaced	$\frac{R1 \times R3}{y}$
Twin small standard-tyred spaced	R4
Twin small standard-tyred in a group	$\frac{R1 \times R4}{8.2}$
Where y = 5.4 for single-tyred axles 6.7 for twin-tyred axles	

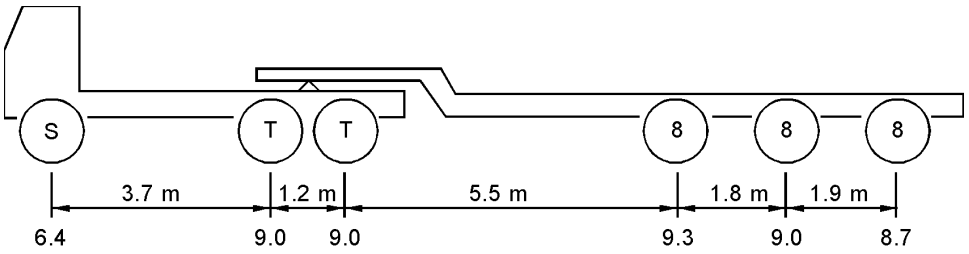
* Currently only mobile plant (including cranes) use specified standard tyres and large tyres.

- Calculate for each axle its AI from

$$AI = \frac{\text{axle weight}}{\text{reference axle weight}}$$

- Determine the VAI for the vehicle, this is the maximum AI for the vehicle.

Example: Calculate the VAI for the transporter with the axle types, axle spacings and axle weights (1000 kg) shown below.

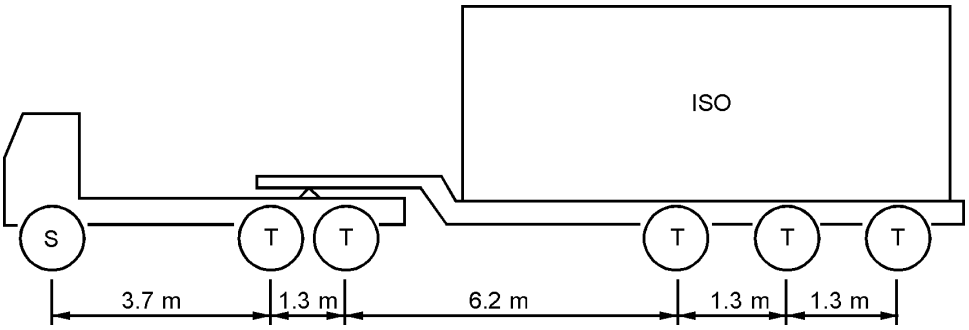


All axles have standard tyres

Reference Weights (Table R1)	5.4	7.3	7.3	10.1	10.1	10.4
	6.4	9.0	9.0	9.3	9.0	8.7
A1 Values	5.4	7.3	7.3	10.1	10.1	10.4
	=1.19	=1.23	=1.23	= 0.92	=0.89	= 0.84

VAI = 1.23

Example: Calculate the axle weights permitted for the articulated vehicle carrying an ISO container with the axle types and spacings shown below.



Axles 1-3 on the tractor have standard tyres. Axles 4-6 on the semi-trailer have 235/75R17.5 small tyres.

Reference Weights for Standard Tyres (Table R1)	5.4	7.4	7.4	6.3	6.3	6.3

Reference weight for spaced axles with 235/75R17.5 tyres = 7.8 (Table R4)
∴Compute $\frac{6.3 \times 7.8}{8.2}$ for axles 4-6 and then apply VAI limit of 1.10 to all axles

Final Reference Weights	5.4	7.4	7.4	6.0	6.0	6.0
Axle Weights permitted (tonnes)	6.0	8.1	8.1	6.6	6.6	6.6

Example: Calculate the VAI for the mobile crane with the axle types, axle spacings and axle weights shown below.

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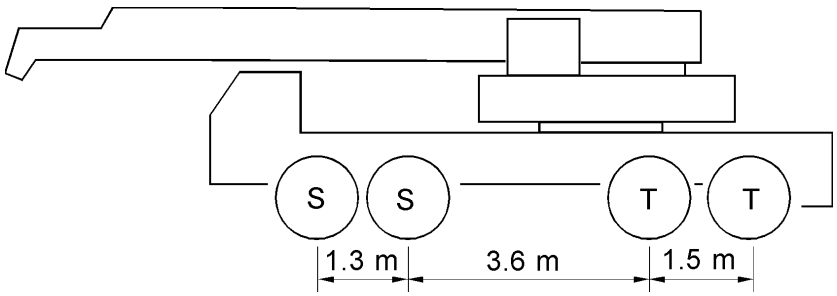


Proposed Axle Weights (1000 kg)	8.58	8.58	10.90	10.90

All axles have 12.00-20 tyres:

Reference Weights for Standard Tyres (Table R1)	4.9	4.9	7.5	7.5

Reference weight for spaced axles with 12.00-20 tyres = 6.9 (Table R3)
∴ Multiply by 6.9 for the front axles and by 6.9 for the rear axles
5.4 6.7

Final Reference Weights	6.26	6.26	7.72	7.72
AI Values	8.58 / 6.26	8.58 / 6.26	10.90 / 7.72	10.90 / 7.72
	= 1.37	= 1.37	= 1.41	= 1.41

VAI = 1.41

Table R1 : Reference Axle Weights for Standard-Tyred Axles

No of Axles in Group	Distance to Nearest Axle (m)	Reference Axle Weight (1000kg) Axle Type			
		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
2	1.1 or more	4.8	7.3	8.5	10.5
2	1.2 or more	4.8	7.3	8.5	10.5
2	1.3 or more	4.9	7.4	8.5	10.6
2	1.4 or more	4.9	7.4	8.6	10.7
2	1.5 or more	4.9	7.5	8.7	10.8
2	1.6 or more	5.0	7.5	8.7	10.8
2	1.7 or more	5.0	7.6	8.8	10.9
2	1.8 or more	5.1	7.7	8.9	11.0
2	1.9 or more	5.1	7.8	9.0	11.2
2	2.0 or more	5.2	7.8	9.1	11.3
2	2.1 or more	5.2	7.9	9.2	11.4
2	2.2 or more	5.3	8.0	9.3	11.5
2	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
3	1.1 or more	4.1	6.2	7.2	8.9
3	1.2 or more	4.1	6.3	7.3	9.0
3	1.3 or more	4.2	6.3	7.4	9.1
3	1.4 or more	4.3	6.5	7.5	9.3
3	1.5 or more	4.3	6.6	7.6	9.5
3	1.6 or more	4.4	6.7	7.8	9.7
3	1.7 or more	4.5	6.9	8.0	9.9
3	1.8 or more	4.6	7.0	8.1	10.1
3	1.9 or more	4.7	7.2	8.3	10.4
3	2.0 or more	4.9	7.4	8.6	10.6
3	2.1 or more	5.0	7.6	8.8	10.9
3	2.2 or more	5.1	7.8	9.0	11.2
3	2.3 or more	5.3	8.0	9.2	11.5
4 or more	1.0 or more	3.8	5.8	6.8	8.4
4 or more	1.1 or more	3.9	5.9	6.8	8.5
4 or more	1.2 or more	3.9	6.0	6.9	8.6
4 or more	1.3 or more	4.0	6.1	7.0	8.7
4 or more	1.4 or more	4.1	6.2	7.2	8.9
4 or more	1.5 or more	4.2	6.3	7.3	9.1
4 or more	1.6 or more	4.3	6.5	7.5	9.4
4 or more	1.7 or more	4.4	6.7	7.7	9.6
4 or more	1.8 or more	4.5	6.9	7.9	9.9
4 or more	1.9 or more	4.6	7.1	8.2	10.2
4 or more	2.0 or more	4.8	7.3	8.4	10.5
4 or more	2.1 or more	4.9	7.5	8.7	10.8
4 or more	2.2 or more	5.1	7.7	8.9	11.1
4 or more	2.3 or more	5.2	8.0	9.2	11.4

Table R2 : Reference Axle Weights, Large Tyres
(a) Single Large-Tyred Axles spaced at 2.4 metres or more

Tyre Size	Reference Axle Weight (1000kg)
13.00-24	7.3
13.00-25	7.3
14.00-20	7.6
14.00-21	7.6
14.00-24	7.8
14.00-25	7.9
14.75-20 (13.00-20 Pilote)	7.5
15.00-22.5	7.2
15.50-25	8.2
16.00-20	8.2
16.00-21	8.4
16.00-24	8.6
16.00-25	8.8
16.50-22.5	7.8
17.50-25	8.5
18.00-22.5	7.9
18.00-24	9.5
18.00-25	9.5
18.00-33	10.0
18.00-49	10.5
20.50-25	9.5
21.00-24	10.6
21.00-25	10.6
21.00-29	11.3
21.00-35	11.3
21.00-49	12.3

Tyre Size	Reference Axle Weight (1000kg)
23.50-25	10.5
24.00-25	12.3
24.00-29	12.3
24.00-35	12.7
24.00-43	13.7
24.00-49	13.8
26.50-25	11.3
26.50-29	12.0
27.00-33	14.1
27.00-49	14.9
29.50-25	12.9
29.50-29	13.2
29.50-33	13.5
29.50-35	13.8
30.00-33	14.9
30.00-39	14.9
30.00-51	14.9
33.25-35	14.5
33.50-33	14.9
33.50-39	14.9
36.00-51	14.9
37.25-35	14.9
37.50-33	14.9
37.50-39	14.9
37.50-51	14.9

Table R2: Reference Axle Weights, Large Tyres (continued)
(b) Recent Additional Large Tyred Axles spaced at 2.4 metres or more

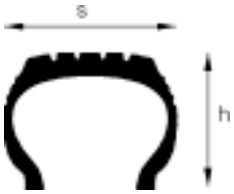
Actual Tyre Size	Equivalent Tyre Size	Reference Load (Tonnes)	Contact Area (Sq Cms)
350/75 R 22.5	–	6.9	645
12.00 R 24	–	7.0	645
14.00 R 22.5	–	7.0	650
385/65 R 22.5	15 R 22.5	7.2	710
Trellborg 17.50/65 R 20	14.75 R 20	7.5	840
14.75/80 R 20 (13.00 R 20 Pilote)	–	7.5	850
15.50/80 R 20 (G20 Pilote)	–	7.6	860
425/65 R 22.5	16.5 R 22.5	7.8	968
445/65 R 22.5	18.00 R 22.5	7.9	1030
Bridgestone 13.00 R 20	–	8.0	1090
Bridgestone 385/95 R25	15.50 R25	8.2	1125
Michelin 445/80 R25 XHC TL	17.5 R25	8.5	1270
Trellborg 500/60 R 22.5	16.00 R 25	8.8	1420
Trellborg 500/60 R 26.5	16.00 R 25	8.8	1420
Bridgestone 550/60 R 22.5	16.00 R 25	8.8	1420
600/55 R 26.5	18.00 R 25	9.5	1740
Trellborg 700/50 R 26.5	18.00 R 25	9.5	1740
22/65 R 25	18.00 R 25	9.6	1740
Goodyear 20.8 R42 DT710	21.00 R 35	11.2	2570
800/65 R 32	29.50 R 33	13.5	3740
Michelin 30.5 LR32 BIBX	29.50 R 33	13.5	3740
33.25 R 29	-	14.0	4200

Table R3 : Reference Axle Weights for Single Specified Standard-Tyred Axles spaced at 2.4 metres or more

This table applies to mobile plant (including cranes) and accompanying towed trailers which use specified standard tyres.

* Tyre Designation	Reference Axle Weight (1000 kg)	Contact Area (Sq Cms)
13/80 R20	6.5	550
12.00-20	6.9	580
12.00 R20	6.9	580
12.00 R 22.5	6.9	590
14/80 R20	7.0	610
F20 Pilote	7.0	610
365/80 R 20	7.0	610

* 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 would not be included in the tyre marking, for example, 12.00 R20.

Table R4 : Reference Axle Weights for Twin Small Standard-Tyred Axles spaced at 2.4 metres or more

This table applies to articulated vehicles fitted with small tyres and involved with the movement of ISO containers. See example on page D-4.

Tyre Designation	Reference Axle Weight (1000 kg)	Contact Area (Sq Cms)
235/75 R17.5	7.8	300
10 R17.5	7.8	310

D2 VEHICLE GROSS INDEX (VGI)

D2.1 Reference Gross Weight

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

In general terms the reference gross weight is equivalent to the legal weight limits, although this is less true since the legal gross weight limits were raised in 1988. (Refer section 2.1.4).

Table R5 lists reference gross weights for various wheelbases.

D2.2 Gross Index (GI)

The GI for a grouping of axles is:

$$GI = \frac{\text{Sum of the axle weights for the grouping}}{\text{Reference gross weight for the grouping wheel base}}$$

The vehicle gross index (VGI) is the maximum gross index for a vehicle.

The wheelbase giving the VGI is termed the **critical wheelbase**.

The VGI is an indicator of the effect of the gross weight(s) of a vehicle on bridges, in particular the main structural members. (Refer section D5).

It should be noted that axle types are not relevant (have no effect) on VGI.

D2.3 Calculation of VGI

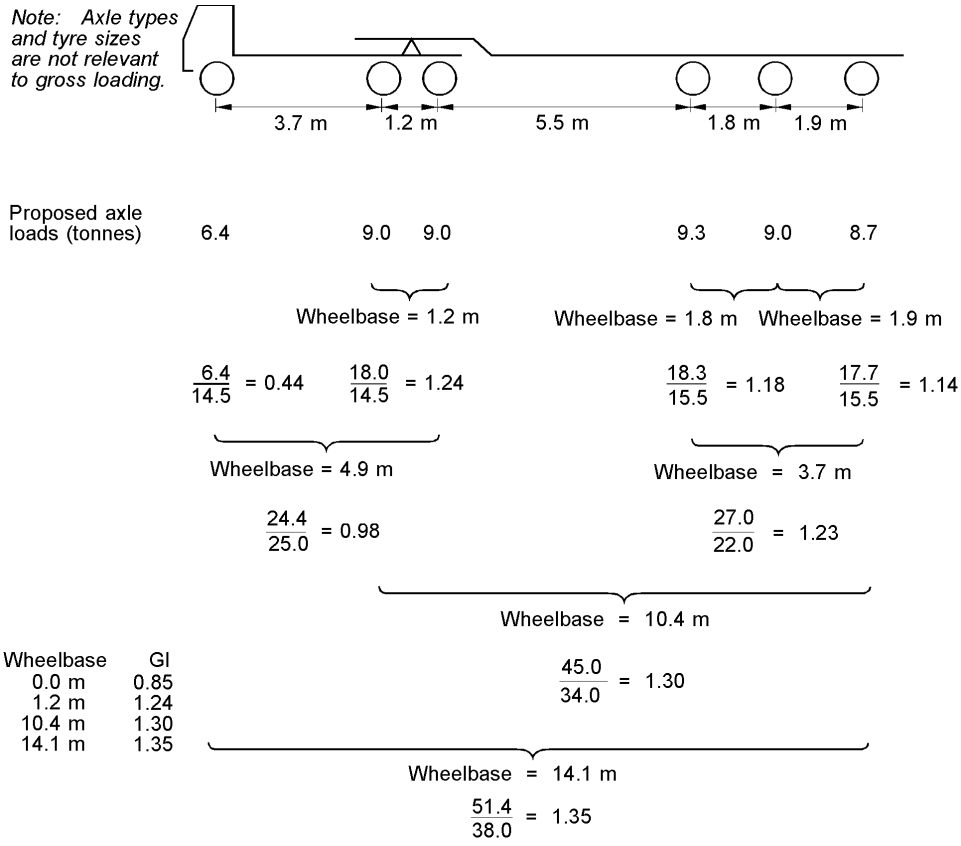
To calculate the VGI and critical wheelbase for a particular vehicle:

- Obtain for the vehicle:
  - axle weights
  - axle spacings
- For the heaviest loaded individual axle and for each grouping of axles:
  - sum the axle weights
  - sum the axle spacings to get the wheelbase
  - from Table R5 get the reference gross weight
  - calculate the $GI = \frac{\text{sum of axle weights}}{\text{reference gross weight}}$

- Determine the VGI for the vehicle, this is the maximum GI for the vehicle.

- Determine the critical wheelbase, this is the wheelbase giving the VGI.

Example: Calculate the VGI and the critical wheelbase for the transporter with the axle weights and axle spacings shown below.

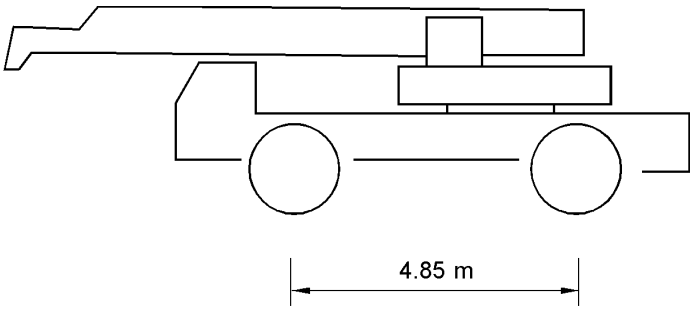


Heaviest loaded individual axle, wheelbase 0.0 m = 9.3/11.0 = 0.85

VGI = 1.35 at a critical wheelbase of 14.1 metres.

Example: Calculate the VGI and the critical wheelbase for the mobile crane with the axle weights and axle spacings shown below.

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 = 1.14 at a critical wheelbase of 0.0 metres.

Table R5 : Reference Gross Weights

Wheelbase (metres)	Reference Gross Weight (1000kg)
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

Wheelbase (metres)	Reference Gross Weight (1000kg)
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
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

D3 PAVEMENT LOADING RATIO (PLR)

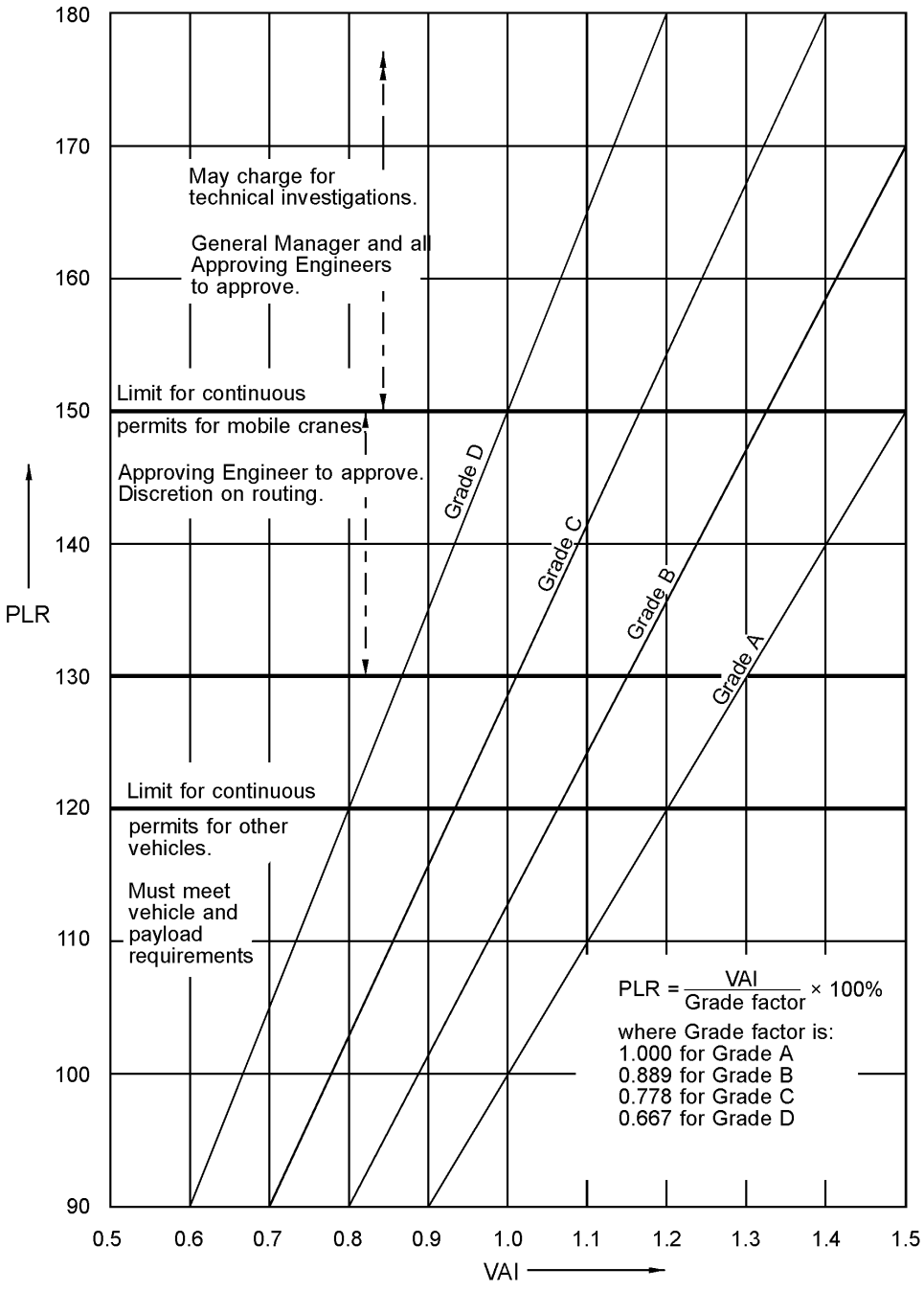
The PLR is used to control the loading on pavements according to the pavement strength. Using the VAI from section D1, the PLR is given by:

$$PLR = \frac{VAI}{\text{Pavement Grade Factor}} \times 100\%$$

where the Pavement Grade Factor is:

1.000 for Grade A pavements;
0.889 for Grade B pavements;
0.778 for Grade C pavements;
0.667 for Grade D pavements.

The graph on the following page represents the above PLR formula graphically.



Graph L1: Pavement Loading

D4DECK LOADING RATIO (DLR)

The DLR is used as a first check on bridge decks.

Using the VAI from section D1 the DLR is given by:

$$\text{DLR} = \frac{\text{VAI}}{\text{Deck Grade Factor}} \times 100\%$$

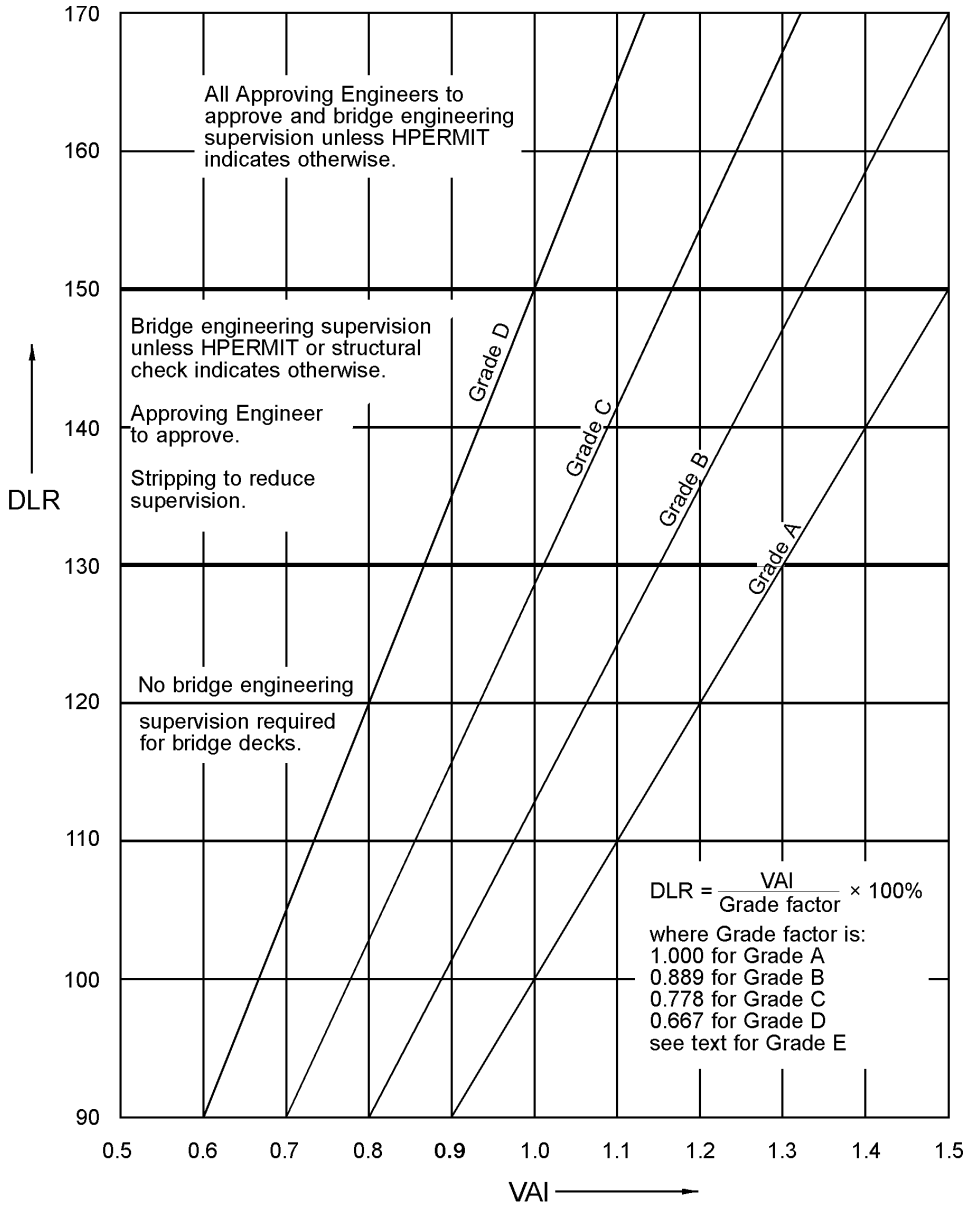
where the Deck Grade Factor is:

1.000 for Grade A decks;
0.889 for Grade B decks;
0.778 for Grade C decks;
0.667 for Grade D decks.

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

If the Deck Capacity Factor (DCF) is available from TOPS system, this should be used in place of the above Deck Grade Factor for more accurate determination of the DLR.

The graph on the following page represents the above DLR formula graphically.



Graph L2 : Deck Loading

Note: TOPS replaced HPERMIT as the computer based permit checking system in 1999

D5 BRIDGE LOADING RATIO (BLR)

The BLR is used as a first check in determining the conditions under which an overweight vehicle can cross a particular bridge as far as the main structural members are concerned.

The BLR is calculated as follows:

(a) If the length of the critical span for the bridge is unknown or is greater than the critical wheelbase determined in section D2, then:

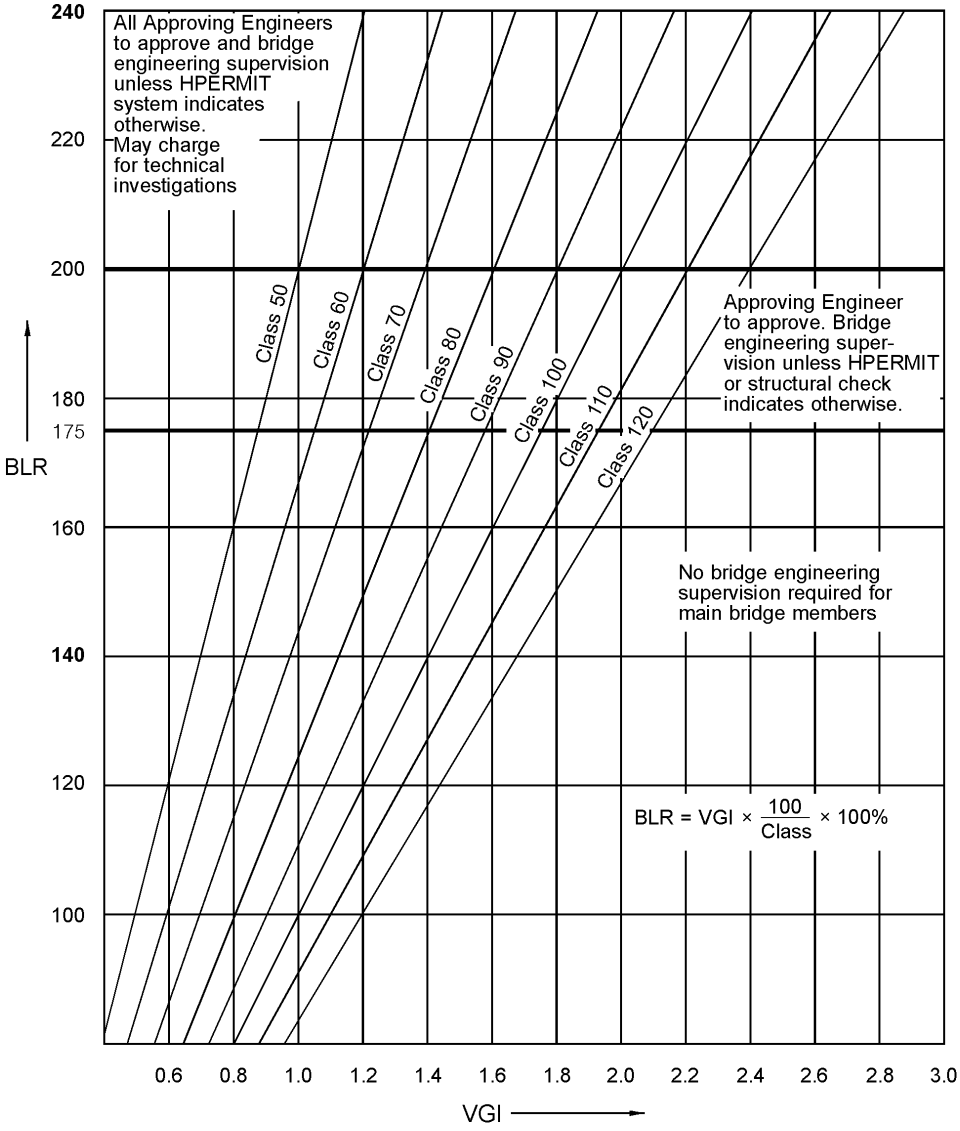
$$BLR = VGI \times \frac{100}{\text{Bridge Class}} \times 100\%$$

(b) Otherwise:

$$BLR = GI \times \frac{100}{\text{Bridge Class}} \times 100\%$$

where GI is the maximum GI for a wheelbase shorter than the critical span.

The graph on the following page represents the above BLR formulae graphically.



Graph L3: Bridge Loading

Note: TOPS replaced HPERMIT as the computer based permit checking system in 1999

D6 TRACTION LIMITS (MGC)

The Maximum Allowable Gradient for Combination (MGC) indicates whether a vehicle combination will be able to develop sufficient traction to prevent damage to the pavement surface by wheel slip.

The MGC for a particular vehicle combination is:

$$\text{MGC} = \frac{(\text{TFC} \times \text{Drive Axle Weight} \times 100}{\text{Total Weight}} - 2$$

where:

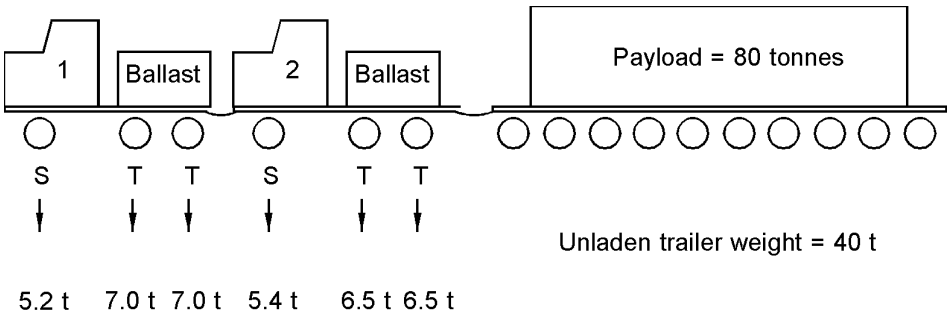
- TFC (traction friction coefficient) is:
  - 0.6 for chipseal surfacing
  - 0.8 for asphaltic concrete surfacing.
- Total Weight is the weight of the whole combination, in tonnes. It includes weights of prime movers, ballast, trailer and payload.
- Drive Axle Weight is the sum of the axle weights of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

Example: Calculate the MGC for the vehicle combination with two ballasted prime movers shown below.

Payload = 80 tonnes

Prime mover 1 :	weight on steering axle	= 5.2 tonnes
	weight on driving axles	= 7.0 tonnes
Prime mover 2 :	weight on steering axle	= 5.4 tonnes
	weight on driving axles	= 6.5 tonnes
Ten axle trailer :	weight of unladen trailer	= 40 tonnes

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



Total Weight =	[5.2 + (2x7.0)]	+	[5.4 + (2x6.5)]	+	[40]	+	[80]
	Sum of prime mover 1 axle weights	+	Sum of prime mover 2 axle weights	+	weight of unladen trailer	+	payload weight

= 157.6 tonnes

Drive axle weight = $2 \times 7.0 + 2 \times 6.5$
= 27.0 tonnes

TFC = 0.6 for chipseal pavements

$$\text{MGC} = \frac{(\text{TFC} \times \text{Drive Axle Weight} \times 100}{\text{Total Weight}} - 2$$

$$= \frac{0.6 \times 27.0 \times 100}{157.6} - 2$$

= 8.28%

This is greater than the maximum uphill gradient on the route, 8%, so the prime movers will be able to develop sufficient traction to shift the load without damaging the pavement. If this application complies with the other requirements of this Policy a permit may be issued.